

Organic Gas Speciation Profile for E10 Summer Liquid Gasoline (OG690)

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1 Introduction

The current CARB organic gas speciation profile for liquid gasoline is OG660 (Liquid Gasoline 1996 SSD Ethanol 2.0% Oxygen, MTBE phased out) [1]. This profile was created by adjusting the CARB composite profile for California Reformulated Gasoline (CaRFG) blended with 11% vol MTBE for ethanol-containing gasoline fuel in 1999 [2]. It is widely used for categories of on-road gasoline vehicle hot soak and running loss evaporative, and spillage of vehicle refueling at gasoline dispensing facilities.

The profile of OG660 was made specifically for E6 gasoline fuel (i.e. 6% vol ethanol, or 2.0% wt oxygen). E6 gasoline completely replaced the MTBE-containing gasoline since 2004, but the ethanol content started to increase in 2009. From 2010, all commercial gasoline fuels contain 10% vol ethanol (i.e. 3.5% wt oxygen), which is called E10. Therefore, it is necessary to create a profile for E10 fuel and use it to replace the current E6 profile for the related emission categories for 2010 and later years.

Four regular grade E10 summer gasoline samples were collected at different gas stations in the LA area by CARB MSCD and ED personnel in September 2010 and June 2011. Detailed hydrocarbon analyses (DHA) of fuel samples were performed at Southwest Research Institute (San Antonio, TX) and oxygenate analyses were conducted in the Fuel Analysis and Method Evaluation Section (FAMES)'s fuel lab in the Haagen-Smit Laboratory of CARB in El Monte, CA. Based on the test results, a new speciation profile OG690 was developed for regular grade E10 summer liquid gasoline fuel in this work.

2 Methodology

In the DHA tests, over two hundred hydrocarbon compounds were detected in the liquid fuel samples by using ASTM6729 (*Standard Test Method for Determination of Individual Components in Spark Ignition Engine Fuels by 100 Meter Capillary High Resolution Gas Chromatography*). Because this method is focused on hydrocarbon analysis, oxygenates in the samples were quantified separately in CARB's fuel lab using ASTM D4815 (*Standard Test Method for Determination of MTBE, ETBE, TAME, DIPE, tertiary-Amyl Alcohol and C₁ to C₄ Alcohols in Gasoline by Gas Chromatography*). The new profile OG690 is made by averaging the test results of four fuel samples. Among the 224 species identified in OG690, nine of them are not included in the existing CARB core chemical database--CEIDARS POLLUTANT table. Thus, new CARB SAROAD codes are generated for these nine species as follows (Table 1):

Table 1. New CARB SAROAD codes to be added to the CEIDARS POLLUTANT table

<i>CARB SAROAD</i>	<i>CAS</i>	<i>Chemical Name</i>	<i>Formula</i>	<i>Molecular Weight</i>
43188	70688-47-0	1,4-dimethyl-1-cyclohexene	C8H14	110.20
43189	1595-16-0	1-methyl-4-(1-methylpropyl)benzene	C11H16	148.13
43190	16746-86-4	2,3-dimethyl-1-hexene	C8H16	112.21
43191	693-61-8	2-undecene, (E)-	C11H22	154.29
43192	16789-51-8	3-ethyl-3-hexene	C8H16	112.21
43193	17302-01-1	3-ethyl-3-methylheptane	C10H22	142.28
43194	2049-95-8	tert-pentylbenzene	C11H16	148.13
43195		trans-1,3-diethylcyclopentane	C9H18	126.24
43197	10405-85-3	trans-4-nonene	C9H18	126.24

3 Results and Discussion

The details of the new profile OG690 are shown in Table 2. The most abundant species in the new profile include ethanol (10.1%), isopentane (5.6%), toluene (5.4%), 2-methylhexane (5.0%) and 2,2,4-trimethylpentane (3.5%). These compounds are also the major species in OG660, which has more 2,2,4-trimethylpentane (9.6%) but less ethanol (5.8%), compared to the new profile. In order to get better comparison, the two profiles are summarized by carbon number and chemical group in Figure 1 and Figure 2, respectively. It can be seen from Figure 1 that the E10 profile has 10% less C7- and C8-compounds than the E6 profile; however, C2-compounds are about 4% more in the E10 profile due to the increase of ethanol content. The group comparison (Figure 2) shows that the new E10 profile consists of much less isoparaffins, but more paraffins, olefins, naphthenes, aromatics and oxygenates, compared to the E6 profile.

