Gasoline Blending Streams Category

Robust Study Summaries

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Petroleum HPV Testing Group
Consortium Registration #1100997
July 31, 2008

Physical-Chemical SIDS

Melting Point

Test Substance - Melting Point

Category Chemical: *No CAS Number Provided*

Test Substance: *No CAS Number Provided*

Test Substance Purity/Composition and Other Test Substance Comments:

Category Chemical Result Type:

Test Substance Result Type: Estimated

Results - Melting Point

Melting Indicator:

Melting Point Value/Range (Temperature): -138 - 13 °C

Results Remarks: Range of melting point values for various hydrocarbon constituents of gasoline blending streams having carbon numbers from C4 to C12 Gasoline blending streams typically exist as liquids at ambient temperatures.

Study/Method - Melting Point

Key Study Sponsor Indicator:

Year Study Performed:

Method/Guideline Followed:

Method/Guideline and Test Condition Remarks:

GLP:

Study Reference:

Reliability/Data Quality - Melting Point

Reliability:

Reliability Remarks:

Boiling Point

Test Substance - Boiling Point

Category Chemical:	*No CAS Number Provided*
Test Substance:	*No CAS Number Provided*
Test Substance Purity/Composition and Other Test Substance Comments:	API PS-6 gasoline
Category Chemical Result Type:	
Test Substance Result Type:	

Results - Boiling Point

Boiling Indicator:	
Boiling Point Value/Range (Temperature):	93 - 428 °C
Results Remarks:	

Study/Method - Boiling Point

Key Study Sponsor Indicator:	
Year Study Performed:	1984
Method/Guideline Followed:	Other
Method/Guideline and Test Condition Remarks:	ASTM D86
GLP:	No Data
Study Reference:	McFarland, H N , Ulrich, C. E , Holdsworth, C E , Kitchen, D. N., Halliwell, W. H. and Blum, S. C. (1984) A chronic Inhalation Study with unleaded gasoline vapor. J. Am College of Toxicol. Vol. 3, No. 4, pp 231-248

Reliability/Data Quality - Boiling Point

Reliability:	
Reliability Remarks:	

Boiling Point

Test Substance - Boiling Point

Category Chemical:	(64741-46-4) Naphtha, petroleum, light straight-run
Test Substance:	(64741-46-4) Naphtha, petroleum, light straight-run
Test Substance Purity/Composition and Other Test Substance Comments:	Naphthenic naphthas
Category Chemical Result Type:	Measured
Test Substance Result Type:	Measured

Results - Boiling Point

Boiling Indicator:	
Boiling Point Value/Range (Temperature):	49 - 177 °C @ Pressure. 1013 hPa
Results Remarks:	Decomposition No The samples which were used by the API in its toxicity assessments for this Group were prepared by the fractionation of two types of crude oil, using a pilot plant still and separating cuts in a distillation range of 120 to 350°F (49 to 177°C) These figures represent a typical boiling range for light straight-run naphtha, CAS No 64741-46-4 The standard oil industry method for determination of boiling range is ASTM D86. The naphthenic naphthas boil in the range of approximately -10 to 230 °C Sample API 81-08 [CAS # 64741-87-3] had an initial boiling point of 102 °F and a final boiling point of 238 °F by method ASTM D86 (equivalent to 39 and 114 °C respectively).

Study/Method - Boiling Point

Key Study Sponsor Indicator:	
Year Study Performed:	
Method/Guideline Followed:	Other
Method/Guideline and Test Condition Remarks:	ASTM D86
GLP:	
Study Reference:	American Society for Testing and Materials (ASTM), 1991 Annual Book of ASTM Standards. Section 5, Petroleum Products, Lubricants and Fossil Fuels. ASTM, Philadelphia, Pa , 1991. King, R.W. et al., Skin carcinogenicity potential of petroleum hydrocarbons. 1 -Separation and characterization of fractions for bioassay. In. Applied Toxicology of Petroleum Hydrocarbons, pp. 123-138, American Petroleum Institute Publication, API, Washington DC, 1984. American Petroleum Institute (1987) Comprehensive analytical analysis of API generic refinery streams

Reliability/Data Quality - Boiling Point

Reliability:	2 - Valid With Restrictions
Reliability Remarks:	

Boiling Point

Test Substance - Boiling Point

Category Chemical:	(64741-55-5) Naphtha, petroleum, light catalytic cracked
Test Substance:	(64741-55-5) Naphtha, petroleum, light catalytic cracked
Test Substance Purity/Composition and Other Test Substance Comments:	Olefinic Naphthas
Category Chemical Result Type:	Measured
Test Substance Result Type:	

Results - Boiling Point

Boiling Indicator:	
Boiling Point Value/Range (Temperature):	37 - 168 °C
Results Remarks:	The olefinic naphtha streams boil in the range of approximately -20 to 190 °C. Sample API #83-20 [CAS #64741-55-5] had an initial boiling point of 99 °F and a final boiling point of 334 °F (equivalent to 37 °C and 168 °C, respectively).

Study/Method - Boiling Point

Key Study Sponsor Indicator:	
Year Study Performed:	
Method/Guideline Followed:	Other
Method/Guideline and Test Condition Remarks:	
GLP:	No Data
Study Reference:	American Petroleum Institute (1987) Comprehensive analytical analysis of API generic refinery streams

Reliability/Data Quality - Boiling Point

Reliability:	2 - Valid With Restrictions
Reliability Remarks:	

Boiling Point

Test Substance - Boiling Point

Category Chemical:	(68955-35-1) Naphtha, petroleum, catalytic reformed
Test Substance:	(68955-35-1) Naphtha, petroleum, catalytic reformed
Test Substance Purity/Composition and Other Test Substance Comments:	AROMATIC NAPHTHAS Substance type: Petroleum product Physical status. Liquid Remark: Aromatic naphtha streams are obtained from the catalytic reforming of mainly n-alkane and cycloparaffinic feedstocks into aromatic and branched chain hydrocarbons. The hydrocarbons are mainly in the range C5 to C12 and boil in the range of approximately 30 to 220°C A typical aromatic naphtha is composed of the following hydrocarbon classes in the approximate proportions shown: Content (volume %) Paraffins 32 Olefins 0.5 Naphthenics 4 Aromatics 63 5 Full range catalytically reformed naphtha (CAS 68955-35-1) is a typical aromatic naphtha stream and the American Petroleum Institute (API, 1987) have characterized a specific sample (API 83-05) of a Full range catalytic reformed naphtha.
Category Chemical Result Type:	Measured
Test Substance Result Type:	Measured

Results - Boiling Point

Boiling Indicator:	
Boiling Point Value/Range (Temperature):	58 - 200 °C
Results Remarks:	The aromatic naphthas boil in the range of approximately 30 to 220 °C. Sample API 83-05 [CAS # 68955-35-1] had an initial boiling point of 136 °F and a final boiling point of 392 °F (equivalent to 58 and 200 °C respectively)

Study/Method - Boiling Point

Key Study Sponsor Indicator:	
Year Study Performed:	
Method/Guideline Followed:	Other
Method/Guideline and Test Condition Remarks:	ASTM D86
GLP:	No Data
Study Reference:	American Petroleum Institute (1987) Comprehensive analytical analysis of API generic refinery streams

Reliability/Data Quality - Boiling Point

Reliability:	2 - Valid With Restrictions
Reliability Remarks:	

Boiling Point

Test Substance - Boiling Point

Category Chemical:	(64741-66-8) Naphtha, petroleum, light alkylate
Test Substance:	(64741-66-8) Naphtha, petroleum, light alkylate
Test Substance Purity/Composition and Other Test Substance Comments:	Paraffinic Naphthas
Category Chemical Result Type:	Measured
Test Substance Result Type:	

Results - Boiling Point

Boiling Indicator:	
Boiling Point Value/Range (Temperature):	37 - 175 °C
Results Remarks:	The paraffinic naphthas boil in the range of approximately 35 to 230 °C. Sample API 83-19 [CAS # 64741-66-8] had an initial boiling point of 98 °F and a final boiling point of 347 °F (equivalent to 37 and 175 °C respectively)

Study/Method - Boiling Point

Key Study Sponsor Indicator:	
Year Study Performed:	
Method/Guideline Followed:	Other
Method/Guideline and Test Condition Remarks:	ASTM D86
GLP:	No Data
Study Reference:	American Petroleum Institute (1987) Comprehensive analytical analysis of API generic refinery streams

Reliability/Data Quality - Boiling Point

Reliability:	2 - Valid With Restrictions
Reliability Remarks:	

Vapor Pressure

Test Substance - Vapor Pressure

Category Chemical: (64741-46-4) Naphtha, petroleum, light straight-run

Test Substance: (64741-46-4) Naphtha, petroleum, light straight-run

Test Substance Purity/Composition and Other Test Substance Comments: LSRN (Low Naphthenic], CONCAWE sample CWE3
The sample was identified by CONCAWE as MRD-95-091, gasoline sample CWE3, CAS No. 64741-46-4, a light straight-run naphtha.

Substance type: Petroleum product
Physical status. Liquid
Remark: The naphtha streams that are rich in naphthenes are obtained from the atmospheric distillation of crude oil. The streams contain saturated and aromatic hydrocarbons, mainly in the range C4 to C10 and boil in the range of approximately minus 39 to 200 °C
The naphthenic naphthas typically are composed of the following hydrocarbon classes:
 Approx. Content (volume %)
Paraffins 72
Olefins <0.1
Naphthenics 21
Aromatics 7
Low naphthenic content
CONCAWE sample CWE3
CAS No. 64741-46-4
Density (g/ml @ 16°C) 0.6662
Sulfur (ppm) 83
Detailed hydrocarbon analysis (Method ASTM D 5134-92)
 Olefins Naphthenes Aromatics Paraffins
n- i-
Total%
1.04 12.23 3.27 48.19 34 02
C4 0.00 0.00
0.00 0.006 0.000
C5 0 085 4.047 0.00 31.91
8.228
C6 0.830 6.696 2.252 16.139 23.917
C7 0.119
1.056 0.382 0.647 1.241
C8 0.00 0.303 0.334
0.263 0.324
C9 0.00 0.165 0.243 0.162 0.178

Category Chemical Result Type: Measured

Test Substance Result Type: Measured

Results - Vapor Pressure

Vapor Pressure Value/Range (Pressure): = 9150 hPa @ Temperature 37 8 °C

Results Remarks:

Study/Method - Vapor Pressure

Key Study Sponsor Indicator:

Year Study Performed: 1995

Method/Guideline Followed: Other

Method/Guideline and Test Condition Remarks: ASTM D5191

GLP: Yes

Study Reference: CONCAWE (1995)
Physico-chemical characterization of gasoline samples, study no. 104990C. Study conducted by Exxon Biomedical Sciences Inc.
CONCAWE, Brussels, 1995.

Reliability/Data Quality - Vapor Pressure

Reliability: 1 - Valid Without Restrictions

Reliability Remarks: (1) valid without restriction

Vapor Pressure

Test Substance - Vapor Pressure

Category Chemical:	(64741-70-4) Naphtha, petroleum, isomerization
Test Substance:	(64741-70-4) Naphtha, petroleum, isomerization
Test Substance Purity/Composition and Other Test Substance Comments:	The sample was identified by CONCAWE as MRD-95-045, gasoline sample W94/810, CAS No. 64741-70-4, isomerate naphtha. See: CONCAWE (1995) Physico-chemical characterization of gasoline samples. Study No. 104990C. Study conducted by Exxon Biomedical Sciences Inc. CONCAWE, Brussels, 1995.
Category Chemical Result Type:	
Test Substance Result Type:	

Results - Vapor Pressure

Vapor Pressure Value/Range (Pressure):	= 7860 hPa @ Temperature: 37.8 °C
Results Remarks:	

Study/Method - Vapor Pressure

Key Study Sponsor Indicator:	
Year Study Performed:	1995
Method/Guideline Followed:	Other
Method/Guideline and Test Condition Remarks:	ASTM D5191
GLP:	Yes
Study Reference:	CONCAWE (1995) Physico-chemical characterization of gasoline samples. Study No. 104990C. Study conducted by Exxon Biomedical Sciences Inc. CONCAWE, Brussels, 1995.

Reliability/Data Quality - Vapor Pressure

Reliability:	1 - Valid Without Restrictions
Reliability Remarks:	(1) valid without restriction

Vapor Pressure

Test Substance - Vapor Pressure

Category Chemical: (64741-46-4) Naphtha, petroleum, light straight-run

Test Substance: (64741-46-4) Naphtha, petroleum, light straight-run

Test Substance Purity/Composition and Other Test Substance Comments: ISRN-Hi Naphthenic, CONCAWE sample W94/809
The sample was identified by CONCAWE as MRD-95-044, gasoline sample W94/809, CAS No. 64741-46-4, a light straight-run naphtha.

Substance type: Petroleum product
Physical status: Liquid
Remark: The naphtha streams that are rich in naphthenes are obtained from the atmospheric distillation of crude oil. The streams contain saturated and aromatic hydrocarbons, mainly in the range C4 to C10 and boil in the range of approximately minus 39 to 200 °C
The naphthenic naphthas typically are composed of the following hydrocarbon classes:
 Approx. Content (volume %)
Paraffins 72
Olefins <0.1
Naphthenics 21
Aromatics 7
High naphthenic content
CONCAWE sample W94/809
CAS No. 64741-46-4
Density (g/ml @ 16°C) 0.7587
Sulfur (ppm) <10
Detailed hydrocarbon analysis (Method ASTM D 5134-92)

Olefins Naphthenes Aromatics Paraffins

 n- i-
Total%
2.18 33.92 17 26 18.88 26.83
C4 0.019 0.00
0.00 0.141 0.059
C5 0.090 0.138 0.00 0.592
0.468
C6 0.066 2.578 0 756 1.565 1.341
C7
0.663 10 265 5.218 3.887 3.811
C8
0.074 11.036 9.044 8.407 9.409
C9 1.161 9.117
2.080 3.762 8 834
C10 0.103 0.778 0.153 0.778
0.103
C11 0.00 0.009 0.007 0.009 0.145

Category Chemical Result Type: Measured

Test Substance Result Type: Measured

Results - Vapor Pressure

Vapor Pressure Value/Range (Pressure): = 1290 hPa @ Temperature: 37.8 °C

Results Remarks:

Study/Method - Vapor Pressure

Key Study Sponsor Indicator:

Year Study Performed: 1995

Method/Guideline Followed: Other

Method/Guideline and Test Condition Remarks: ASTM D5191

GLP: Yes

Study Reference: CONCAWE (1995)
Physico-chemical characterization of gasoline samples, study no. 104990C. Study conducted by Exxon Biomedical Sciences Inc.
CONCAWE, Brussels, 1995.