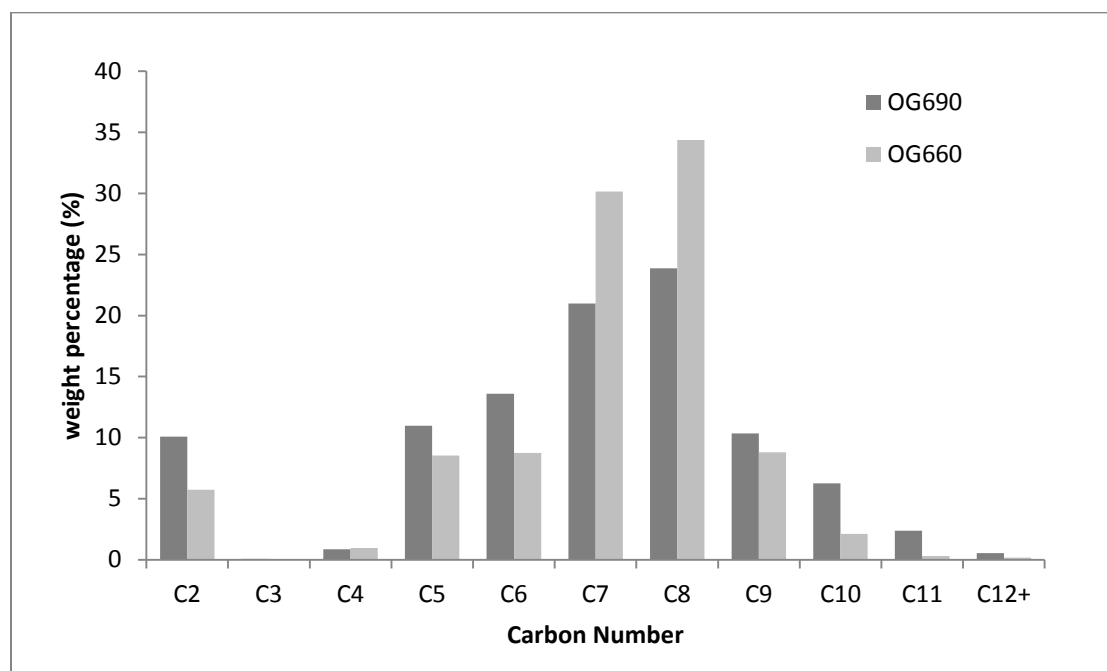


Figure 1. Speciation profile comparison between OG690 and OG660 by carbon number

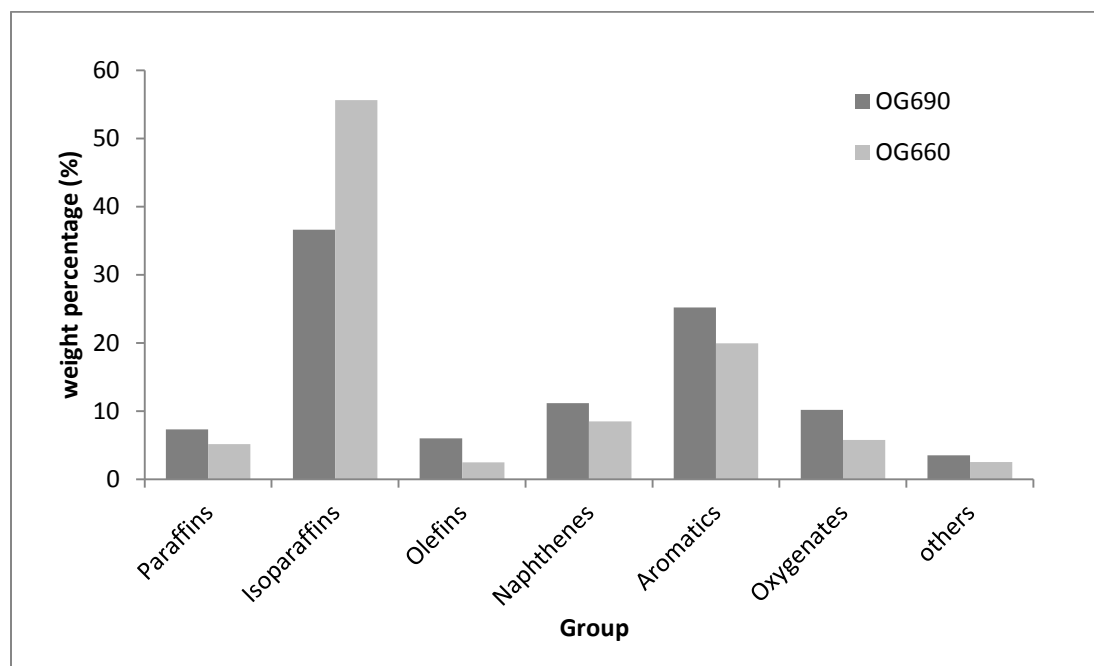


Figure 2. Speciation profile comparison between OG690 and OG660 by group

The ROG/TOG ratio of OG690 is 1.00. Assuming that the mass of FID-THC is based on the molecular weight of methane per carbon measured, the TOG/THC fraction is 1.068 based on the profile (Table 2) and it can be used to convert THC emission mass to actual weight TOG.

Table 2. OG speciation profile for E10 summer liquid gasoline fuel

<i>Species Name</i>	<i>SAROAD</i>	<i>Weight Percentage (%)</i>
(2-methylpropyl)benzene	45235	0.063631
1,1,3-trimethylcyclohexane	91064	0.081630
1,1,3-trimethylcyclopentane	91030	0.143575
1,1,4-trimethylcyclohexane	91057	0.051237
1,2,3,5-tetramethylbenzene	91104	0.222045
1,2,3-trimethylbenzene	45225	0.440333
1,2,4,5-tetramethylbenzene	91103	0.178553
1,2,4-triethylbenzene	91119	0.035971
1,2,4-trimethylbenzene	45208	1.856477
1,2,4-trimethylcyclohexane	99099	0.059858
1,2-diethylbenzene	98154	0.069567
1,2-dimethyl-3-ethylbenzene	45254	0.110332
1,2-dimethyl-4-ethylbenzene	45252	0.334088
1,2-isodipropylbenzene	91114	0.077359
1,3,5-triethylbenzene	91117	0.020642
1,3,5-trimethylbenzene	45207	0.633860
1,3-diethylbenzene	45113	0.107386
1,3-dimethyl-2-ethylbenzene	45253	0.099744
1,3-dimethyl-4-ethylbenzene	45251	0.195303
1,3-dimethyl-5-ethylbenzene	45257	0.262918
1,3-dipropylbenzene	45237	0.130446
1,4-diethylbenzene	45114	0.178622

1,4-Dimethyl-1-cyclohexene	43188	0.005839
1,4-dimethyl-2-ethylbenzene	45250	0.176923
1-butene	43213	0.009012
1-ethyl-4-isopropylbenzene	91102	0.037580
1-hexene	43245	0.532983
1-methyl-1-ethylcyclohexane	91081	0.132463
1-methyl-2-ethylbenzene	99915	0.374309
1-methyl-2-n-butylbenzene	45243	0.018075
1-methyl-2-n-propylbenzene	98178	0.091784
1-methyl-3-ethylbenzene	99912	1.160068
1-methyl-3-isopropylbenzene	98153	0.016939
1-methyl-3-n-propylbenzene	98152	0.368104
1-methyl-4-(1-methylpropyl)benzene	43189	0.062156
1-methyl-4-ethylbenzene	99914	0.517643
1-methyl-4-isobutylbenzene	99064	0.011999
1-methyl-4-isopropylbenzene	91094	0.018998
1-methyl-4-t-butylbenzene	91100	0.023522
1-methylcyclopentene	92000	0.221530
1-methylnaphthalene	91124	0.075910
1-pentene	43224	0.146585
2,2,3-trimethylhexane	91059	0.005499
2,2,3-trimethylbutane	43160	0.030936
2,2,3-trimethylpentane	43296	0.071015
2,2,4-trimethylheptane	98174	0.427106
2,2,4-trimethylpentane	43276	3.513095
2,2,5-trimethylhexane	98033	0.761332
2,2-dimethylbutane	43291	0.758375
2,2-dimethylheptane	91056	0.144152
2,2-dimethylhexane	98138	0.033083
2,2-dimethyloctane	98175	0.109229
2,2-dimethylpropane	98130	0.006359
2,3,3-trimethyl-1-butene	91002	0.007034
2,3,3-trimethylpentane	43280	0.323793
2,3,4-trimethylpentane	43279	1.010670
2,3,5-trimethylhexane	98141	0.099409
2,3-Dimethyl-1-hexene	43190	0.011433
2,3-dimethyl-2-heptene	91079	0.004376
2,3-dimethylbutane	98001	1.034654
2,3-dimethylhexane	98139	0.514430
2,4-dimethylhexane	43277	0.613834
2,4-dimethyloctane	98149	0.193545
2,4-dimethylpentane	43271	1.382377
2,5-dimethylheptane	98143	0.305405
2,5-dimethylhexane	43278	0.481558
2,5-dimethyloctane	98176	0.153634
2,6-dimethylheptane	98157	0.158361
2,6-dimethylnaphthalene	98185	0.029520
2,6-dimethyloctane	98177	0.145071
2-ethyl-1-butene	98002	0.006249
2-ethyl-1-pentene	91022	0.157740
2-methyl-1-butene	43225	0.301247
2-methyl-1-hexene	91020	0.165505
2-methyl-1-pentene	98040	0.127699