Reliability/Data Quality - Vapor Pressure

Reliability: 1 - Valid Without Restrictions

Reliability Remarks: (1) valid without restriction

Vapor Pressure

Test Substance - Vapor Pressure

Category Chemical:	(64741-70-4) Naphtha, petroleum, isomerization
Test Substance:	(64741-70-4) Naphtha, petroleum, isomerization
Test Substance Purity/Composition and Other Test Substance Comments:	The sample was identified by CONCAWE as MRD-95-092, gasoline sample CWE4, CAS No. 64741-70-4, isomerate naphtha. See: CONCAWE (1995) Physico-chemical characterization of gasoline samples. Study No. 104990C. Study conducted by Exxon Biomedical Sciences Inc. CONCAWE, Brussels, 1995.
Category Chemical Result Type:	
Test Substance Result Type:	

Results - Vapor Pressure

Vapor Pressure Value/Range (Pressure):	= 7330 hPa @ Temperature: 37.8 °C
Results Remarks:	

Study/Method - Vapor Pressure

Key Study Sponsor Indicator:	
Year Study Performed:	1995
Method/Guideline Followed:	Other
Method/Guideline and Test Condition Remarks:	ASTM D5191
GLP:	Yes
Study Reference:	CONCAWE (1995) Physico-chemical characterization of gasoline samples. Study No. 104990C. Study conducted by Exxon Biomedical Sciences Inc. CONCAWE, Brussels, 1995.

Reliability/Data Quality - Vapor Pressure

Reliability:	1 - Valid Without Restrictions
Reliability Remarks:	(1) valid without restriction

Vapor Pressure

Test Substance - Vapor Pressure

Category Chemical:	(64741-55-5) Naphtha, petroleum, light catalytic cracked
Test Substance:	(64741-55-5) Naphtha, petroleum, light catalytic cracked
Test Substance Purity/Composition and Other Test Substance Comments:	The sample was identified by CONCAWE as MRD-95-090, gasoline sample CWE2, CAS No. 64741-55-5, a catalytically-cracked light naphtha. See: CONCAWE (1995) Physico-chemical characterization of gasoline samples, study No. 104990C. Study conducted by Exxon Biomedical Sciences Inc. CONCAWE, Brussels, 1995
Category Chemical Result Type:	Measured
Test Substance Result Type:	Measured

Results - Vapor Pressure

Vapor Pressure Value/Range (Pressure):	= 5550 hPa @ Temperature: 37.8 °C
Results Remarks:	

Study/Method - Vapor Pressure

Key Study Sponsor Indicator:	
Year Study Performed:	1995
Method/Guideline Followed:	Other
Method/Guideline and Test Condition Remarks:	ASTM D5191
GLP:	Yes
Study Reference:	See: CONCAWE (1995) Physico-chemical characterization of gasoline samples, study No. 104990C. Study conducted by Exxon Biomedical Sciences Inc. CONCAWE, Brussels, 1995

Reliability/Data Quality - Vapor Pressure

Reliability:	1 - Valid Without Restrictions
Reliability Remarks:	(1) valid without restriction

Vapor Pressure

Test Substance - Vapor Pressure

Category Chemical:	(68919-37-9) Naphtha, petroleum, full-range reformed
Test Substance:	(68919-37-9) Naphtha, petroleum, full-range reformed
Test Substance Purity/Composition and Other Test Substance Comments:	The sample was identified by CONCAWE as MRD-95-089, gasoline sample CWE1, CAS No. 68919-37-9, a reformate full range.
Category Chemical Result Type:	Measured
Test Substance Result Type:	Measured

Results - Vapor Pressure

Vapor Pressure Value/Range (Pressure):	= 4630 hPa @ Temperature 37.8 °C
Results Remarks:	

Study/Method - Vapor Pressure

Key Study Sponsor Indicator:	
Year Study Performed:	1995
Method/Guideline Followed:	Other
Method/Guideline and Test Condition Remarks:	ASTM D5191
GLP:	Yes
Study Reference:	CONCAWE (1996) Environmental risk assessment of petroleum substances: the hydrocarbon block method. Report 96/52, CONCAWE, Brussels.

Reliability/Data Quality - Vapor Pressure

Reliability:	1 - Valid Without Restrictions
Reliability Remarks:	(1) valid without restriction

Vapor Pressure

Test Substance - Vapor Pressure

Category Chemical:	(64741-54-4) Naphtha, petroleum, heavy catalytic cracked
Test Substance:	(64741-54-4) Naphtha, petroleum, heavy catalytic cracked
Test Substance Purity/Composition and Other Test Substance Comments:	The sample was identified by CONCAWE as MRD-95-046, gasoline sample U94/811, CAS No. 64741-54-4, a catalytically-cracked heavy naphtha. See: CONCAWE (1995) Physico-chemical characterization of gasoline samples, study No. 104990C. Study conducted by Exxon Biomedical Sciences Inc. CONCAWE, Brussels, 1995
Category Chemical Result Type:	Measured
Test Substance Result Type:	Measured

Results - Vapor Pressure

Vapor Pressure Value/Range (Pressure):	= 5930 hPa @ Temperature: 37.8 °C
Results Remarks:	

Study/Method - Vapor Pressure

Key Study Sponsor Indicator:	
Year Study Performed:	1995
Method/Guideline Followed:	Other
Method/Guideline and Test Condition Remarks:	ASTM D5191
GLP:	Yes
Study Reference:	See: CONCAWE (1995) Physico-chemical characterization of gasoline samples, study No. 104990C Study conducted by Exxon Biomedical Sciences Inc. CONCAWE, Brussels, 1995

Reliability/Data Quality - Vapor Pressure

Reliability:	1 - Valid Without Restrictions
Reliability Remarks:	(1) valid without restriction

Vapor Pressure

Test Substance - Vapor Pressure

Category Chemical:	(64741-63-5) Naphtha, petroleum, light catalytic reformed
Test Substance:	(64741-63-5) Naphtha, petroleum, light catalytic reformed
Test Substance Purity/Composition and Other Test Substance Comments:	The sample was identified by CONCAWE as MRD-95-047, gasoline sample W94/812, CAS No. 64741-63-5, a light reformate.
Category Chemical Result Type:	Measured
Test Substance Result Type:	Measured

Results - Vapor Pressure

Vapor Pressure Value/Range (Pressure):	= 5500 hPa @ Temperature: 37.8 °C
Results Remarks:	

Study/Method - Vapor Pressure

Key Study Sponsor Indicator:	
Year Study Performed:	1995
Method/Guideline Followed:	Other
Method/Guideline and Test Condition Remarks:	ASTM D5191
GLP:	Yes
Study Reference:	CONCAWE (1996) Environmental risk assessment of petroleum substances the hydrocarbon block method. Report 96/52, CONCAWE, Brussels.

Reliability/Data Quality - Vapor Pressure

Reliability:	1 - Valid Without Restrictions
Reliability Remarks:	(1) valid without restriction

Partition Coefficient

Test Substance - Partition Coefficient

Category Chemical: (64741-46-4) Naphtha, petroleum, light straight-run

Test Substance: (64741-46-4) Naphtha, petroleum, light straight-run

Test Substance Purity/Composition and Other Test Substance Comments: LSRN (Moderate Naphthenic]
Substance type: Petroleum product
Physical status: Liquid
Remark: The naphtha streams that are rich in naphthenes are obtained from the atmospheric distillation of crude oil. The streams contain saturated and aromatic hydrocarbons, mainly in the range C4 to C10 and boil in the range of approximately minus 39 to 200 °C
The naphthenic naphthas typically are composed of the following hydrocarbon classes.
 Approx Content (volume %)
Paraffins 72
Olefins <0.1
Naphthenics 21
Aromatics 7
Moderate naphthenic content
Chevron sample (Chevron, 1995)
CAS No. 64741-46-4
Detailed hydrocarbon analysis (Method ASTM D 5134-92)
Olefins Naphthenes Aromatics Paraffins

n- i-
Total%
0.72 22.41 3 06 73.31 31.13
C4 0.03 0 00
0.00 5 85 5 580
C5 0.085 1.73 0.00 38.80
16.27
C6 0 36 6.24 0.70 18.18 6 26
C7
0.05 7.11 1 12 5.58 2.00
C8 0.00 5.31
0 96 3.22 0.79
C9 0.00 1.95 0.25 1.20 0.13

C10 0.00 0.07 0.03 0.46 0.08

Category Chemical Result Type: Estimated by Calculation

Test Substance Result Type: Estimated

Results - Partition Coefficient

Partition Coefficient Value/Range (Log K_{OW}): 2.13 - 4 76 @ Temperature: 25 °C

Results Remarks: Log P values represent the spread of calculated and/or measured values for C5 to C9 hydrocarbon components found in LSRN, CAS No 64741-46-4 Detailed hydrocarbon analysis performed by Chevron Research was used to identify the
components of this specific moderate naphthenic (19 7%) LSRN sample. Calculated SAR result for surrogate structures contained in program database (smilecas dat). Calculation based on an atom/fragment contribution method of W. Meylan and P. Howard.

Study/Method - Partition Coefficient

Key Study Sponsor Indicator:

Year Study Performed: 2000

Method/Guideline Followed: Other

Method/Guideline and Test Condition Remarks: Calculated by LOGKOWWIN ver 1.65

GLP: No

Study Reference: Meylan, M, SRC 1994-1999
LOGKOWWIN is contained in the computer program EPIWIN
(Estimate ver. 3.04), available from Syracuse Research Corp.

Reliability/Data Quality - Partition Coefficient

Reliability: 2 - Valid With Restrictions

Reliability Remarks: (2) Valid with restrictions

Partition Coefficient

Test Substance - Partition Coefficient

Category Chemical:	(64741-63-5) Naphtha, petroleum, light catalytic reformed
Test Substance:	(64741-63-5) Naphtha, petroleum, light catalytic reformed
Test Substance Purity/Composition and Other Test Substance Comments:	Light Catalytically Reformed Naphtha
Category Chemical Result Type:	Estimated by Calculation
Test Substance Result Type:	Estimated

Results - Partition Coefficient

Partition Coefficient Value/Range (Log K_{OW}):	2.13 - 4.54 @ Temperature: 25 °C
Results Remarks:	

Study/Method - Partition Coefficient

Key Study Sponsor Indicator:	
Year Study Performed:	2000
Method/Guideline Followed:	Other
Method/Guideline and Test Condition Remarks:	Calculated by LOGKOWWIN ver. 1.65. Log P values represent the spread of calculated and/or measured values for C5 to C9 hydrocarbon components found in LCRN, CAS No 64741-63-5. Detailed hydrocarbon analysis performed by Chevron Research was used to identify the components of this specific LCRN sample. Calculation based on an atom/fragment contribution method of W. Meylan and P. Howard. Calculated SAR result for surrogate structure contained in program database (smilecas.dat)
GLP:	No
Study Reference:	Chevron Research (1995) Gasoline analysis Internal report Meylan, M, SRC 1994-1999. LOGKOWWIN is contained in the computer program EPIWIN (Estimate ver. 3.04), available from Syracuse Research Corp.

Reliability/Data Quality - Partition Coefficient

Reliability:	2 - Valid With Restrictions
Reliability Remarks:	(2) Valid with restrictions

Partition Coefficient

Test Substance - Partition Coefficient

Category Chemical:	(68955-35-1) Naphtha, petroleum, catalytic reformed
Test Substance:	(68955-35-1) Naphtha, petroleum, catalytic reformed
Test Substance Purity/Composition and Other Test Substance Comments:	Full -Range Catalytically Reformed Naphtha (FRCRN)- CAS No. 68955-35-1; API sample 83-05
Category Chemical Result Type:	Estimated by Calculation
Test Substance Result Type:	Estimated

Results - Partition Coefficient

Partition Coefficient Value/Range (Log K_{OW}):	2.13 - 4.76 @ Temperature. 25 °C
Results Remarks:	

Study/Method - Partition Coefficient

Key Study Sponsor Indicator:	
Year Study Performed:	2000
Method/Guideline Followed:	Other
Method/Guideline and Test Condition Remarks:	Calculated by LOGKOWWIN ver. 1.65. Log P values represent the spread of calculated and/or measured values for C5 to C9 hydrocarbon components found in FRCRN, CAS No 68955-35-1 Detailed hydrocarbon analysis was used to identify the components of this FRCRN (63% aromatics) sample. Calculated SAR result for surrogate structures contained in program database (smilecas.dat) Calculation based on an atom/fragment contribution method of W. Meylan and P. Howard
GLP:	No
Study Reference:	American Petroleum Institute (1987) Comprehensive analytical analysis of API generic refinery streams Meylan, M. SRC 1994-1999. LOGKOWWIN is contained in the computer program EPIWIN (Estimate ver. 3 04), available from Syracuse Research Corp.

Reliability/Data Quality - Partition Coefficient

Reliability:	2 - Valid With Restrictions
Reliability Remarks:	(2) Valid with restrictions

Partition Coefficient

Test Substance - Partition Coefficient

Category Chemical:	(64741-46-4) Naphtha, petroleum, light straight-run
Test Substance:	(64741-46-4) Naphtha, petroleum, light straight-run
Test Substance Purity/Composition and Other Test Substance Comments:	LSRN (Low Naphthenic), CONCAWE sample CWE3 Substance type. Petroleum product Physical status: Liquid Remark: The naphtha streams that are rich in naphthenes are obtained from the atmospheric distillation of crude oil. The streams contain saturated and aromatic hydrocarbons, mainly in the range C4 to C10 and boil in the range of approximately minus 39 to 200 °C The naphthenic naphthas typically are composed of the following hydrocarbon classes: Approx. Content (volume %) Paraffins 72 Olefins <0.1 Naphthenics 21 Aromatics 7 Low naphthenic content CONCAWE sample CWE3 CAS No. 64741-46-4 Density (g/ml @ 16°C) 0.6662 Sulfur (ppm) 83 Detailed hydrocarbon analysis (Method ASTM D 5134-92) Olefins Naphthenes Aromatics Paraffins n- i- Total% 1.04 12.23 3.27 48.19 34.02 C4 0.00 0.00 0.00 0 006 0.000 C5 0 085 4 047 0.00 31.91 8 228 C6 0 830 6.696 2.252 16 139 23.917 C7 0.119 1.056 0.382 0.647 1.241 C8 0.00 0.303 0.334 0 263 0.324 C9 0.00 0.165 0.243 0.162 0.178
Category Chemical Result Type:	Estimated by Calculation
Test Substance Result Type:	Estimated

Results - Partition Coefficient

Partition Coefficient Value/Range (Log K_{OW}):	2.13 - 4 @ Temperature. 25 °C
Results Remarks:	Log P values represent the spread of calculated and/or measured values for C5 to C7 hydrocarbon components found in LSRN, CAS No 64741-46-4. Detailed hydrocarbon analysis was used to identify the components of this specific low naphthenic LSRN sample. Calculation based on an atom/fragment contribution method of W. Meylan and P. Howard. Calculated SAR result for surrogate structure contained in program database (smilecas.dat).

Study/Method - Partition Coefficient

Key Study Sponsor Indicator:	
Year Study Performed:	2000
Method/Guideline Followed:	Other
Method/Guideline and Test Condition Remarks:	Calculated by LOGKOWWIN ver. 1.65
GLP:	Yes
Study Reference:	CONCAWE (1995) Physico-chemical characterization of gasoline samples, study no 104990C. Study conducted by Exxon Biomedical Sciences Inc. CONCAWE, Brussels, 1995. Meylan, M, SRC 1994-1999. LOGKOWWIN is contained in the computer program EPIWIN (Estimate ver. 3.04), available from Syracuse Research Corp.