2-methyl-2-butene	43228	0.639848
2-methyl-2-hexene	90028	0.086626
2-methyl-2-octene	91068	0.054959
2-methyl-2-pentene	98004	0.215692
2-methyl-cis-3-hexene	91004	0.032659
2-methylheptane	98140	0.763150
2-methylhexane	43275	4.963669
2-methylindan	91108	0.170530
2-methylnaphthalene	91123	0.206080
2-methyloctane	98146	0.345778
2-methylpentane	43229	2.971986
2-undecene, (E)-	43191	0.012708
3,3-diethylpentane	91072	0.105367
3,3-dimethyl-1-pentene	91000	0.181945
3,3-dimethylhexane	98171	0.043590
3,4-dimethyl-2-pentene	91011	0.047600
3,4-dimethylhexane	98150	0.012169
3,5-dimethylheptane	98144	0.088075
3-ethyl-2-pentene	98007	0.032552
3-ethyl-3-hexene	43192	0.009487
3-ethyl-3-methylheptane	43193	0.141176
3-ethylheptane	91071	0.090859
3-ethylhexane	91039	0.324491
3-ethylnonane	91097	0.012051
3-ethyloctane	91089	0.038405
3-methyl-1-butene	43223	0.217780
3-methyl-1-hexene	90030	0.003407
3-methyl-3-ethylpentane	91036	0.051270
3-methyl-5-ethylheptane	91287	0.066875
3-methyl-cis-2-hexene	90029	0.009999
3-methyl-cis-2-pentene	98163	0.231139
3-methyl-cis-3-hexene	91024	0.103744
3-methylheptane	43298	0.905530
3-methylhexane	43295	2.441381
3-methylnonane	91090	0.113303
3-methyloctane	98172	0.396751
3-methylpentane	43230	1.914294
3-methyl-trans-2-hexene	91027	0.060680
3-methyl-trans-3-hexene	90032	0.065594
4-methyl-cis-2-pentene	98170	0.022443
4-methylheptane	43297	0.380622
4-methylindan	91107	0.177328
4-methylnonane	99122	0.121499
4-methyloctane	98173	0.246788
4-methyl-trans-2-hexene	90031	0.040733
4-methyl-trans-2-pentene	43293	0.067317
5-methyl-1-hexene	91005	0.134550
5-methylindan	91106	0.167704
5-methylnonane	91088	0.068641
Benzene	45201	0.701747
Butylcyclohexane	90101	0.040982
C10 olefins	43125	0.114914
C11 aromatics	45505	0.165031

c2 alkyl indan	98084	0.024340
c7 cycloalkanes	43115	0.044103
c7 external olefins	43294	0.025238
c8 cycloalkanes	43116	0.056490
c8 olefins	43290	0.264767
c9 cycloalkanes	43117	0.052853
c9-c12 isoalkanes	99275	0.958706
cis-1,2-dimethylcyclohexane	91055	0.173001
cis-1,3-dimethylcyclopentane	91018	0.552920
cis-1,trans-2,3-trimethylcyclopentane	91038	0.147550
cis-1,trans-2,4-trimethylcyclopentane	91031	0.052087
cis-1,trans-2,cis-4-trimethylcyclohexane	91073	0.100068
cis-1-ethyl-2-methylcyclopentane	99093	0.078076
cis-1-ethyl-3-methylcyclopentane	99071	0.226414
cis-2-butene	43217	0.063130
cis-2-hexene	98035	0.189009
cis-2-pentene	43227	0.231759
cis-3-heptene	91025	0.071995
cis-3-nonene	91084	0.005352
Cyclohexane	43248	0.442185
Cyclohexene	43273	0.041039
Cyclopentane	43242	1.671898
Cyclopentene	43292	0.119545
Dimethylcyclopentene	90065	0.072879
Dimethylindans	46750	0.369896
dimethylindene	46752	0.009818
ethanol	43302	10.077250
ethylbenzene	45203	1.567810
ethylcyclohexane	43288	0.364661
ethylcyclopentane	98057	0.430002
indan	98044	0.267147
indene	98048	0.171991
isobutane	43214	0.082944
isobutylene	43215	0.005602
isopentane	98132	5.566234
isoprene	43243	0.007030
isopropylbenzene	98043	0.093571
isopropylcyclohexane	90120	0.022017
Isopropylcyclopentane	43178	0.021021
methylcyclohexane	43261	1.243808
methylcyclopentane	43262	2.098554
methylheptyne	90044	0.002921
methylnonenes	99358	0.034934
m-xylene	45205	3.441459
naphthalene	98046	0.197209
n-butane	43212	0.645341
n-butylbenzene	91098	0.062627
n-butylcyclopentane	91085	0.049987
n-decane	43238	0.159544
n-dodecane	43255	0.039724
n-heptane	43232	1.841036
n-hexane	43231	1.702202
n-nonane	43235	0.553954