Reliability/Data Quality - Partition Coefficient

Reliability:	2 - Valid With Restrictions
Reliability Remarks:	(2) Valid with restrictions

Partition Coefficient

Test Substance - Partition Coefficient

Category Chemical: (64741-46-4) Naphtha, petroleum, light straight-run

Test Substance: (64741-46-4) Naphtha, petroleum, light straight-run

Test Substance Purity/Composition and Other Test Substance Comments: LSRN-Hi Naphthenic, CONCAWE sample W94/809
Substance type: Petroleum product
Physical status: Liquid
Remark: The naphtha streams that are rich in naphthenes are obtained from the atmospheric distillation of crude oil. The streams contain saturated and aromatic hydrocarbons, mainly in the range C4 to C10 and boil in the range of approximately minus 39 to 200 °C
The naphthenic naphthas typically are composed of the following hydrocarbon classes
 Approx. Content (volume %)
Paraffins 72
Olefins <0.1
Naphthenics 21
Aromatics 7
High naphthenic content
CONCAWE sample W94/809
CAS No. 64741-46-4
Density (g/ml @ 16°C) 0.7587
Sulfur (ppm) <10
Detailed hydrocarbon analysis (Method ASTM D 5134-92)

 Olefins Naphthenes Aromatics Paraffins
 n- i-
Total%
2 18 33.92 17.26 18 88 26.83
C4 0 019 0.00
0.00 0.141 0.059
C5 0.090 0.138 0.00 0.592
0 468
C6 0.066 2 578 0.756 1.565 1 341
C7
0.663 10.265 5.218 3.887 3.811
C8
0 074 11 036 9 044 8.407 9 409
C9 1.161 9.117
2.080 3.762 8.834
C10 0.103 0.778 0.153 0.778
0.103
C11 0.00 0.009 0 007 0.009 0.145

Category Chemical Result Type: Estimated by Calculation

Test Substance Result Type: Estimated

Results - Partition Coefficient

Partition Coefficient Value/Range (Log K_{OW}): 2.73 - 4 85 @ Temperature. 25 °C

Results Remarks: Log P values represent the spread of calculated and/or measured values for C5 to C9 hydrocarbon components found in LSRN, CAS No 64741-46-4. Detailed hydrocarbon analysis was used to identify the components of this specific high naphthenic LSRN sample. Calculation based on an atom/fragment contribution method of W. Meylan and P. Howard. Calculated SAR result for surrogate structure contained in program database (smilecas.dat)

Study/Method - Partition Coefficient

Key Study Sponsor Indicator:

Year Study Performed: 2000

Method/Guideline Followed: Other

Method/Guideline and Test Condition Remarks: Calculated by LOGKOWWIN ver. 1.65

GLP: No

Study Reference: CONCAWE (1995)
Physico-chemical characterization of gasoline samples, study no 104990C. Study conducted by Exxon
Biomedical Sciences Inc.
CONCAWE, Brussels, 1995.

Meylan, M, SRC 1994-1999
LOGKOWWIN is contained in the computer program EPIWIN (Estimate ver. 3.04), available from Syracuse Research Corp.

Reliability/Data Quality - Partition Coefficient

Reliability: 2 - Valid With Restrictions

Reliability Remarks:	(2) Valid with restrictions

Partition Coefficient

Test Substance - Partition Coefficient

Category Chemical:	(64741-55-5) Naphtha, petroleum, light catalytic cracked
Test Substance:	(64741-55-5) Naphtha, petroleum, light catalytic cracked
Test Substance Purity/Composition and Other Test Substance Comments:	Substance type : Petroleum product Physical status : Liquid Remark : The naphtha streams obtained from the catalytic cracking of heavy distillates into lighter fractions contain saturated, olefinic and aromatic hydrocarbons. However, their olefins content is higher than any of the naphtha streams derived by other processes. The catalytically cracked naphthas boil in the range of approximately -20 to 230°C and contain hydrocarbons in the range C4 to C10. The catalytically cracked naphthas typically are composed of the following hydrocarbon classes: Approx. Content (volume %) Paraffins 30 Olefins 46 Naphthenics 10 Aromatics 14 Light catalytically cracked naphtha (LCCN) (CAS 64741-55-5) is a typical olefinic naphtha stream. The American Petroleum Institute have reported (API, 1987) a thorough characterization of a specific sample of a light catalytically cracked naphtha (API 83-20), which has a high olefinic content and which was used in many of the mammalian toxicity studies. The characterization of this sample are found in the attached revised robust summary (page 43).
Category Chemical Result Type:	Estimated by Calculation
Test Substance Result Type:	Estimated

Results - Partition Coefficient

Partition Coefficient Value/Range (Log K_{OW}):	2.13 - 4 @ Temperature: 25 °C
Results Remarks:	Log P values represent the spread of calculated and/or measured values for the C5 to C9 hydrocarbon components found in LCCN, CAS No. 64741-55-5. Detailed hydrocarbon analysis performed by Chevron Research was used to identify the components of this specific LCCN sample. Calculated SAR result for surrogate structures contained in program database (smilecas.dat). Calculation based on an atom/fragment contribution method of W. Meylan and P. Howard.

Study/Method - Partition Coefficient

Key Study Sponsor Indicator:	
Year Study Performed:	2000
Method/Guideline Followed:	Other
Method/Guideline and Test Condition Remarks:	Calculated by LOGKOWWIN ver. 1.65.
GLP:	No
Study Reference:	Meylan, W. SRC 1994-1999. LOGKOWWIN is contained in the computer program EPIWIN (Estimate ver. 3.04), available from Syracuse Research Corp.

Reliability/Data Quality - Partition Coefficient

Reliability:	2 - Valid With Restrictions
Reliability Remarks:	(2) Valid with restrictions

Partition Coefficient

Test Substance - Partition Coefficient

Category Chemical:	(64741-66-8) Naphtha, petroleum, light alkylate
Test Substance:	(64741-66-8) Naphtha, petroleum, light alkylate
Test Substance Purity/Composition and Other Test Substance Comments:	Substance type : Petroleum product Physical status : Liquid Remark: Paraffinic naphtha streams are obtained by alkylation (catalytic reaction), isomerisation (catalytic conversion) and solvent extraction. They contain mostly saturated hydrocarbons, generally in the range C5 to C10 and boil in the range of approximately 90 to 160°C. The paraffinic naphthas typically are composed of the following hydrocarbon classes: Content (volume %) Paraffins 99.4 Olefins 0 Naphthenics 0.6 Aromatics 0 Light Alkylate Naphtha (CAS 64741-66-8) is a typical paraffinic naphtha stream. The American Petroleum Institute have reported a thorough characterization of a specific sample (API 83-19) of Light Alkylate Naphtha (LAN). The results of this characterization are found in the attached revised robust summary (page 2).
Category Chemical Result Type:	Estimated by Calculation
Test Substance Result Type:	Estimated

Results - Partition Coefficient

Partition Coefficient Value/Range (Log K_{OW}):	3.11 - 4.54 @ Temperature. 25 °C
Results Remarks:	Log P values represent the spread of calculated and/or measured values for the C5 to C9 hydrocarbon components found in LAN, CAS No. 64741-66-8. Detailed hydrocarbon analysis performed by Chevron Research was used to identify the components of this specific LAN sample. Calculated SAR result for surrogate structures contained in program database (smilecas.dat). Calculation based on an atom/fragment contribution method of W. Meylan and P. Howard

Study/Method - Partition Coefficient

Key Study Sponsor Indicator:	
Year Study Performed:	2000
Method/Guideline Followed:	Other
Method/Guideline and Test Condition Remarks:	Calculated by LOGKOWWIN ver. 1.65
GLP:	No
Study Reference:	Meylan, W., SRC 1994-1999. LOGKOWWIN is contained in the computer program EPIWIN (Estimate ver. 3.04), available from Syracuse Research Corp.

Reliability/Data Quality - Partition Coefficient

Reliability:	2 - Valid With Restrictions
Reliability Remarks:	(2) Valid with restrictions

Partition Coefficient

Test Substance - Partition Coefficient

Category Chemical:	*No CAS Number Provided*
Test Substance:	
Test Substance Purity/Composition and Other Test Substance Comments:	Gasoline CONCAWE sample, CWE5, Blend (match to API PS-6), CAS No. 86290-81-5
Category Chemical Result Type:	Estimated by Calculation
Test Substance Result Type:	Estimated

Results - Partition Coefficient

Partition Coefficient Value/Range (Log K_{OW}):	2.13 - 4.5 @ Temperature: 25 °C
Results Remarks:	Log P values represent the spread of calculated and/or measured values for C5 to C8 hydrocarbon components found in gasoline, CAS No 86290-81-5. Detailed hydrocarbon analysis was used to identify the components of this specific gasoline sample. Calculation based on an atom/fragment contribution method of W. Meylan and P Howard. Calculated SAR result for surrogate structure contained in program database (smilecas.dat).

Study/Method - Partition Coefficient

Key Study Sponsor Indicator:	
Year Study Performed:	2000
Method/Guideline Followed:	Other
Method/Guideline and Test Condition Remarks:	Calculated by LOGKOWWIN ver. 1.65
GLP:	No
Study Reference:	CONCAWE (1995) Physico-chemical characterization of gasoline samples, study no. 104990C. Study conducted by Exxon Biomedical Sciences Inc. Concawe, Brussels, 1995 Meylan, M, SRC 1994-1999. LOGKOWWIN is contained in the computer program EPIWIN (Estimate ver 3.04), available from Syracuse Research Corp.

Reliability/Data Quality - Partition Coefficient

Reliability:	2 - Valid With Restrictions
Reliability Remarks:	(2) Valid with restrictions

Water Solubility

Test Substance - Water Solubility

Category Chemical: (64741-63-5) Naphtha, petroleum, light catalytic reformed

Test Substance: (64741-63-5) Naphtha, petroleum, light catalytic reformed

Test Substance Purity/Composition and Other Test Substance Comments: AROMATIC NAPHTHAS
Substance type: Petroleum product
Physical status: Liquid
Remark: Aromatic naphtha streams are obtained from the catalytic reforming of mainly n-alkane and cycloparaffinic feedstocks into aromatic and branched chain hydrocarbons. The hydrocarbons are mainly in the range C5 to C12 and boil in the range of approximately 30 to 220°C. A typical aromatic naphtha is composed of the following hydrocarbon classes in the approximate proportions shown:
Content (volume %)
Paraffins 32
Olefins 0.5
Naphthenics 4
Aromatics 63.5
Light Catalytically Reformed Naphtha
Sample identified by Chevron Research as a light catalytically reformed naphtha CAS No. 64741-63-5
Detailed hydrocarbon analysis

Olefins	Naphthenes	Aromatics	Paraffins
 			total n- total%
0.90	2 36	39.40	57.34 17.51 C4
0.00	0.00	0.81	0.78 C5
0.34	0.26	0.00	19.45
8 05 C6	0.27	0.62	8.37
16 23 4.69 C7			
0 28	1.18	29.77	17.70 3 59 C8
0.01	0 27	1.26	3.12
0.40			

Category Chemical Result Type: Measured

Test Substance Result Type: Measured

Results - Water Solubility

Water Solubility Indicator:

Water Solubility Value/Range (Solubility): 3 - 2000 mg/L

pH Value:

pKa - Protein Kinase:

pH Value at Saturation:

Results Remarks: Gas chromatographic analysis of selected components freshwater and saltwater solubilities of 13.7 and 14.0 ppm respectively. Measured test concentrations of the light catalytically reformed naphtha were based on the total combined concentrations of pentane, 2-methyl-pentane, benzene, toluene, ethylbenzene, ortho, meta and para-xylene, which represent more than 50% composition of the test substance. Concentrations for these components reached equilibrium by 24 hours.
Individual components of complex petroleum substances have specific and differing solubilities. Calculated and measured water solubilities for LCRN components range from approximately 3 to 2000 mg/l. At any particular loading rate, the resulting aqueous concentration of each chemical constituent is a function of the relative volume of the two
phases (aqueous and the petroleum mixture), the partition coefficient between the phases, the amount of component present and the maximum water solubility of each component. Initially as the petroleum mixture is added in amounts below the solubility limit of the least soluble component the aqueous concentration increases proportionally until the least soluble component reaches a saturation concentration, and only the more soluble components continue to dissolve, resulting in a two phase system. Further addition of the petroleum mixture results in an aqueous concentration that is a non-linear function of the amount added.

Study/Method - Water Solubility

Key Study Sponsor Indicator:

Year Study Performed:	1995
Method/Guideline Followed:	Other
Method/Guideline and Test Condition Remarks:	Preparation of Water Soluble Fraction Water Accommodated Fractions (WAFs) of LCRN were prepared at 50 mg/l loading in freshwater and saltwater and equilibrated for 48 hours in tightly closed systems with minimal headspace.
GLP:	Yes
Study Reference:	ABC Laboratories, Inc (1998) Method Validation for the Analysis of the Water Accomodated Fraction of Light Catalytically Cracked Naphtha using Purge-and-Trap and GC/FID, Study No. 43582. ABC Laboratories, Inc. Environmental Toxicology, 7200 E. ABC Lane, Columbia, Missouri CONCAWE (1992) Ecotoxicological Testing Of Petroleum Products : Test Methodology. Report 92/56, CONCAWE, Brussels. CONCAWE (1996) Environmental risk assessment of petroleum substances: the hydrocarbon block method. Report 96/52, CONCAWE, Brussels. ECETOC (1998) QSARS in the Assessment of the Environmental Fate and Effects of Chemicals. Technical Report No. 74 ECETOC, (1996) Aquatic Toxicity Testing of Sparingly Soluble, Volatile and Unstable Substances. Monograph 26

Reliability/Data Quality - Water Solubility

Reliability:	2 - Valid With Restrictions
Reliability Remarks:	(2) Valid with restrictions

Water Solubility

Test Substance - Water Solubility

Category Chemical:	(68955-35-1) Naphtha, petroleum, catalytic reformed
Test Substance:	(68955-35-1) Naphtha, petroleum, catalytic reformed
Test Substance Purity/Composition and Other Test Substance Comments:	Full -Range Catalytically Reformed Naphtha (FRCRN)-CAS No. 68955-35-1; API sample 83-05. AROMATIC NAPHTHAS Substance type: Petroleum product Physical status: Liquid Remark: Aromatic naphtha streams are obtained from the catalytic reforming of mainly n-alkane and cycloparaffinic feedstocks into aromatic and branched chain hydrocarbons. The hydrocarbons are mainly in the range C5 to C12 and boil in the range of approximately 30 to 220°C. A typical aromatic naphtha is composed of the following hydrocarbon classes in the approximate proportions shown: Content (volume %) Paraffins 32 Olefins 0.5 Naphthenics 4 Aromatics 63.5
Category Chemical Result Type:	Measured
Test Substance Result Type:	Measured

Results - Water Solubility

Water Solubility Indicator:	
Water Solubility Value/Range (Solubility):	3 - 2000 mg/L
pH Value:	
pKa - Protein Kinase:	
pH Value at Saturation:	
Results Remarks:	Gas chromatographic analysis of LCRN components benzene, toluene, ethylbenzene, ortho, meta and para-xylene in WAFs indicated freshwater solubility of 6.3 ppm. Concentrations for these components reached equilibrium by 48 hours. Individual components of complex petroleum substances have specific and differing solubilities. Calculated and measured water solubilities for FRCRN components range from approximately 3 to 2000 mg/l. At any particular loading rate, the resulting aqueous concentration of each chemical constituent is a function of the relative volume of the two phases (aqueous and the petroleum mixture), the partition coefficient between the phases, the amount of component present and the maximum water solubility of each component Initially as the petroleum mixture is added in amounts below the solubility limit of the least soluble component the aqueous concentration increases proportionally until the least soluble component reaches a saturation concentration, and only the more soluble components continue to dissolve, resulting in a two phase system. Further addition of the petroleum mixture results in an aqueous concentration that is a non-linear function of the amount added.

Study/Method - Water Solubility

Key Study Sponsor Indicator:	
Year Study Performed:	1995
Method/Guideline Followed:	Other
Method/Guideline and Test Condition Remarks:	Preparation of Water Soluble Fraction Water Accommodated Fractions (WAFs) of CONCAWE Reformate light naphtha (LCRN), CAS no. 64741-63-5 (CONCAWE sample ID W94/812) were prepared at 100 mg/l loading in freshwater and equilibrated for 48 hours in tightly closed systems with minimal headspace. Detailed hydrocarbon analysis was used to identify the components of this CONCAWE Light Cracked Naphtha (63% aromatics) sample. The analysis indicated that the composition of the CONCAWE LCRN sample was essentially identical to the

	composition of API 83-05 FRCRN sample. Therefore the water solubility information for the CONCAWE LCRN sample is applicable to the FRCRN sample.
GLP:	Yes
Study Reference:	CONCAWE (1992) Ecotoxicological Testing Of Petroleum Products : Test Methodology. Report 92/56, CONCAWE, Brussels. CONCAWE (1995) Algal, Growth Inhibition Test study no. 104767, test substance MRD-95-047 Study conducted by Exxon Biomedical Sciences Inc. CONCAWE (1996) Environmental risk assessment of petroleum substances: the hydrocarbon block method. Report 96/52, CONCAWE, Brussels. ECETOC (1998) QSARS in the Assessment of the Environmental Fate and Effects of Chemicals Technical Report No. 74 ECETOC, (1996) Aquatic Toxicity Testing of Sparingly Soluble, Volatile and Unstable Substances. Monograph 26.

Reliability/Data Quality - Water Solubility

Reliability:	2 - Valid With Restrictions
Reliability Remarks:	(2) Valid with restrictions

Water Solubility

Test Substance - Water Solubility

Category Chemical: (64741-46-4) Naphtha, petroleum, light straight-run

Test Substance: (64741-46-4) Naphtha, petroleum, light straight-run

Test Substance Purity/Composition and Other Test Substance Comments: LSRN-Hi Naphthenic, CONCAWE sample W94/809
Substance type: Petroleum product
Physical status: Liquid
Remark. The naphtha streams that are rich in naphthenes are obtained from the atmospheric distillation of crude oil. The streams contain saturated and aromatic hydrocarbons, mainly in the range C4 to C10 and boil in the range of approximately minus 39 to 200 °C
The naphthenic naphthas typically are composed of the following hydrocarbon classes:
 Approx. Content (volume %)
Paraffins 72
Olefins <0.1
Naphthenics 21
Aromatics 7
High naphthenic content
CONCAWE sample W94/809
CAS No. 64741-46-4
Density (g/ml @ 16°C) 0 7587
Sulfur (ppm) <10
Detailed hydrocarbon analysis (Method ASTM D 5134-92)

 Olefins Naphthenes Aromatics Paraffins
 n- i-
Total%
2.18 33.92 17.26 18.88 26.83
C4 0.019 0.00 0.00 0.141 0.059
C5 0.090 0 138 0.00 0 592 0.468
C6 0.066 2.578 0.756 1.565 1 341
C7 0.663 10 265 5.218 3.887 3.811
C8 0.074 11 036 9.044 8.407 9 409
C9 1.161 9.117 2.080 3.762 8 834
C10 0.103 0 778 0 153 0 778 0 103
C11 0.00 0.009 0.007 0.009 0.145

Category Chemical Result Type: Measured

Test Substance Result Type: Measured

Results - Water Solubility

Water Solubility Indicator:

Water Solubility Value/Range (Solubility): 3 - 2000 mg/L

pH Value:

pKa - Protein Kinase:

pH Value at Saturation:

Results Remarks: Gas chromatographic analysis of TEX (toluene, ethyl benzene, and xylenes) components indicated freshwater solubility of 5.7-7.9 ppm (as TEX). Measured test concentrations of the LSRN were based on the total combined concentrations of TEXN which represent approximately 13% composition of the test substance. Concentrations for these components reached equilibrium by 19 hours.
Individual components of complex petroleum substances have specific and differing solubilities Calculated and measured water solubilities for LSRN components range from approximately 3 to 2000 mg/l. At any particular loading
rate, the resulting aqueous concentration of each chemical constituent is a function of the relative volume of the two phases (aqueous and the petroleum mixture), the partition coefficient between the phases, the amount of component
present and the maximum water solubility of each component.
Initially as the petroleum mixture is added in amounts below the solubility limit of the least soluble component the aqueous concentration increases proportionally until the least soluble component reaches a saturation concentration, and only the more soluble components continue to dissolve,
resulting in a two phase system. Further addition of the petroleum mixture results in an aqueous concentration that is a non-linear function of the amount added

Study/Method - Water Solubility

Key Study Sponsor Indicator:

Year Study Performed:	1995
Method/Guideline Followed:	Other
Method/Guideline and Test Condition Remarks:	Preparation of Water Soluble Fractions Water Accommodated Fractions (WAFs) of LSRN were prepared at 100 mg/L loading in freshwater and equilibrated for 48 hours in tightly closed systems with minimal headspace.
GLP:	Yes
Study Reference:	CONCAWE (1992) Ecotoxicological Testing Of Petroleum Products : Test Methodology. Report 92/56, CONCAWE, Brussels. CONCAWE (1995) Fish -acute toxicity test: study no. 104858, test substance MRD-95-048. Study conducted by Exxon Biomedical Sciences Inc. CONCAWE, Brussels. CONCAWE (1996) Environmental risk assessment of petroleum substances: the hydrocarbon block method. Report 96/52, CONCAWE, Brussels. ECETOC (1998) QSARS in the Assessment of the Environmental Fate and Effects of Chemicals Technical Report No 74 ECETOC, (1996) Aquatic Toxicity Testing of Sparingly Soluble, Volatile and Unstable Substances. Monograph 26.

Reliability/Data Quality - Water Solubility

Reliability:	2 - Valid With Restrictions
Reliability Remarks:	(2) Valid with restrictions

Water Solubility

Test Substance - Water Solubility

Category Chemical: (64741-46-4) Naphtha, petroleum, light straight-run

Test Substance: (64741-46-4) Naphtha, petroleum, light straight-run

Test Substance Purity/Composition and Other Test Substance Comments: LSRN (Low Naphthenic], CONCAWE sample CWE39
Substance type: Petroleum product
Physical status: Liquid
Remark: The naphtha streams that are rich in naphthenes are obtained from the atmospheric distillation of crude oil. The streams contain saturated and aromatic hydrocarbons, mainly in the range C4 to C10 and boil in the range of approximately minus 39 to 200 °C
The naphthenic naphthas typically are composed of the following hydrocarbon classes:
 Approx Content (volume %)
Paraffins 72
Olefins <0 1
Naphthenics 21
Aromatics 7
Low naphthenic content
CONCAWE sample CWE3
CAS No. 64741-46-4
Density (g/ml @ 16°C) 0.6662
Sulfur (ppm) 83
Detailed hydrocarbon analysis (Method ASTM D 5134-92)
Olefins Naphthenes Aromatics Paraffins

 n- i-
Total%
1.04 12.23 3 27 48.19 34.02
C4 0 00 0.00
0.00 0 006 0.000
C5 0.085 4.047 0.00 31 91
8.228
C6 0.830 6 696 2 252 16.139 23.917
C7 0 119
1.056 0 382 0.647 1 241
C8 0 00 0 303 0.334
0 263 0.324
C9 0.00 0.165 0.243 0.162 0.178

Category Chemical Result Type: Measured

Test Substance Result Type: Measured

Results - Water Solubility

Water Solubility Indicator:

Water Solubility Value/Range (Solubility): 3 - 2000 mg/L

pH Value:

pKa - Protein Kinase:

pH Value at Saturation:

Results Remarks: Gas chromatographic analysis of BTEX components indicated freshwater solubility at 24 hours of 4.9 ppm as benzene.
Individual components of complex petroleum substances have specific and differing solubilities. Calculated and measured water solubilities for LSRN components range from approximately 3 to 2000 mg/l. At any particular loading rate, the resulting aqueous concentration of each chemical constituent is a function of the relative volume of the two phases (aqueous and the petroleum mixture), the partition coefficient between the phases, the amount of component
present and the maximum water solubility of each component.
Initially as the petroleum mixture is added in amounts below the solubility limit of the least soluble component the aqueous concentration increases proportionally until the least soluble component reaches a saturation concentration, and only the more soluble components continue to dissolve, resulting in a two phase system Further addition of the petroleum mixture results in an aqueous concentration that is a non-linear function of the amount added.

Study/Method - Water Solubility

Key Study Sponsor Indicator:

Year Study Performed: 1995

Method/Guideline Followed: Other

Method/Guideline and Test Condition Remarks:	Preparation of Water Soluble Fractions Water Accommodated Fractions (WAFs) of LSRN were prepared at 1000 mg/L loading in freshwater and equilibrated for 48 hours in tightly closed systems with minimal headspace.
GLP:	Yes
Study Reference:	CONCAWE (1992) Ecotoxicological Testing Of Petroleum Products : Test Methodology. Report 92/56, CONCAWE, Brussels. CONCAWE (1996) Environmental risk assessment of petroleum substances: the hydrocarbon block method Report 96/52, CONCAWE, Brussels. ECETOC (1998) QSARS in the Assessment of the Environmental Fate and Effects of Chemicals. Technical Report No. 74 ECETOC, (1996) Aquatic Toxicity Testing of Sparingly Soluble, Volatile and Unstable Substances. Monograph 26 Springborn Laboratories, Inc. (1993) CWE3 (Straight Run Gasoline) Toxicity to freshwater Alga, Selenastrum capricornutum. SLI Report # 93-6-4805. Springborn Laboratories, Inc. Environmental Sciences division, 790 Main Street, Wareham, Massachusetts, USA.

Reliability/Data Quality - Water Solubility

Reliability:	2 - Valid With Restrictions
Reliability Remarks:	(2) Valid with restrictions

Water Solubility

Test Substance - Water Solubility

Category Chemical:	(64741-55-5) Naphtha, petroleum, light catalytic cracked
Test Substance:	(64741-55-5) Naphtha, petroleum, light catalytic cracked
Test Substance Purity/Composition and Other Test Substance Comments:	Substance type : Petroleum product Physical status Liquid Remark : The naphtha streams obtained from the catalytic cracking of heavy distillates into lighter fractions contain saturated, olefinic and aromatic hydrocarbons. However, their olefins content is higher than any of the naphtha streams derived by other processes. The catalytically cracked naphthas boil in the range of approximately -20 to 230°C and contain hydrocarbons in the range C4 to C10. The catalytically cracked naphthas typically are composed of the following hydrocarbon classes: Approx. Content (volume %) Paraffins 30 Olefins 46 Naphthenics 10 Aromatics 14 Light catalytically cracked naphtha (LCCN) (CAS 64741-55-5) is a typical olefinic naphtha stream. The American Petroleum Institute have reported (API, 1987) a thorough characterization of a specific sample of a light catalytically cracked naphtha (API 83-20), which has a high olefinic content and which was used in many of the mammalian toxicity studies. The characterization of this sample are found in the attached revised robust summary (page 43).
Category Chemical Result Type:	Measured
Test Substance Result Type:	Measured

Results - Water Solubility

Water Solubility Indicator:	
Water Solubility Value/Range (Solubility):	3 - 2000 mg/L
pH Value:	
pKa - Protein Kinase:	
pH Value at Saturation:	
Results Remarks:	Gas chromatographic analysis of selected components indicated freshwater and saltwater solubilities of 4.6 and 4.3 ppm respectively Measured test concentrations of the light alkylate naphtha were based on the total combined concentrations of benzene, toluene, ethylbenzene, o-xylene and p-xylene, which represent 13% composition of the test substance. Concentrations for these components reached equilibrium in freshwater and saltwater by 24 and 12 hours respectively. Conclusion : Individual components of complex petroleum substances have specific and differing solubilities. Calculated and measured water solubilities for LCCN components range from approximately 3 to 2000 mg/l. At any particular loading rate, the resulting aqueous concentration of each chemical constituent is a function of the relative volume of the two phases (aqueous and the petroleum mixture), the partition coefficient between the phases, the amount of component present and the maximum water solubility of each component. Initially as the petroleum mixture is added in amounts below the solubility limit of the least soluble component the aqueous concentration increases proportionally until the least soluble component reaches a saturation concentration, and only the more soluble components continue to dissolve, resulting in a two phase system. Further addition of the petroleum mixture results in an aqueous concentration that is a non-linear function of the amount added.

Study/Method - Water Solubility

Key Study Sponsor Indicator:	
Year Study Performed:	1995

Method/Guideline Followed:	Other
Method/Guideline and Test Condition Remarks:	Preparation of Water Soluble Fraction Water Accommodated Fractions (WAFs) of LCCN were prepared at 50 mg/l loading in freshwater and saltwater and equilibrated for 72 hours in tightly closed systems with minimal headspace.
GLP:	Yes
Study Reference:	CONCAWE (1992) Ecotoxicological Testing Of Petroleum Products - Test Methodology. Report 92/56, CONCAWE, Brussels CONCAWE (1996) Environmental risk assessment of petroleum substances: the hydrocarbon block method. Report 96/52, CONCAWE, Brussels.ECETOC (1998) QSARS in the Assessment of the Environmental Fate and Effects of Chemicals. Technical Report No. 74. ECETOC, (1996) Aquatic Toxicity Testing of Sparingly Soluble, Volatile and Unstable Substances. Monograph 26. Stonybrook Laboratories, Inc.(1995) Method Validation for the Analysis of Whole Light Catalytically Cracked Naphtha (LCCN) in Water Accomodated Fraction (WAF) using Purge-and-Trap and GC/FID, Study No. 66232. Stonybrook Laboratories, Inc. Princeton, NJ.1995

Reliability/Data Quality - Water Solubility

Reliability:	2 - Valid With Restrictions
Reliability Remarks:	(2) Valid with restrictions

Water Solubility

Test Substance - Water Solubility

Category Chemical: (64741-66-8) Naphtha, petroleum, light alkylate

Test Substance: (64741-66-8) Naphtha, petroleum, light alkylate

Test Substance Purity/Composition and Other Test Substance Comments: Substance type : Petroleum product
Physical status : Liquid
Remark: Paraffinic naphtha streams are obtained by alkylation (catalytic reaction), isomerisation (catalytic conversion) and solvent extraction. They contain mostly saturated hydrocarbons, generally in the range C5 to C10 and boil in the range of approximately 90 to 160°C. The paraffinic naphthas typically are composed of the following hydrocarbon classes:
 Content (volume %)
Paraffins 99.4
Olefins 0
Naphthenics 0.6
Aromatics 0
Light Alkylate Naphtha (CAS 64741-66-8) is a typical paraffinic naphtha stream.
The American Petroleum Institute have reported a thorough characterization of a specific sample (API 83-19) of Light Alkylate Naphtha (LAN). The results of this characterization are found in the attached revised robust summary (page 2).