n-octane	43233	0.593017
n-pentadecane	43260	0.000972
n-pentane	43220	1.641577
n-pentylbenzene	45255	0.051965
n-propyl alcohol	43303	0.084413
n-propylbenzene	45209	0.357737
n-tetradecane	43259	0.010035
n-tridecane	43258	0.040188
n-undecane	43241	0.079341
other c12	99035	0.128446
other c8	99031	0.002677
other c9	99032	0.117064
o-xylene	45204	1.950125
pentamethylbenzene	91122	0.037032
propane	43204	0.003462
propylcyclopentane	90116	0.003250
p-xylene	45206	1.403648
t-butylbenzene	45215	0.092909
tert-Pentylbenzene	43194	0.085794
toluene	45202	5.374841
trans-1,2-cis-4-trimethylcyclopentane	43312	0.260321
trans-1,2-dimethylcyclopentane	91021	0.558112
trans-1,3-diethylcyclopentane	43195	0.196057
trans-1,3-dimethylcyclohexane	98059	0.519366
trans-1,3-dimethylcyclopentane	91019	0.630756
trans-1,3-pentadiene	90100	0.005334
trans-1-ethyl-3-methylcyclopentane	99085	0.150257
trans-1-ethyl-4-methylcyclohexane	99082	0.053417
trans-1-methyl-2-propylcyclopentane	43183	0.120487
trans-2-butene	43216	0.051166
trans-2-heptene	91026	0.062993
trans-2-hexene	98034	0.219600
trans-2-nonene	91075	0.001459
trans-2-octene	43263	0.025342
trans-2-pentene	43226	0.425639
trans-3-heptene	98006	0.135725
trans-3-hexene	98136	0.106078
trans-3-nonene	91080	0.067590
trans-3-octene	91049	0.077481
trans-4-nonene	43197	0.004133
trimethylindan	46755	0.049193
trimethyloctanes	90096	1.092928
unidentified	99999	3.265150
<i>Total</i>		<i>100.000000</i>

4 Estimated Impacts of the Profile Update on the Emission Inventory

The newly-developed profile, OG690, will replace the current profile OG660 for the inventory categories associated with on-road gasoline vehicle hot soak emissions, on-road gasoline vehicle running loss evaporative, and spillage of vehicle refueling at gasoline dispensing facilities for 2010 and later years as E10 is in use. The related SCCs/EICs are summarized in the Appendix.

The statewide annual average TOG emissions for the above categories are 188.74 tons/day, 3.32% of the statewide total TOG emissions, based on the 2009 Almanac projection for year 2010 [3]. Using the new profile OG690, the ROG will be 188.74 tons/day (ROG/TOG=1.00), which is 0.76% higher than the estimated ROG based on the current profile OG660 (ROG/TOG=0.9924). The emissions of benzene will decrease 30.16% and the emissions of toluene will increase 5.30% (Table 3).

The ozone forming potential (OFP) calculated based on SAPRC07 mechanism is 3.10 gO3/gORG for the new profile; while the one for the current profile is 2.56 gO3/gORG.

Table 3. Changes on emissions of organic gas species for liquid gasoline related categories (2010)

Statewide Annual Ave. Emissions		Current OG660 (tons/day)	New OG690 (tons/day)	Change	
				Emissions(tons/day)	Percentage
ROG		187.31	188.74	1.43	0.76%
Toxics	Benzene	1.89	1.32	-0.57	-30.16%
	Toluene	9.63	10.14	+0.51	+5.30%

5 Version Control

This section will be completed after management approval and after the CEIDARS FRACTION table and ORGPROFILE table are updated. Version information from CEIDARS FRACTION table will be copied here.

References:

1. California Air Resources Board Main Speciation Profiles. In Jan 1, 2012 ed.; California Air Resources Board: 2012.
2. Allen, P.; Bradley, R.; Croes, B.; Luo, D.; Vincent, R.; Woodhouse, L. *Air Quality Impacts of the Use of Ethanol in California Reformulated Gasoline*; California Air Resources Board: November 18, 1999.
3. CEPAM. In California Air Resources Board: 2012.