Category Chemical Result Type: Measured

Test Substance Result Type: Measured

Results - Water Solubility

Water Solubility Indicator:

Water Solubility Value/Range (Solubility): 1 - 30 mg/L

pH Value:

pKa - Protein Kinase:

pH Value at Saturation:

Results Remarks: Gas chromatographic analysis of selected components indicated freshwater and saltwater solubilities of 1.6 and 0.9 ppm respectively. Measured test concentrations of the light alkylate naphtha were based on the total combined concentrations of 2,3 dimethyl butane; 2,4 dimethyl pentane; 2,2,4 trimethyl pentane, 2,5 dimethyl hexane; 2,3,4 trimethyl pentane, 2,3,3 trimethyl pentane and 1-methyl-1-ethyl cyclopentane, which represent 68% composition of the test substance. Concentrations for these components reached equilibrium in freshwater and saltwater by 24 and 12 hours respectively.
Individual components of complex petroleum substances have specific and differing solubilities. Calculated and measured water solubilities for LAN components range from <1 to approximately 30 mg/l. At any particular loading rate, the resulting aqueous concentration of each chemical constituent is a function of the relative volume of the two phases (aqueous and the petroleum mixture), the partition coefficient between the phases, the amount of component present and the maximum water solubility of each component. Initially as the petroleum mixture is added in amounts below the solubility limit of the least soluble component the aqueous concentration increases proportionally until the least soluble component reaches a saturation concentration, and only the more soluble components continue to dissolve,
resulting in a two phase system. Further addition of the petroleum mixture results in an aqueous concentration that is a non-linear function of the amount added.

Study/Method - Water Solubility

Key Study Sponsor Indicator:

Year Study Performed: 1995

Method/Guideline Followed: Other

Method/Guideline and Test Condition Remarks:	Preparation of Water Soluble Fraction Water Accommodated Fractions (WAFs) of LAN were prepared at 50 mg/l loading in freshwater and saltwater and equilibrated for 72 hours in tightly closed systems with minimal headspace.
GLP:	Yes
Study Reference:	CONCAWE (1992) Ecotoxicological Testing Of Petroleum Products : Test Methodology. Report 92/56, CONCAWE, Brussels. CONCAWE (1996) Environmental risk assessment of petroleum substances: the hydrocarbon block method. Report 96/52, CONCAWE, Brussels. ECETOC (1998) QSARS in the Assessment of the Environmental Fate and Effects of Chemicals. Technical Report No. 74 ECETOC, (1996) Aquatic Toxicity Testing of Sparingly Soluble, Volatile and Unstable Substances. Monograph 26. Stonybrook Laboratories, Inc. (1995) Method Validation for the Analysis of Whole Light Alkylate Naphtha (LAN) in Water Accomodated Fraction (WAF) using Purge-and-Trap and GC/FID, Study No. 65969. Stonybrook Laboratories Inc. Princeton, NJ.

Reliability/Data Quality - Water Solubility

Reliability:	2 - Valid With Restrictions
Reliability Remarks:	(2) Valid with restrictions

Water Solubility

Test Substance - Water Solubility

Category Chemical: *No CAS Number Provided*

Test Substance:

Test Substance Purity/Composition and Other Test Substance Comments: Gasoline CONCAWE sample, CWE5, Blend (match to API PS-6), CAS No.
86290-81-5

Category Chemical Result Type: Measured

Test Substance Result Type: Measured

Results - Water Solubility

Water Solubility Indicator:

Water Solubility Value/Range (Solubility): 3 - 2000 mg/L

pH Value:

pKa - Protein Kinase:

pH Value at Saturation:

Results Remarks: Gas chromatographic analysis of BTEX components indicated freshwater solubility at 24 hours of 3.1, 3.1, <6.9E-3, and 0.92 ppm (as BTEX, respectively).
Individual components of complex petroleum substances have specific and differing solubilities Calculated and measured water solubilities for LSRN components range from approximately 3 to 2000 mg/l At any particular loading
rate, the resulting aqueous concentration of each chemical constituent is a function of the relative volume of the two phases (aqueous and the petroleum mixture), the partition coefficient between the phases, the amount of component
present and the maximum water solubility of each component
Initially as the petroleum mixture is added in amounts below the solubility limit of the least soluble component the aqueous concentration increases proportionally until the least soluble component reaches a saturation concentration, and only the more soluble components continue to dissolve,
resulting in a two phase system. Further addition of the petroleum mixture results in an aqueous concentration that is a non-linear function of the amount added.

Study/Method - Water Solubility

Key Study Sponsor Indicator:

Year Study Performed: 1995

Method/Guideline Followed: Other

Method/Guideline and Test Condition Remarks: Preparation of Water Soluble Fraction
Water Accommodated Fractions (WAFs) of LSRN were prepared at 100 mg/l loading in freshwater and equilibrated for 48 hours in tightly closed systems with minimal headspace

GLP: Yes

Study Reference: CONCAWE (1992) Ecotoxicological Testing Of Petroleum Products Test Methodology Report 92/56, CONCAWE, Brussels.
CONCAWE (1996) Environmental risk assessment of petroleum substances: the hydrocarbon block method. Report 96/52, CONCAWE, Brussels.
ECETOC (1998) QSARS in the Assessment of the Environmental Fate and Effects of Chemicals Technical Report No. 74
ECETOC, (1996) Aquatic Toxicity Testing of Sparingly Soluble, Volatile

and Unstable Substances Monograph 26.

Reliability/Data Quality - Water Solubility

Reliability: 2 - Valid With Restrictions

Reliability Remarks: (2) Valid with restrictions

Physical-Chemical Other

Density/Specific Gravity

Test Substance - Density/Specific Gravity

Category Chemical:	(64741-66-8) Naphtha, petroleum, light alkylate
Test Substance:	(64741-66-8) Naphtha, petroleum, light alkylate
Test Substance Purity/Composition and Other Test Substance Comments:	Paragginic Naphtha
Category Chemical Result Type:	Measured
Test Substance Result Type:	Measured

Results - Density/Specific Gravity

Density Type:	Relative Density
Density/Specific Gravity Value/Range:	0 697 @ Temperature: 15 °C
Results Remarks:	

Study/Method - Density/Specific Gravity

Key Study Sponsor Indicator:	
Year Study Performed:	
Method/Guideline Followed:	Other
Method/Guideline and Test Condition Remarks:	ASTM D287
GLP:	No Data
Study Reference:	American Petroleum Institute (1987) Comprehensive analytical analysis of API generic refinery streams. American Society for Testing and Materials (ASTM), 1991 Annual Book of ASTM Standards Section 5, Petroleum Products, Lubricants and Fossil Fuels, ASTM, Philadelphia, Pa., 1991.

Reliability/Data Quality - Density/Specific Gravity

Reliability:	1 - Valid Without Restrictions
Reliability Remarks:	

Fate SIDS

Photodegradation

Test Substance - Photodegradation

Category Chemical: (64741-63-5) Naphtha, petroleum, light catalytic reformed

Test Substance: (64741-63-5) Naphtha, petroleum, light catalytic reformed

Test Substance Purity/Composition and Other Test Substance Comments: Light Catalytically Reformed Naphtha.
AROMATIC NAPHTHAS
Substance type: Petroleum product
Physical status. Liquid
Remark: Aromatic naphtha streams are obtained from the catalytic reforming of mainly n-alkane and cycloparaffinic feedstocks into aromatic and branched chain hydrocarbons. The hydrocarbons are mainly in the range C5 to C12 and boil in the range of approximately 30 to 220°C. A typical aromatic naphtha is composed of the following hydrocarbon classes in the approximate proportions shown.
Content (volume %)
Paraffins 32
Olefins 0.5
Naphthenics 4
Aromatics 63.5
Sample identified by Chevron Research as a light catalytically reformed naphtha CAS No. 64741-63-5
Detailed hydrocarbon analysis

Olefins Naphthenes Aromatics Paraffins
total n-
total%
0.90 2.36 39.40 57.34 17 51
C4 0.00 0.00 0.00 0.00 0.81 0.78
C5 0.34 0.26 0.00 19.45 8.05
C6 0.27 0.62 8 37 16.23 4.69
C7 0.28 1.18 29.77 17.70 3 59
C8 0.01 0.27 1.26 3.12 0.40

Category Chemical Result Type: Estimated by Calculation

Test Substance Result Type: Estimated

Results - Photodegradation

Photodegradation Result Description: Indirect Photolysis

Photodegradation Value/Range: 6.691E-13 - 7.1392E-12 cm3/molecule*sec

Half Life:

Rate Constant:

Photo Medium:

Temperature:

Sensitizer: Hydroxy Radicals

Sensitizer Concentration and Units: 1500000 OH radicals/cm3

Light Source: Sunlight

Light Source Spectrum:

UV/VIS Absorption Spectrum:

Quantum Yield:

Breakdown Products Description:

Results Remarks: Rate constant: 0.6691E-12 cm 3/mol-sec (isopentane) to 7.1392E-12 (2,3 dimethyl pentane)
Half life: 1.498 to 15.985 days

Study/Method - Photodegradation

Key Study Sponsor Indicator:

Year Study Performed: 2000

Method/Guideline Followed:	AOPWIN (EPI Suite; EPIWIN)
Deviations from Method/Guideline:	
Method/Guideline Description:	Calculated by AOPWIN ver. 1.89. Method based on the work of R. Atkinson
Method/Guideline and Test Condition Remarks:	Relative intensity = 1 based on intensity of sunlight AOPWIN ver 1 89 calculates atmospheric oxidation half lives of hydrocarbons in contact with hydroxyl radicals in the troposphere, under the influence of sunlight and in contact with O3 Atmospheric oxidation rates were calculated for the C5 to C8 hydrocarbon components found in LCRN, CAS No. 64741-63-5 Detailed hydrocarbon analysis performed by Chevron Research was used to identify the components of this specific LCRN sample. Based on a 12-hour day, the range for atmospheric half-lives for LCRN constituents is. 1 '498 days (2,3 dimethyl pentane) to 15 985 days (isopentane).
GLP:	No
Study Reference:	Meylan, M, SRC 1994-1999. AOPWIN is contained in the computer program EPIWIN (Estimate ver. 3.04), available from Syracuse Research Corp.

Reliability/Data Quality - Photodegradation

Reliability:	2 - Valid With Restrictions
Reliability Remarks:	(2) Valid with restrictions

Photodegradation

Test Substance - Photodegradation

Category Chemical: (64741-46-4) Naphtha, petroleum, light straight-run

Test Substance: (64741-46-4) Naphtha, petroleum, light straight-run

Test Substance Purity/Composition and Other Test Substance Comments: LSRN-Hi Naphthenic, CONCAWE sample W94/809
Substance type: Petroleum product
Physical status: Liquid
Remark. The naphtha streams that are rich in naphthenes are obtained from the atmospheric distillation

of crude oil The streams contain saturated and aromatic hydrocarbons, mainly in the range C4 to C10

and boil in the range of approximately minus 39 to 200 °C
The naphthenic naphthas typically are composed of the following hydrocarbon classes
 Approx. Content (volume %)
Paraffins 72
Olefins <0.1
Naphthenics 21
Aromatics 7
High naphthenic content
CONCAWE sample W94/809
CAS No. 64741-46-4
Density (g/ml @ 16°C) 0 7587
Sulfur (ppm) <10
Detailed hydrocarbon analysis (Method ASTM D 5134-92)

 Olefins Naphthenes Aromatics Paraffins
 n- i-
Total%
2.18 33.92 17.26 18.88 26 83
C4 0.019 0 00 0 00 0.141 0.059
C5 0 090 0.138 0.00 0 592 0.468
C6 0 066 2.578 0.756 1.565 1.341
C7 0.663 10.265 5 218 3 887 3.811
C8 0.074 11.036 9.044 8.407 9.409
C9 1.161 9.117 2.080 3 762 8.834
C10 0 103 0.778 0 153 0 778 0.103
C11 0.00 0 009 0.007 0 009 0.145

Category Chemical Result Type: Estimated by Calculation

Test Substance Result Type: Estimated

Results - Photodegradation

Photodegradation Result Description: Indirect Photolysis

Photodegradation Value/Range: 1.9498E12 - 1.35606E-11 cm3/molecule*sec

Half Life:

Rate Constant:

Photo Medium:

Temperature:

Sensitizer: Hydroxy Radicals

Sensitizer Concentration and Units: 1500000 OH radicals/cm3

Light Source: Sunlight

Light Source Spectrum:

UV/VIS Absorption Spectrum:

Quantum Yield:

Breakdown Products Description:

Results Remarks: Rate Constant: 1.9498E-12 (benzene) to 13.5606 E(m-xylene) cm3/molecule-sec Half-life: 0.789 to 5.486 days
AOPWIN ver. 1.89 calculates atmospheric oxidation half lives of hydrocarbons in contact with hydroxyl radicals in the troposphere, under the influence of sunlight and in contact with O3. Atmospheric oxidation rates were calculated for the C5 to C9 hydrocarbon components found in LSRN, CAS No. 64741-46-4 Detailed hydrocarbon analysis

	was used to identify the components of this specific low naphthenic LSRN sample Based on a 12-hour day, the range for atmospheric half-lives for LSRN constituents is 0.789 days (m-xylene) to 5.486 days (benzene)

Study/Method - Photodegradation

Key Study Sponsor Indicator:	
Year Study Performed:	2000
Method/Guideline Followed:	AOPWIN (EPI Suite; EPIWIN)
Deviations from Method/Guideline:	
Method/Guideline Description:	Calculated by AOPWIN ver. 1 89. Method based on the work of R Atkinson
Method/Guideline and Test Condition Remarks:	
GLP:	No
Study Reference:	CONCAWE (1995) Physico-chemical characterization of gasoline samples, study no. 104990C. Study conducted by Exxon Biomedical Sciences Inc CONCAWE, Brussels, 1995. Meylan, M, SRC 1994-1999. AOPWIN is contained in the computer program EPIWIN (Estimate ver 3.04), available from Syracuse Research Corp.

Reliability/Data Quality - Photodegradation

Reliability:	2 - Valid With Restrictions
Reliability Remarks:	(2) Valid with restrictions

Photodegradation

Test Substance - Photodegradation

Category Chemical:	*No CAS Number Provided*
Test Substance:	*No CAS Number Provided*
Test Substance Purity/Composition and Other Test Substance Comments:	Gasoline CONCAWE sample, CWE5, Blend (match to API PS-6), CAS No. 86290-81-5
Category Chemical Result Type:	Estimated by Calculation
Test Substance Result Type:	Estimated

Results - Photodegradation

Photodegradation Result Description:	Indirect Photolysis
Photodegradation Value/Range:	6.991E-13 - 1.35606E-11 cm3/molecule*sec
Half Life:	
Rate Constant:	
Photo Medium:	
Temperature:	
Sensitizer:	Hydroxy Radicals
Sensitizer Concentration and Units:	1500000 OH radicals/cm3
Light Source:	Sunlight
Light Source Spectrum:	
UV/VIS Absorption Spectrum:	
Quantum Yield:	
Breakdown Products Description:	
Results Remarks:	Rate constant: 0.6991 E-12 (isopentane) to 13.5606 E-12 (m-xylene) cm3/molecule-sec Half-life: 0.789 to 15.985 days

Study/Method - Photodegradation

Key Study Sponsor Indicator:	
Year Study Performed:	2000
Method/Guideline Followed:	AOPWIN (EPI Suite; EPIWIN)
Deviations from Method/Guideline:	
Method/Guideline Description:	Calculated by AOPWIN ver. 1.89. Method based on the work of R. Atkinson
Method/Guideline and Test Condition Remarks:	AOPWIN ver 1.89 calculates atmospheric oxidation half lives of hydrocarbons in contact with hydroxyl radicals in the troposphere, under the influence of sunlight and in contact with O3 Atmospheric oxidation rates were calculated for the C5 to C8 hydrocarbon components found in gasoline. Detailed

	hydrocarbon analysis was used to identify the components of this specific gasoline sample. Based on a 12-hour day, the range for atmospheric half-lives for gasoline constituents is: 0.789 days (m-xylene) to 15.985 days (isopentane).
GLP:	No
Study Reference:	CONCAWE (1995) Physico-chemical characterization of gasoline samples, study no. 104990C. Study conducted by Exxon Biomedical Sciences Inc. Concawe, Brussels, 1995. Meylan, M, SRC 1994-1999. AOPWIN is contained in the computer program EPIWIN (Estimate ver. 3.04), available from Syracuse Research Corp.