Appendix

Table 1. SCCs/EICs associated with liquid gasoline profile

<i>SCC/EIC</i>	<i>Names</i>		
6	EMFAC/DTIM		HOT SOAK
9	EMFAC/DTIM	GASOLINE	RUNNING EVAPORATIVES
206	EMFAC/DTIM	LIGHT-MED DUTY GASOLINE	HOT SOAK
209	EMFAC/DTIM	LIGHT-MED DUTY GASOLINE	RUNNING EVAPORATIVES
306	EMFAC/DTIM	HEAVY DUTY GASOLINE	HOT SOAK
309	EMFAC/DTIM	HEAVY DUTY GASOLINE	RUNNING EVAPORATIVES
46508	ON-ROAD VEHICLES	LIGHT DUTY PASSENGER	HOT SOAK
46565	GASOLINE DISP. FACIL	VEHICLE REFUELING	SPILLAGE
47506	ON-ROAD VEHICLES	LIGHT DUTY TRUCKS	HOT SOAK
48025	ON-ROAD VEHICLES	MOTORCYCLES	HOT SOAK
48041	ON-ROAD VEHICLES	HD GAS TRUCKS	HOT SOAK
54239	ON-ROAD VEHICLES	MEDIUM DUTY TRUCKS	HOT SOAK
82693	ON-ROAD VEHICLES	LIGHT DUTY PASSENGER	CAT HOT SOAK
82701	ON-ROAD VEHICLES	LIGHT DUTY PASSENGER	NON-CAT HOT SOAK
82719	ON-ROAD VEHICLES	LIGHT/MEDIUM TRUCKS	CAT HOT SOAK
82727	ON-ROAD VEHICLES	LIGHT/MEDIUM TRUCKS	NON-CAT HOT SOAK
83113	ON-ROAD VEHICLES	HEAVY GAS TRUCKS	NON-CAT HOT SOAK
83162	ON-ROAD VEHICLES	HEAVY GAS TRUCKS	CAT HOT SOAK
83386	ON-ROAD VEHICLES	LIGHT DUTY PASSENGER	CAT RUNNING EVAP
83394	ON-ROAD VEHICLES	LIGHT DUTY PASSENGER	NON-CAT RUNNING EVAP
83402	ON-ROAD VEHICLES	LIGHT/MEDIUM TRUCKS	CAT RUNNING EVAP
83410	ON-ROAD VEHICLES	LIGHT/MEDIUM TRUCKS	NON-CAT RUNNING EVAP
83428	ON-ROAD VEHICLES	HD GAS TRUCKS	NON-CAT RUNNING EVAP
83436	ON-ROAD VEHICLES	HD GAS TRUCKS	CAT RUNNING EVAP
83444	ON-ROAD VEHICLES	MOTORCYCLES	RUNNING EVAP
84087	ON-ROAD VEHICLES	LT. DUTY TRUCKS - 1	NON-CAT RUNNING EVAP
84103	ON-ROAD VEHICLES	LT. DUTY TRUCKS - 1	NON-CAT HOT SOAK
84178	ON-ROAD VEHICLES	LT. DUTY TRUCKS - 1	CAT RUNNING EVAP
84194	ON-ROAD VEHICLES	LT. DUTY TRUCKS - 1	CAT HOT SOAK
84293	ON-ROAD VEHICLES	MEDIUM TRUCKS	NON-CAT RUNNING EVAP
84319	ON-ROAD VEHICLES	MEDIUM TRUCKS	NON-CAT HOT SOAK
84384	ON-ROAD VEHICLES	MEDIUM TRUCKS	CAT RUNNING EVAP
84400	ON-ROAD VEHICLES	MEDIUM TRUCKS	CAT HOT SOAK
84459	ON-ROAD VEHICLES	LT.HVY.DTY TRUCKS- 1	NON-CAT RUNNING EVAP
84475	ON-ROAD VEHICLES	LT.HVY.DTY TRUCKS- 1	NON-CAT HOT SOAK
84533	ON-ROAD VEHICLES	LT.HVY.DTY TRUCKS- 1	CAT RUNNING EVAP
84558	ON-ROAD VEHICLES	LT.HVY.DTY TRUCKS- 1	CAT HOT SOAK
84608	ON-ROAD VEHICLES	MED HVY GAS TRUCKS	NON-CAT RUNNING EVAP
84624	ON-ROAD VEHICLES	MED HVY GAS TRUCKS	NON-CAT HOT SOAK
84681	ON-ROAD VEHICLES	MED HVY GAS TRUCKS	CAT RUNNING EVAP
84707	ON-ROAD VEHICLES	MED HVY GAS TRUCKS	CAT HOT SOAK
86157	ON-ROAD VEHICLES	LT. DUTY TRUCKS - 2	NON-CATALYST RUNNING EVAP
86173	ON-ROAD VEHICLES	LT. DUTY TRUCKS - 2	NON-CATALYST HOT SOA