Reliability/Data Quality - Photodegradation

Reliability:	2 - Valid With Restrictions
Reliability Remarks:	(2) Valid with restrictions

Photodegradation

Test Substance - Photodegradation

Category Chemical: (64741-46-4) Naphtha, petroleum, light straight-run

Test Substance: (64741-46-4) Naphtha, petroleum, light straight-run

Test Substance Purity/Composition and Other Test Substance Comments: LSRN-Moderate (19.7%) Naphthenic,
LSRN (Moderate Naphthenic]
Substance type: Petroleum product
Physical status: Liquid
Remark: The naphtha streams that are rich in naphthenes are obtained from the atmospheric distillation of crude oil. The streams contain saturated and aromatic hydrocarbons, mainly in the range C4 to C10 and boil in the range of approximately minus 39 to 200 °C
The naphthenic naphthas typically are composed of the following hydrocarbon classes:
 Approx. Content (volume %)
Paraffins 72
Olefins <0.1
Naphthenics 21
Aromatics 7
Moderate naphthenic content
Chevron sample (Chevron, 1995)
CAS No. 64741-46-4
Detailed hydrocarbon analysis (Method ASTM D 5134-92)

Olefins	Naphthenes	Aromatics	Paraffins		
			n-	i- Total%	
0.72	22.41	3.06	73.31	31.13 C4	0.03
0.00					
0.00	5.85	5.580 C5	0.085	1.73	0.00
38.80					
16.27 C6	0.36	6.24	0.70	18.18	6.26 C7
0.05	7.11	1.12	5.58	2.00 C8	0.00
5.31					
0.96	3.22	0.79 C9	0.00	1.95	0.25
1.20	0.13				
 C10	0.00	0.07	0 03	0.46	0.08

Category Chemical Result Type: Estimated by Calculation

Test Substance Result Type: Estimated

Results - Photodegradation

Photodegradation Result Description: Indirect Photolysis

Photodegradation Value/Range: 6.691E-13 - 1.35606E-11 cm3/molecule*sec

Half Life:

Rate Constant:

Photo Medium:

Temperature:

Sensitizer: Hydroxy Radicals

Sensitizer Concentration and Units: 1500000 OH radicals/cm3

Light Source: Sunlight

Light Source Spectrum:

UV/VIS Absorption Spectrum:

Quantum Yield:

Breakdown Products Description:

Results Remarks: Rate Constant: 0.6691E -12 (isopentane) to 13.5606E -12 (m-xylene) cm 3/molecule-sec
Half-life: 0.789 to 15.985 days
AOPWIN ver. 1.89 calculates atmospheric oxidation half lives of
hydrocarbons in contact with hydroxyl radicals in the troposphere, under
the influence of sunlight and in contact with O3. Atmospheric oxidation
rates were calculated for the C5 to C9 hydrocarbon components found in
LSRN, CAS No. 64741-46-4. Detailed hydrocarbon analysis was used to
identify the components of this specific

	moderate naphthenic LSRN sample. Based on a 12-hour day, the range for atmospheric half-lives for LSRN constituents is: 0.789 days (m-xylene) to 15.985 days (isopentane).

Study/Method - Photodegradation

Key Study Sponsor Indicator:	
Year Study Performed:	2000
Method/Guideline Followed:	AOPWIN (EPI Suite; EPIWIN)
Deviations from Method/Guideline:	
Method/Guideline Description:	Calculated by AOPWIN ver. 1.89. Method based on the work of R.Atkinson
Method/Guideline and Test Condition Remarks:	Relative intensity : = 1 based on intensity of sunlight
GLP:	No
Study Reference:	Meylan, M, SRC 1994-1999 AOPWIN is contained in the computer program EPIWIN (Estimate ver. 3.04), available from Syracuse Research Corp

Reliability/Data Quality - Photodegradation

Reliability:	2 - Valid With Restrictions
Reliability Remarks:	(2) Valid with restrictions

Photodegradation

Test Substance - Photodegradation

Category Chemical: (64741-66-8) Naphtha, petroleum, light alkylate

Test Substance: (64741-66-8) Naphtha, petroleum, light alkylate

Test Substance Purity/Composition and Other Test Substance Comments: Light alkylate naphtha
Paraffinic naphtha
Substance type : Petroleum product
Physical status : Liquid
Remark: Paraffinic naphtha streams are obtained by alkylation (catalytic reaction), isomerisation (catalytic conversion) and solvent extraction. They contain mostly saturated hydrocarbons, generally in the range C5 to C10 and boil in the range of approximately 90 to 160°C The paraffinic naphthas typically are composed of the following hydrocarbon classes:
 Content (volume %)
Paraffins 99.4
Olefins 0
Naphthenics 0.6
Aromatics 0
Light Alkylate Naphtha (CAS 64741-66-8) is a typical paraffinic naphtha stream.
The American Petroleum Institute have reported a thorough characterization of a specific sample (API 83-19) of Light Alkylate Naphtha (LAN). The results of this characterization are found in the attached revised robust summary (page 2).

Category Chemical Result Type: Estimated by Calculation

Test Substance Result Type: Estimated

Results - Photodegradation

Photodegradation Result Description: Indirect Photolysis

Photodegradation Value/Range: 6.691E-13 - 9.956E-12 cm3/molecule*sec

Half Life:

Rate Constant:

Photo Medium:

Temperature:

Sensitizer: Hydroxy Radicals

Sensitizer Concentration and Units: 1500000 OH radicals/cm3

Light Source: Sunlight

Light Source Spectrum:

UV/VIS Absorption Spectrum:

Quantum Yield:

Breakdown Products Description:

Results Remarks: Rate Constant 0.6691E-12 (isopentane) cm 3/mol-sec to 9.956E-12 (2,3,5 trimethyl hexane)
Half-life 1.074 days to 15.985 days

Study/Method - Photodegradation

Key Study Sponsor Indicator:

Year Study Performed: 2000

Method/Guideline Followed: AOPWIN (EPI Suite; EPIWIN)

Deviations from Method/Guideline:	
Method/Guideline Description:	Calculated by AOPWIN ver. 1.89. Method based on the work of R.Atkinson
Method/Guideline and Test Condition Remarks:	AOPWIN ver. 1.89 calculates atmospheric oxidation half lives of hydrocarbons in contact with hydroxyl radicals in the troposphere, under the influence of sunlight and in contact with O3. Atmospheric oxidation rates were calculated for the C5 to C8 hydrocarbon components found in LAN, CAS No. 64741-66-8. Detailed hydrocarbon analysis performed by Chevron Research was used to identify the components of this specific LAN sample. Based on a 12-hour day, the range for atmospheric half-lives for LAN constituents is: 1.074 days (2,3,5 trimethyl hexane) to 15.985 days (isopentane).
GLP:	No
Study Reference:	Meylan, M, SRC 1994-1999. AOPWIN is contained in the computer program EPIWIN (Estimate ver. 3.04), available from Syracuse Research Corp.

Reliability/Data Quality - Photodegradation

Reliability:	2 - Valid With Restrictions
Reliability Remarks:	(2) Valid with restrictions

Photodegradation

Test Substance - Photodegradation

Category Chemical:	(64741-55-5) Naphtha, petroleum, light catalytic cracked
Test Substance:	(64741-55-5) Naphtha, petroleum, light catalytic cracked
Test Substance Purity/Composition and Other Test Substance Comments:	Light catalytic cracked naphtha Olefinic naphthas Substance type Petroleum product Physical status . Liquid Remark : The naphtha streams obtained from the catalytic cracking of heavy distillates into lighter fractions contain saturated, olefinic and aromatic hydrocarbons. However, their olefins content is higher than any of the naphtha streams derived by other processes. The catalytically cracked naphthas boil in the range of approximately -20 to 230°C and contain hydrocarbons in the range C4 to C10. The catalytically cracked naphthas typically are composed of the following hydrocarbon classes: Approx. Content (volume %) Paraffins 30 Olefins 46 Naphthenics 10 Aromatics 14 Light catalytically cracked naphtha (LCCN) (CAS 64741-55-5) is a typical olefinic naphtha stream. The American Petroleum Institute have reported (API, 1987) a thorough characterization of a specific sample of a light catalytically cracked naphtha (API 83-20), which has a high olefinic content and which was used in many of the mammalian toxicity studies. The characterization of this sample are found in the attached revised robust summary (page 43).
Category Chemical Result Type:	Estimated by Calculation
Test Substance Result Type:	Estimated

Results - Photodegradation

Photodegradation Result Description:	Indirect Photolysis
Photodegradation Value/Range:	6.691E-13 - 8.941E-11 cm3/molecule*sec
Half Life:	
Rate Constant:	
Photo Medium:	
Temperature:	
Sensitizer:	Hydroxy Radicals
Sensitizer Concentration and Units:	1500000 OH radicals/cm3
Light Source:	Sunlight
Light Source Spectrum:	
UV/VIS Absorption Spectrum:	
Quantum Yield:	
Breakdown Products Description:	
Results Remarks:	Rate constant: 0.6691E-12 cm 3/mol-sec (isopentane) to 89.41 E-12 (1-methyl cyclopentene) Half life: 1.44 hours to 15 985 days Sensitizer: O3 radical Conc. of sensitizer: 7E1103/cm3 Rate constant: 1.2E-17 to 43-17 cm 3/molecule-sec Half life: 38.378 min to 22.920 Hrs.

Study/Method - Photodegradation

Key Study Sponsor Indicator:	

Year Study Performed:	2000
Method/Guideline Followed:	AOPWIN (EPI Suite; EPIWIN)
Deviations from Method/Guideline:	
Method/Guideline Description:	Calculated by AOPWIN ver. 1.89. Method based on the work of R. Atkinson
Method/Guideline and Test Condition Remarks:	AOPWIN ver. 1.89 calculates atmospheric oxidation half lives of hydrocarbons in contact with hydroxyl radicals in the troposphere, under the influence of sunlight and in contact with O3. Atmospheric oxidation rates were calculated for the C5 to C9 hydrocarbon components found in LCCN CAS No. 647415. Detailed hydrocarbon analysis performed by Chevron Research was used to identify the components of this specific LCCN sample. Based on a 12-hour day, the range for atmospheric half-lives for LCCN constituents due to OH reactions is: 1.44 hours (1-methyl cyclopentene) to 15.985 days (isopentane). The range for atmospheric half-lives due to O3 reactions for LCCN olefinic constituents (accounting for approximately 30% composition) is 38.378 min (1-methyl cyclopentene) to 22.920 Hrs (C5 olefins).
GLP:	No
Study Reference:	Meylan, M. SRC 1994-1999. AOPWIN is contained in the computer program EPIWIN (Estimate ver. 3.04), available from Syracuse Research Corp.

Reliability/Data Quality - Photodegradation

Reliability:	2 - Valid With Restrictions
Reliability Remarks:	(2) Valid with restrictions

Photodegradation

Test Substance - Photodegradation

Category Chemical: (64741-46-4) Naphtha, petroleum, light straight-run

Test Substance: (64741-46-4) Naphtha, petroleum, light straight-run

Test Substance Purity/Composition and Other Test Substance Comments: LSRN-Low Naphthenic, CONCAWE sample CWE39
Substance type. Petroleum product
Physical status: Liquid
Remark. The naphtha streams that are rich in naphthenes are obtained from the atmospheric distillation

of crude oil. The streams contain saturated and aromatic hydrocarbons, mainly in the range C4 to C10

and boil in the range of approximately minus 39 to 200 °C
The naphthenic naphthas typically are composed of the following hydrocarbon classes:
 Approx. Content (volume %)
Paraffins 72
Olefins <0.1
Naphthenics 21
Aromatics 7
Low naphthenic content
CONCAWE sample CWE3
CAS No. 64741-46-4
Density (g/ml @ 16°C) 0.6662
Sulfur (ppm) 83
Detailed hydrocarbon analysis (Method ASTM D 5134-92)
Olefins Naphthenes Aromatics Paraffins

n- i-
Total%
1.04 12.23 3.27 48.19 34.02
C4 0.00 0.00
0.00 0.006 0.000
C5 0.085 4.047 0.00 31.91
8.228
C6 0.830 6.696 2.252 16.139 23 917
C7 0.119
1.056 0.382 0.647 1.241
C8 0.00 0 303 0.334
0 263 0.324
C9 0.00 0.165 0.243 0.162 0.178

Category Chemical Result Type: Estimated by Calculation

Test Substance Result Type: Estimated

Results - Photodegradation

Photodegradation Result Description: Indirect Photolysis

Photodegradation Value/Range: 6.991E-13 - 8.4783E-12 cm3/molecule*sec

Half Life:

Rate Constant:

Photo Medium:

Temperature:

Sensitizer: Hydroxy Radicals

Sensitizer Concentration and Units: 1500000 OH radicals/cm3

Light Source: Sunlight

Light Source Spectrum:

UV/VIS Absorption Spectrum:

Quantum Yield:

Breakdown Products Description:

Results Remarks: Rate Constant: 0.6991 E-12 (isopentane) to 8 4783 E-12(cyclohexane) cm3/molecule-sec
Half-life 1.262 to 15.985 days
AOPWIN ver. 1.89 calculates atmospheric oxidation half lives of hydrocarbons in contact with hydroxyl radicals in the troposphere, under the influence of sunlight and in contact with O3. Atmospheric oxidation rates were calculated for the C5 to C9 hydrocarbon components found in LSRN, CAS No. 64741-46-4. Detailed hydrocarbon analysis was used to identify the components of this specific low naphthenic LSRN sample. Based on a 12-hour day, the range for atmospheric half-lives for

	LSRN constituents is: 1.262 days (cyclohexane) to 15.985 days (isopentane)

Study/Method - Photodegradation

Key Study Sponsor Indicator:	
Year Study Performed:	2000
Method/Guideline Followed:	AOPWIN (EPI Suite; EPIWIN)
Deviations from Method/Guideline:	
Method/Guideline Description:	Calculated by AOPWIN ver. 1.89. Method based on the work of R.Atkinson
Method/Guideline and Test Condition Remarks:	
GLP:	No
Study Reference:	CONCAWE (1995) Physico-chemical characterization of gasoline samples, study no. 104990C. Study conducted by Exxon Biomedical Sciences Inc. CONCAWE, Brussels, 1995. Meylan, M, SRC 1994-1999. AOPWIN is contained in the computer program EPIWIN (Estimate ver. 3 04), available from Syracuse Research Corp.