86249	ON-ROAD VEHICLES	LT. DUTY TRUCKS - 2	CATALYST RUNNING EVAP
86264	ON-ROAD VEHICLES	LT. DUTY TRUCKS - 2	CATALYST HOT SOAK
86462	ON-ROAD VEHICLES	LT.HVY.DTY TRUCKS- 2	NON-CATALYST RUNNING EVAP
86488	ON-ROAD VEHICLES	LT.HVY.DTY TRUCKS- 2	NON-CATALYST HOT SOA
86561	ON-ROAD VEHICLES	LT.HVY.DTY TRUCKS- 2	CATALYST RUNNING EVAP
86587	ON-ROAD VEHICLES	LT.HVY.DTY TRUCKS- 2	CATALYST HOT SOAK
86694	ON-ROAD VEHICLES	HEAVY HEAVY DUTY GAS	NON-CATALYST RUNNING EVAP
86710	ON-ROAD VEHICLES	HEAVY HEAVY DUTY GAS	NON-CATALYST HOT SOA
86793	ON-ROAD VEHICLES	HEAVY HEAVY DUTY GAS	CATALYST RUNNING EVAP
86819	ON-ROAD VEHICLES	HEAVY HEAVY DUTY GAS	CATALYST HOT SOAK
86983	ON-ROAD VEHICLES	MOTORCYCLES (MCY)	CATALYST RUNNING EVAP
87007	ON-ROAD VEHICLES	MOTORCYCLES (MCY)	CATALYST HOT SOAK
87072	ON-ROAD VEHICLES	HEAVY DUTY GAS URBAN	NON-CATALYST RUNNING EVAP
87098	ON-ROAD VEHICLES	HEAVY DUTY GAS URBAN	NON-CATALYST HOT SOA
87163	ON-ROAD VEHICLES	HEAVY DUTY GAS URBAN	CATALYST RUNNING EVAP
87189	ON-ROAD VEHICLES	HEAVY DUTY GAS URBAN	CATALYST HOT SOAK
87247	ON-ROAD VEHICLES	SCHOOL BUSES (SB)	NON-CATALYST RUNNING EVAP
87262	ON-ROAD VEHICLES	SCHOOL BUSES (SB)	NON-CATALYST HOT SOA
87338	ON-ROAD VEHICLES	SCHOOL BUSES (SB)	CATALYST RUNNING EVAP
87353	ON-ROAD VEHICLES	SCHOOL BUSES (SB)	CATALYST HOT SOAK
87452	ON-ROAD VEHICLES	MOTOR HOMES (MH)	NON-CATALYST RUNNING EVAP
87478	ON-ROAD VEHICLES	MOTOR HOMES (MH)	NON-CATALYST HOT SOA
87544	ON-ROAD VEHICLES	MOTOR HOMES (MH)	CATALYST RUNNING EVAP
87569	ON-ROAD VEHICLES	MOTOR HOMES (MH)	CATALYST HOT SOAK
40600602	PETROLEUM MARKTNG	MISCELLANEOUS	SPILL LOSS W/O CNTLS
33038011000000	GASOLINE DISP. FACIL	VEHICLE REFUELING	SPILLAGE
71070811000000	ON-ROAD VEHICLES	LIGHT DUTY PASSENGER	NON-CAT RUNNING EVAP
71071211000000	ON-ROAD VEHICLES	LIGHT DUTY PASSENGER	NON-CAT HOT SOAK
71073611000000	ON-ROAD VEHICLES	LIGHT DUTY PASSENGER	CAT RUNNING EVAP
71074011000000	ON-ROAD VEHICLES	LIGHT DUTY PASSENGER	CAT HOT SOAK
72070811000000	ON-ROAD VEHICLES	LIGHT/MEDIUM TRUCKS	NON-CAT RUNNING EVAP
72071211000000	ON-ROAD VEHICLES	LIGHT/MEDIUM TRUCKS	NON-CAT HOT SOAK
72073611000000	ON-ROAD VEHICLES	LIGHT/MEDIUM TRUCKS	CAT RUNNING EVAP
72074011000000	ON-ROAD VEHICLES	LIGHT/MEDIUM TRUCKS	CAT HOT SOAK
72270811000000	ON-ROAD VEHICLES	LT. DUTY TRUCKS - 1	NON-CAT RUNNING EVAP
72271211000000	ON-ROAD VEHICLES	LT. DUTY TRUCKS - 1	NON-CAT HOT SOAK
72273611000000	ON-ROAD VEHICLES	LT. DUTY TRUCKS - 1	CAT RUNNING EVAP
72274011000000	ON-ROAD VEHICLES	LT. DUTY TRUCKS - 1	CAT HOT SOAK
72370811000000	ON-ROAD VEHICLES	LT. DUTY TRUCKS - 2	NON-CATALYST RUNNING EVAP
72371211000000	ON-ROAD VEHICLES	LT. DUTY TRUCKS - 2	NON-CATALYST HOT SOA
72373611000000	ON-ROAD VEHICLES	LT. DUTY TRUCKS - 2	CATALYST RUNNING EVAP
72374011000000	ON-ROAD VEHICLES	LT. DUTY TRUCKS - 2	CATALYST HOT SOAK
72470811000000	ON-ROAD VEHICLES	MEDIUM TRUCKS	NON-CAT RUNNING EVAP
72471211000000	ON-ROAD VEHICLES	MEDIUM TRUCKS	NON-CAT HOT SOAK
72473611000000	ON-ROAD VEHICLES	MEDIUM TRUCKS	CAT RUNNING EVAP
72474011000000	ON-ROAD VEHICLES	MEDIUM TRUCKS	CAT HOT SOAK
73070811000000	ON-ROAD VEHICLES	HD GAS TRUCKS	NON-CAT RUNNING EVAP
73071211000000	ON-ROAD VEHICLES	HEAVY GAS TRUCKS	NON-CAT HOT SOAK