Reliability/Data Quality - Photodegradation

Reliability:	2 - Valid With Restrictions
Reliability Remarks:	(2) Valid with restrictions

Photodegradation

Test Substance - Photodegradation

Category Chemical:	(68955-35-1) Naphtha, petroleum, catalytic reformed
Test Substance:	(68955-35-1) Naphtha, petroleum, catalytic reformed
Test Substance Purity/Composition and Other Test Substance Comments:	Full -Range Catalytically Reformed Naphtha (FRCRN) -CAS No. 68955- 35-1; API sample 83-05. AROMATIC NAPHTHAS Substance type Petroleum product Physical status: Liquid Remark. Aromatic naphtha streams are obtained from the catalytic reforming of mainly n-alkane and cycloparaffinic feedstocks into aromatic and branched chain hydrocarbons. The hydrocarbons are mainly in the range C5 to C12 and boil in the range of approximately 30 to 220°C. A typical aromatic naphtha is composed of the following hydrocarbon classes in the approximate proportions shown: Content (volume %) Paraffins 32 Olefins 0.5 Naphthenics 4 Aromatics 63.5 Full range catalytically reformed naphtha (CAS 64741-66-8) is a typical aromatic naphtha stream and the American Petroleum Institute (API, 1987) have characterized a specific sample (API 83-05) of a Full range catalytic reformed naphtha. The results of this characterization are in the attached revised robust summary, page 128.
Category Chemical Result Type:	Estimated by Calculation
Test Substance Result Type:	Estimated

Results - Photodegradation

Photodegradation Result Description:	Indirect Photolysis
Photodegradation Value/Range:	6.691E-13 - 1.6698E-11 cm3/molecule*sec
Half Life:	
Rate Constant:	
Photo Medium:	
Temperature:	
Sensitizer:	Hydroxy Radicals
Sensitizer Concentration and Units:	1500000 OH radicals/cm3
Light Source:	Sunlight
Light Source Spectrum:	
UV/VIS Absorption Spectrum:	
Quantum Yield:	
Breakdown Products Description:	
Results Remarks:	Rate constant: 0.6691E -12 cm 3/mol-sec (isopentane) to 16.698E -12 (1,2,4 trimethyl benzene) Half life: 0.641 to 15.985 days

Study/Method - Photodegradation

Key Study Sponsor Indicator:	
Year Study Performed:	
Method/Guideline Followed:	AOPWIN (EPI Suite; EPIWIN)

Deviations from Method/Guideline:	
Method/Guideline Description:	Calculated by AOPWIN ver 1.89 Method based on the work of R. Atkinson
Method/Guideline and Test Condition Remarks:	Relative intensity: = 1 based on intensity of sunlight AOPWIN ver 1.89 calculates atmospheric oxidation half lives of hydrocarbons in contact with hydroxyl radicals in the troposphere, under the influence of sunlight and in contact with O3 Atmospheric oxidation rates were calculated for the C5 to C9 hydrocarbon components found in FRCRN, CAS No 68955-35-1. Detailed hydrocarbon analysis was used to identify the components of this specific FRCRN (63% aromatics) sample. Based on a 12-hour day, the range for atmospheric half-lives for FRCRN constituents is. 0.641 days (1, 2, 4 trimethylbenzene) to 15.985 days (isopentane).
GLP:	No
Study Reference:	Meylan, M, SRC 1994-1999. AOPWIN is contained in the computer program EPIWIN (Estimate ver 3 04), available from Syracuse Research Corp.

Reliability/Data Quality - Photodegradation

Reliability:	2 - Valid With Restrictions
Reliability Remarks:	(2) Valid with restrictions

Stability in Water

Test Substance - Stability In Water

Category Chemical: (64741-46-4) Naphtha, petroleum, light straight-run

Test Substance: (64741-46-4) Naphtha, petroleum, light straight-run

Test Substance Purity/Composition and Other Test Substance Comments: LSRN -Low Naphthenic, CONCAWE sample CWE39
Substance type: Petroleum product
Physical status: Liquid
Remark: The naphtha streams that are rich in naphthenes are obtained from the atmospheric distillation of crude oil. The streams contain saturated and aromatic hydrocarbons, mainly in the range C4 to C10 and boil in the range of approximately minus 39 to 200 °C
The naphthenic naphthas typically are composed of the following hydrocarbon classes
 Approx. Content (volume %)
Paraffins 72
Olefins <0.1
Naphthenics 21
Aromatics 7
Low naphthenic content
CONCAWE sample CWE3
CAS No. 64741-46-4
Density (g/ml @ 16°C) 0.6662
Sulfur (ppm) 83
Detailed hydrocarbon analysis (Method ASTM D 5134-92)
Olefins Naphthenes Aromatics Paraffins

 n- i-
Total%
1.04 12.23 3.27 48.19 34.02
C4 0.00 0.00
0.00 0.006 0.000
C5 0.085 4.047 0.00 31.91
8.228
C6 0.830 6.696 2 252 16.139 23.917
C7 0.119
1.056 0.382 0.647 1 241
C8 0.00 0.303 0.334
0 263 0.324
C9 0.00 0 165 0.243 0.162 0.178

Category Chemical Result Type:

Test Substance Result Type:

Results - Stability In Water

Stability in Water Result Description:

Stability in Water Value/Range:

pH Value:

Hydrolysis Indicator:

Preliminary Test:

Effect :

Half-Life	@ pH Value

Breakdown Products Description:

Results Remarks: Hydrolysis unlikely

Study/Method - Stability In Water

Key Study Sponsor Indicator:

Year Study Performed:

Method/Guideline Followed:	
Deviations from Method/Guideline:	
Method/Guideline Description:	
Method/Guideline and Test Condition Remarks:	
GLP:	
Study Reference:	Harris, J.C. (1982) Rate of Hydrolysis. In Handbook of Chemical Property Estimation Methods. p. 7-6. W. J. Lyman, W.F. Reehl and D.H. Rosenblatt, eds. McGraw-Hill Book Company, New York, NY, USA.

Reliability/Data Quality - Stability In Water

Reliability:	1 - Valid Without Restrictions
Reliability Remarks:	(1) Valid without restriction

Stability in Water

Test Substance - Stability In Water

Category Chemical: (64741-46-4) Naphtha, petroleum, light straight-run

Test Substance: (64741-46-4) Naphtha, petroleum, light straight-run

Test Substance Purity/Composition and Other Test Substance Comments: LSRN-Hi Naphthenic, CONCAWE sample W94/809,
Substance type: Petroleum product
Physical status: Liquid
Remark: The naphtha streams that are rich in naphthenes are obtained from the atmospheric distillation of crude oil. The streams contain saturated and aromatic hydrocarbons, mainly in the range C4 to C10 and boil in the range of approximately minus 39 to 200 °C
The naphthenic naphthas typically are composed of the following hydrocarbon classes:
 Approx. Content (volume %)
Paraffins 72
Olefins <0.1
Naphthenics 21
Aromatics 7
High naphthenic content
CONCAWE sample W94/809
CAS No. 64741-46-4
Density (g/ml @ 16°C) 0.7587
Sulfur (ppm) <10
Detailed hydrocarbon analysis (Method ASTM D 5134-92)

 Olefins Naphthenes Aromatics Paraffins
 n- i-
Total%
2.18 33.92 17.26 18.88 26.83
C4 0.019 0.00
0 00 0.141 0.059
C5 0.090 0.138 0.00 0 592
0.468
C6 0.066 2.578 0.756 1.565 1.341
C7
0 663 10.265 5.218 3.887 3.811
C8
0.074 11 036 9.044 8.407 9 409
C9 1.161 9.117
2.080 3.762 8.834
C10 0.103 0.778 0.153 0.778
0.103
C11 0.00 0.009 0.007 0.009 0.145

Category Chemical Result Type:

Test Substance Result Type:

Results - Stability In Water

Stability in Water Result Description:

Stability in Water Value/Range:

pH Value:

Hydrolysis Indicator:

Preliminary Test:

Effect :

Half-Life	@ pH Value

Breakdown Products Description:

Results Remarks: Hydrolysis unlikely

Study/Method - Stability In Water

Key Study Sponsor Indicator:

Year Study Performed:

Method/Guideline Followed:	
Deviations from Method/Guideline:	
Method/Guideline Description:	
Method/Guideline and Test Condition Remarks:	
GLP:	
Study Reference:	Harris, J.C. (1982) Rate of Hydrolysis. In Handbook of Chemical Property Estimation Methods. p. 7-6 W. J. Lyman, W F Reehl and D.H. Rosenblatt, eds. McGraw-Hill Book Company, New York, NY, USA.

Reliability/Data Quality - Stability In Water

Reliability:	1 - Valid Without Restrictions
Reliability Remarks:	(1) Valid without restriction

Stability in Water

Test Substance - Stability In Water

Category Chemical: (64741-63-5) Naphtha, petroleum, light catalytic reformed

Test Substance: (64741-63-5) Naphtha, petroleum, light catalytic reformed

Test Substance Purity/Composition and Other Test Substance Comments: Light Catalytically Reformed Naphtha.
AROMATIC NAPHTHAS
Substance type: Petroleum product
Physical status: Liquid
Remark: Aromatic naphtha streams are obtained from the catalytic reforming of mainly n-alkane and cycloparaffinic feedstocks into aromatic and branched chain hydrocarbons The hydrocarbons are mainly in the range C5 to C12 and boil in the range of approximately 30 to 220°C. A typical aromatic naphtha is composed of the following hydrocarbon classes in the approximate proportions shown:
Content (volume %)
Paraffins 32
Olefins 0.5
Naphthenics 4
Aromatics 63.5
Full range catalytically reformed naphtha (CAS 64741-63-5) is a typical aromatic naphtha stream and the American Petroleum Institute (API, 1987) have characterized a specific sample (API 83-04) of a Full range catalytic reformed naphtha.

Category Chemical Result Type:

Test Substance Result Type:

Results - Stability In Water

Stability in Water Result Description:

Stability in Water Value/Range:

pH Value:

Hydrolysis Indicator:

Preliminary Test:

Effect :

Half-Life	@ pH Value

Breakdown Products Description:

Results Remarks: Hydrolysis unlikely

Study/Method - Stability In Water

Key Study Sponsor Indicator:

Year Study Performed:

Method/Guideline Followed:

Deviations from Method/Guideline:

Method/Guideline Description:

Method/Guideline and Test Condition Remarks:	
GLP:	
Study Reference:	Harris, J.C. (1982) Rate of Hydrolysis. In Handbook of Chemical Property Estimation Methods. p. 7-6. W. J. Lyman, W.F. Reehl and D.H Rosenblatt, eds. McGraw-Hill Book Company, New York, NY, USA.

Reliability/Data Quality - Stability In Water

Reliability:	1 - Valid Without Restrictions
Reliability Remarks:	(1) Valid without restriction

Stability in Water

Test Substance - Stability In Water

Category Chemical: (64741-55-5) Naphtha, petroleum, light catalytic cracked

Test Substance: (64741-55-5) Naphtha, petroleum, light catalytic cracked

Test Substance Purity/Composition and Other Test Substance Comments: Substance type Petroleum product
Physical status : Liquid
Remark : The naphtha streams obtained from the catalytic cracking of heavy distillates into lighter fractions contain saturated, olefinic and aromatic hydrocarbons. However, their olefins content is higher than any of the naphtha streams derived by other processes. The catalytically cracked naphthas boil in the range of approximately -20 to 230°C and contain hydrocarbons in the range C4 to C10. The catalytically cracked naphthas typically are composed of the following hydrocarbon classes:
Approx. Content (volume %)
Paraffins 30
Olefins 46
Naphthenics 10
Aromatics 14
Light catalytically cracked naphtha (LCCN) (CAS 64741-55-5) is a typical olefinic naphtha stream. The American Petroleum Institute have reported (API, 1987) a thorough characterization of a specific sample of a light catalytically cracked naphtha (API 83-20), which has a high olefinic content and which was used in many of the mammalian toxicity studies. The characterization of this sample are found in the attached revised robust summary (page 43).

Category Chemical Result Type:

Test Substance Result Type:

Results - Stability In Water

Stability in Water Result Description:

Stability in Water Value/Range:

pH Value:

Hydrolysis Indicator:

Preliminary Test:

Effect :

Half-Life	@ pH Value

Breakdown Products Description:

Results Remarks: Hydrolysis unlikely

Study/Method - Stability In Water

Key Study Sponsor Indicator:

Year Study Performed:

Method/Guideline Followed:

Deviations from Method/Guideline:	
Method/Guideline Description:	
Method/Guideline and Test Condition Remarks:	
GLP:	
Study Reference:	Harris, J C. (1982) Rate of Hydrolysis. In Handbook of Chemical Property Estimation Methods p. 7-6 W. J. Lyman, W F Reehl and D.H Rosenblatt, eds. McGraw-Hill Book Company, New York, NY, USA.

Reliability/Data Quality - Stability In Water

Reliability:	1 - Valid Without Restrictions
Reliability Remarks:	(1) Valid without restriction

Stability in Water

Test Substance - Stability In Water

Category Chemical: (64741-66-8) Naphtha, petroleum, light alkylate

Test Substance: (64741-66-8) Naphtha, petroleum, light alkylate

Test Substance Purity/Composition and Other Test Substance Comments: Light alkylate naphtha
Parafinnic naphtha
Substance type : Petroleum product
Physical status : Liquid
Remark: Paraffinic naphtha streams are obtained by alkylation (catalytic reaction), isomerisation (catalytic conversion) and solvent extraction. They contain mostly saturated hydrocarbons, generally in the range C5 to C10 and boil in the range of approximately 90 to 160°C. The paraffinic naphthas typically are composed of the following hydrocarbon classes.
 Content (volume %)
Paraffins 99.4
Olefins 0
Naphthenics 0 6
Aromatics 0
Light Alkylate Naphtha (CAS 64741-66-8) is a typical paraffinic naphtha stream.
The American Petroleum Institute have reported a thorough characterization of a specific sample (API 83-19) of Light Alkylate Naphtha (LAN). The results of this characterization are found in the attached revised robust summary (page 2).

Category Chemical Result Type:

Test Substance Result Type:

Results - Stability In Water

Stability in Water Result Description:

Stability in Water Value/Range:

pH Value:

Hydrolysis Indicator:

Preliminary Test:

Effect :

Half-Life	@ pH Value

Breakdown Products Description:

Results Remarks: Hydrolysis unlikely

Study/Method - Stability In Water

Key Study Sponsor Indicator:

Year Study Performed:

Method/Guideline Followed:

Deviations from Method/Guideline:

Method/Guideline Description:	
Method/Guideline and Test Condition Remarks:	
GLP:	
Study Reference:	Harris, J.C. (1982) Rate of Hydrolysis. In Handbook of Chemical Property Estimation Methods. p. 7-6. W. J. Lyman, W.F Reehl and D H. Rosenblatt, eds. McGraw-Hill Book Company, New York, NY, USA.