73073611000000	ON-ROAD VEHICLES	HD GAS TRUCKS	CAT RUNNING EVAP
73074011000000	ON-ROAD VEHICLES	HEAVY GAS TRUCKS	CAT HOT SOAK
73270811000000	ON-ROAD VEHICLES	LT.HVY.DTY TRUCKS- 1	NON-CAT RUNNING EVAP
73271211000000	ON-ROAD VEHICLES	LT.HVY.DTY TRUCKS- 1	NON-CAT HOT SOAK
73273611000000	ON-ROAD VEHICLES	LT.HVY.DTY TRUCKS- 1	CAT RUNNING EVAP
73274011000000	ON-ROAD VEHICLES	LT.HVY.DTY TRUCKS- 1	CAT HOT SOAK
73370811000000	ON-ROAD VEHICLES	LT.HVY.DTY TRUCKS- 2	NON-CATALYST RUNNING EVAP
73371211000000	ON-ROAD VEHICLES	LT.HVY.DTY TRUCKS- 2	NON-CATALYST HOT SOA
73373611000000	ON-ROAD VEHICLES	LT.HVY.DTY TRUCKS- 2	CATALYST RUNNING EVAP
73374011000000	ON-ROAD VEHICLES	LT.HVY.DTY TRUCKS- 2	CATALYST HOT SOAK
73470811000000	ON-ROAD VEHICLES	MED. HVY. DTY TRUCKS	NON-CAT RUNNING EVAP
73471211000000	ON-ROAD VEHICLES	MED. HVY. DTY TRUCKS	NON-CAT HOT SOAK
73473611000000	ON-ROAD VEHICLES	MED. HVY. DTY TRUCKS	CAT RUNNING EVAP
73474011000000	ON-ROAD VEHICLES	MED. HVY. DTY TRUCKS	CAT HOT SOAK
73670811000000	ON-ROAD VEHICLES	HVY. HVY. DTY TRUCKS	NON-CATALYST RUNNING EVAP
73671211000000	ON-ROAD VEHICLES	HVY. HVY. DTY TRUCKS	NON-CATALYST HOT SOA
73673611000000	ON-ROAD VEHICLES	HVY. HVY. DTY TRUCKS	CATALYST RUNNING EVAP
73674011000000	ON-ROAD VEHICLES	HVY. HVY. DTY TRUCKS	CATALYST HOT SOAK
75070811000000	ON-ROAD VEHICLES	MOTORCYCLES	RUNNING EVAP
75071211000000	ON-ROAD VEHICLES	MOTORCYCLES	HOT SOAK
75073611000000	ON-ROAD VEHICLES	MOTORCYCLES (MCY)	CATALYST RUNNING EVAP
75074011000000	ON-ROAD VEHICLES	MOTORCYCLES (MCY)	CATALYST HOT SOAK
76270811000000	ON-ROAD VEHICLES	HVY. GAS URBAN BUSES	NON-CATALYST RUNNING EVAP
76271211000000	ON-ROAD VEHICLES	HVY. GAS URBAN BUSES	NON-CATALYST HOT SOA
76273611000000	ON-ROAD VEHICLES	HVY. GAS URBAN BUSES	CATALYST RUNNING EVAP
76274011000000	ON-ROAD VEHICLES	HVY. GAS URBAN BUSES	CATALYST HOT SOAK
77070811000000	ON-ROAD VEHICLES	SCHOOL BUSES (SB)	NON-CATALYST RUNNING EVAP
77071211000000	ON-ROAD VEHICLES	SCHOOL BUSES (SB)	NON-CATALYST HOT SOA
77073611000000	ON-ROAD VEHICLES	SCHOOL BUSES (SB)	CATALYST RUNNING EVAP
77074011000000	ON-ROAD VEHICLES	SCHOOL BUSES (SB)	CATALYST HOT SOAK
77170811000000	ON-ROAD VEHICLES	SCHOOL BUSES (SB)	NON-CATALYST RUNNING EVAP
77171211000000	ON-ROAD VEHICLES	SCHOOL BUSES (SB)	NON-CATALYST HOT SOAK
77173611000000	ON-ROAD VEHICLES	SCHOOL BUSES (SB)	CATALYST RUNNING EVAP
77174011000000	ON-ROAD VEHICLES	SCHOOL BUSES (SB)	CATALYST HOT SOAK
77670811000000	ON-ROAD VEHICLES	OTHER BUSES (OB)	NON-CATALYST RUNNING EVAP
77671211000000	ON-ROAD VEHICLES	OTHER BUSES (OB)	NON-CATALYST HOT SOAK
77673611000000	ON-ROAD VEHICLES	OTHER BUSES (OB)	CATALYST RUNNING EVAP
77674011000000	ON-ROAD VEHICLES	OTHER BUSES (OB)	CATALYST RUNNING EVAP
77770811000000	ON-ROAD VEHICLES	OTHER BUSES (OB)	NON-CATALYST RUNNING EVAP
77771211000000	ON-ROAD VEHICLES	OTHER BUSES (OB)	NON-CATALYST HOT SOAK
77773611000000	ON-ROAD VEHICLES	OTHER BUSES (OB)	CATALYST RUNNING EVAP
77774011000000	ON-ROAD VEHICLES	OTHER BUSES (OB)	CATALYST HOT SOAK
78070811000000	ON-ROAD VEHICLES	MOTOR HOMES (MH)	NON-CATALYST RUNNING EVAP
78071211000000	ON-ROAD VEHICLES	MOTOR HOMES (MH)	NON-CATALYST HOT SOA
78073611000000	ON-ROAD VEHICLES	MOTOR HOMES (MH)	CATALYST RUNNING EVAP
78074011000000	ON-ROAD VEHICLES	MOTOR HOMES (MH)	CATALYST HOT SOAK