Reliability/Data Quality - Stability In Water

Reliability:	1 - Valid Without Restrictions
Reliability Remarks:	(1) Valid without restriction

Stability in Water

Test Substance - Stability In Water

Category Chemical: (64741-46-4) Naphtha, petroleum, light straight-run

Test Substance: (64741-46-4) Naphtha, petroleum, light straight-run

Test Substance Purity/Composition and Other Test Substance Comments: LSRN-Moderate (19.7%) Naphthenic,
Substance type: Petroleum product
Physical status. Liquid
Remark: The naphtha streams that are rich in naphthenes are obtained from the atmospheric distillation of crude oil. The streams contain saturated and aromatic hydrocarbons, mainly in the range C4 to C10 and boil in the range of approximately minus 39 to 200 °C
The naphthenic naphthas typically are composed of the following hydrocarbon classes:
 Approx. Content (volume %)
Paraffins 72
Olefins <0 1
Naphthenics 21
Aromatics 7
Moderate naphthenic content
Chevron sample (Chevron, 1995)
CAS No 64741-46-4
Detailed hydrocarbon analysis (Method ASTM D 5134-92)
 Olefins Naphthenes Aromatics Paraffins
 n- i-
Total%
0.72 22.41 3.06 73.31 31.13
C4 0.03 0.00 0.00 5 85 5.580
C5 0.085 1 73 0.00 38 80 16.27
C6 0.36 6.24 0.70 18.18 6.26
C7 0 05 7.11 1.12 5 58 2.00
C8 0.00 5.31 0 96 3.22 0.79
C9 0.00 1.95 0.25 1.20 0.13
C10 0.00 0.07 0 03 0.46 0.08

Category Chemical Result Type:

Test Substance Result Type:

Results - Stability In Water

Stability in Water Result Description:

Stability in Water Value/Range:

pH Value:

Hydrolysis Indicator:

Preliminary Test:

Effect :

Half-Life	@ pH Value

Breakdown Products Description:

Results Remarks: Hydrolysis unlikely

Study/Method - Stability In Water

Key Study Sponsor Indicator:

Year Study Performed:

Method/Guideline Followed:	
Deviations from Method/Guideline:	
Method/Guideline Description:	
Method/Guideline and Test Condition Remarks:	
GLP:	
Study Reference:	Harris, J C. (1982) Rate of Hydrolysis. In Handbook of Chemical Property Estimation Methods p 7-6. W. J Lyman, W.F. Reehl and D.H. Rosenblatt, eds. McGraw-Hill Book Company, New York, NY, USA.

Reliability/Data Quality - Stability In Water

Reliability:	1 - Valid Without Restrictions
Reliability Remarks:	(1) Valid without restriction

Stability in Water

Test Substance - Stability In Water

Category Chemical: (68955-35-1) Naphtha, petroleum, catalytic reformed

Test Substance: (68955-35-1) Naphtha, petroleum, catalytic reformed

Test Substance Purity/Composition and Other Test Substance Comments: Full -Range Catalytically Reformed Naphtha (FRCRN) -CAS No. 68955-35-1; API sample 83-05
AROMATIC NAPHTHAS
Substance type: Petroleum product
Physical status: Liquid
Remark: Aromatic naphtha streams are obtained from the catalytic reforming of mainly n-alkane and cycloparaffinic feedstocks into aromatic and branched chain hydrocarbons. The hydrocarbons are mainly in the range C5 to C12 and boil in the range of approximately 30 to 220°C A typical aromatic naphtha is composed of the following hydrocarbon classes in the approximate proportions shown:
Content (volume %)
Paraffins 32
Olefins 0.5
Naphthenics 4
Aromatics 63.5
Full range catalytically reformed naphtha (CAS 64741-66-8) is a typical aromatic naphtha stream and the American Petroleum Institute (API, 1987) have characterized a specific sample (API 83-05) of a Full range catalytic reformed naphtha. The results of this characterization are in the attached revised robust summary, page 128.

Category Chemical Result Type:

Test Substance Result Type:

Results - Stability In Water

Stability in Water Result Description:

Stability in Water Value/Range:

pH Value:

Hydrolysis Indicator:

Preliminary Test:

Effect :

Half-Life	@ pH Value

Breakdown Products Description:

Results Remarks: Hydrolysis unlikely

Study/Method - Stability In Water

Key Study Sponsor Indicator:

Year Study Performed:

Method/Guideline Followed:

Deviations from Method/Guideline:

Method/Guideline Description:	
Method/Guideline and Test Condition Remarks:	
GLP:	
Study Reference:	Harris, J.C. (1982) Rate of Hydrolysis. In Handbook of Chemical Property Estimation Methods. p. 7-6. W. J. Lyman, W.F. Reehl and D H. Rosenblatt, eds. McGraw-Hill Book Company, New York, NY, USA.

Reliability/Data Quality - Stability In Water

Reliability:	1 - Valid Without Restrictions
Reliability Remarks:	(1) Valid without restriction

Stability in Water

Test Substance - Stability In Water

Category Chemical: *No CAS Number Provided*

Test Substance:

Test Substance Purity/Composition and Other Test Substance Comments: Gasoline CONCAWE sample, CWE5, Blend (match to API PS-6), CAS No 86290-81-5

Category Chemical Result Type:

Test Substance Result Type:

Results - Stability In Water

***Stability in Water* Result Description:**

Stability in Water Value/Range:

pH Value:

Hydrolysis Indicator:

Preliminary Test:

Effect :

Half-Life	@ pH Value

Breakdown Products Description:

Results Remarks: Hydrolysis unlikely

Study/Method - Stability In Water

Key Study Sponsor Indicator:

Year Study Performed:

Method/Guideline Followed:

Deviations from Method/Guideline:

Method/Guideline Description:

***Method/Guideline* and Test Condition Remarks:**

GLP:

Study Reference: Harris, J.C. (1982) Rate of Hydrolysis. In Handbook of Chemical Property Estimation Methods. p. 7-6. W J. Lyman, W.F. Reehl and D.H. Rosenblatt, eds McGraw-Hill Book Company, New York, NY, USA.

Reliability/Data Quality - Stability In Water

Reliability:	1 - Valid Without Restrictions
Reliability Remarks:	(1) Valid without restriction

Transport Between Environmental Compartments Fugacity/Dist

Test Substance - Transport Between Environmental Compartments Fugacity/Dist

Category Chemical: *No CAS Number Provided*

Test Substance:

Test Substance Purity/Composition and Other Test Substance Comments: Gasoline CONCAWE sample, CWE5, Blend (match to API PS-6)

Category Chemical Result Type: Estimated by Calculation

Test Substance Result Type: Estimated

Results - Transport Between Environmental Compartments Fugacity/Dist

Fugacity/Distribution Result Description: Multimedia (Fugacity) Modeling

Test Results: Media: Soil, air, water, suspended sediment, sediment

Medium % distribution
Air: 97 to 99 99
Soil. 0.00 to 1.2
Water: 0.003 to 2.7
Sediment <0.001 to 0.02
Suspended sediment <0.001 to 0.02

Transport Table:

	Emissions (kg/h)	Half-life (hr)	Mass Distribution (percent)	Loss by Reaction (percent)	Loss by Advection (percent)
Air					
Water					
Soil					
Sediment					

Temperature:

Level of Multi-media Model: I

Model Input (Water Solubility):

Model Input (Vapor Pressure):

Model Input (log Kow):

Model Input (Melting Point):

Henry's Law Constant:

Model Concentration -- Air:

Model Concentration -- Water:

Model Concentration -- Soil:

Model Concentration -- Sediment:

Results Remarks: The constituents of this complex petroleum mixture are expected to partition primarily to air. Moderate partitioning to water and soil is predicted for the aromatic components of this mixture

Study/Method - Transport Between Environmental Compartments Fugacity/Dist

Key Study Sponsor Indicator:	
Year Study Performed:	2000
Method/Guideline Followed:	Other
Deviations from Method/Guideline:	
Method/Guideline Description:	Calculated according to Mackay Level I
Method/Guideline and Test Condition Remarks:	Model based on chemical fugacity Physical properties input are those calculated by the EPIWIN Estimation 3.04 program and included in this summary. Values represent the spread of calculated values for C5 to C8 hydrocarbon components found in gasoline. Detailed hydrocarbon analysis was used to identify the components of this specific gasoline sample. The majority of components in gasoline will partition rapidly to air, where these hydrocarbons will be rapidly oxidized by OH radicals. With the exception of toluene, partitioning to air is > 97% for all components.
GLP:	
Study Reference:	CONCAWE (1995) Physico-chemical characterization of gasoline samples, study no. 104990C. Study conducted by Exxon Biomedical Sciences Inc. Concawe, Brussels, 1995. Mackay, D, A. DiGuardo, S. Paterson, & C. Cowan (1997) EQC Model, ver. 1.01, 1997, available from the Environmental Modelling Centre, Trent University, Canada.

Reliability/Data Quality - Transport Between Environmental Compartments Fugacity/Dist

Reliability:	2 - Valid With Restrictions
Reliability Remarks:	(2) Valid with restrictions

Transport Between Environmental Compartments Fugacity/Dist

Test Substance - Transport Between Environmental Compartments Fugacity/Dist

Category Chemical: (64741-46-4) Naphtha, petroleum, light straight-run

Test Substance: (64741-46-4) Naphtha, petroleum, light straight-run

Test Substance Purity/Composition and Other Test Substance Comments: Light straight-run naphtha (LSRN) - High (33.9%) naphthenic, CAS No. 64741-46-4

Category Chemical Result Type: Estimated by Calculation

Test Substance Result Type: Estimated

Results - Transport Between Environmental Compartments Fugacity/Dist

Fugacity/Distribution Result Description: Multimedia (Fugacity) Modeling

Test Results: Media: Soil, air, water, suspended sediment, sediment

Medium % distribution
Air: 97 to 99.97
Soil: 0.03 to 1.2
Water: 0.008 to 2.7
Sediment 0.00 to 0.02
Suspended sediment 0.00

Transport Table:

	Emissions (kg/h)	Half-life (hr)	Mass Distribution (percent)	Loss by Reaction (percent)	Loss by Advection (percent)
Air					
Water					
Soil					
Sediment					

Temperature:

Level of Multi-media Model: I

Model Input (Water Solubility):

Model Input (Vapor Pressure):

Model Input (log Kow):

Model Input (Melting Point):

Henry's Law Constant:

Model Concentration -- Air:

Model Concentration -- Water:

Model Concentration -- Soil:

Model Concentration -- Sediment:

Results Remarks: The constituents of this complex petroleum mixture are expected to partition primarily to air.

Study/Method - Transport Between Environmental Compartments Fugacity/Dist

Key Study Sponsor Indicator:

Year Study Performed:	2000
Method/Guideline Followed:	Other
Deviations from Method/Guideline:	
Method/Guideline Description:	Calculated according to Mackay Level 1
Method/Guideline and Test Condition Remarks:	Model based on chemical fugacity. Physical properties input are those calculated by the EPIWIN Estimation 3.04 program and included in this summary. Values represent the spread of calculated values for C5 to C9 hydrocarbon components found in LSRN, CAS No 64741-46-4. Detailed hydrocarbon analysis was used to identify the components of this specific high naphthenic LSRN sample. The majority of LSRN components will partition rapidly to air, where these hydrocarbons will be rapidly oxidized by OH radicals.
GLP:	
Study Reference:	CONCAWE (1995) Physico-chemical characterization of gasoline samples, study no. 104990C. Study conducted by Exxon Biomedical Sciences Inc. CONCAWE, Brussels, 1995. Mackay, D, A. DiGuardo, S. Paterson, & C. Cowan (1997) EQC Model, ver. 1 01, 1997, available from the Environmental Modelling Centre, Trent University, Canada.

Reliability/Data Quality - Transport Between Environmental Compartments Fugacity/Dist

Reliability:	2 - Valid With Restrictions
Reliability Remarks:	(2) Valid with restrictions

Transport Between Environmental Compartments Fugacity/Dist

Test Substance - Transport Between Environmental Compartments Fugacity/Dist

Category Chemical: (64741-46-4) Naphtha, petroleum, light straight-run

Test Substance: (64741-46-4) Naphtha, petroleum, light straight-run

Test Substance Purity/Composition and Other Test Substance Comments: Light Straight Run Naphtha (LSRN)-Moderate (19.7%)
Naphthenic, No. 64741-46-4

Category Chemical Result Type: Estimated by Calculation

Test Substance Result Type: Estimated

Results - Transport Between Environmental Compartments Fugacity/Dist

Fugacity/Distribution Result Description: Multimedia (Fugacity) Modeling

Test Results: Media: Soil, air, water, suspended sediment, sediment

Medium % distribution
Air: 97 to 99.97
Soil: 0.00 to 1.2
Water: 0.013 to 2.7
Sediment 0.00 to 0.03
Suspended sediment 0.00

Transport Table:

	Emissions (kg/h)	Half-life (hr)	Mass Distribution (percent)	Loss by Reaction (percent)	Loss by Advection (percent)
Air					
Water					
Soil					
Sediment					

Temperature:

Level of Multi-media Model: I

Model Input (Water Solubility):

Model Input (Vapor Pressure):

Model Input (log Kow):

Model Input (Melting Point):

Henry's Law Constant:

Model Concentration -- Air:

Model Concentration -- Water:

Model Concentration -- Soil:

Model Concentration -- Sediment:

Results Remarks: The constituents of this complex petroleum mixture are expected to partition primarily to air.

Study/Method - Transport Between Environmental Compartments Fugacity/Dist

Key Study Sponsor Indicator:

Year Study Performed:	2000
Method/Guideline Followed:	Other
Deviations from Method/Guideline:	
Method/Guideline *Description*:	Calculated according to Mackay Level 1
Method/Guideline and Test Condition Remarks:	Model based on chemical fugacity. Physical properties input are those calculated by the EPIWIN Estimation 3 04 program and included in this summary Values represent the spread of calculated values for C5 to C9 hydrocarbon components found in LSRN, CAS No 64741-46-4. *Detailed hydrocarbon* analysis was used to identify the components of this specific moderate naphthenic (19.7%) LSRN sample. The majority of LSRN components will partition rapidly to air, where these hydrocarbons will be rapidly oxidized by OH radicals.
GLP:	
Study Reference:	Mackay, D, A. DiGuardo, S Paterson, & C. Cowan (1997) EQC Model, ver. 1.01, 1997, available from the Environmental Modelling Centre, Trent University, Canada.

Reliability/Data Quality - Transport Between Environmental Compartments Fugacity/Dist

Reliability:	2 - Valid With Restrictions
Reliability Remarks:	(2) Valid with restrictions

Transport Between Environmental Compartments Fugacity/Dist

Test Substance - Transport Between Environmental Compartments Fugacity/Dist

Category Chemical: (64741-46-4) Naphtha, petroleum, light straight-run

Test Substance: (64741-46-4) Naphtha, petroleum, light straight-run

Test Substance Purity/Composition and Other Test Substance Comments: Light straight-run naphtha (LSRN) - Low (12 2%) naphthenic, CAS No. 64741-46-4

Category Chemical Result Type: Estimated by Calculation

Test Substance Result Type: Estimated

Results - Transport Between Environmental Compartments Fugacity/Dist

Fugacity/Distribution Result Description: Multimedia (Fugacity) Modeling

Test Results: Media: Soil, air, water, suspended sediment, sediment

Medium % distribution
Air: 98.89 to 99.98
Soil: 0.01 to 0.11
Water: 0.01 to 1.0
Sediment <0.001
Suspended sediment <0.001

Transport Table:

	Emissions (kg/h)	Half-life (hr)	Mass Distribution (percent)	Loss by Reaction (percent)	Loss by Advection (percent)
Air					
Water					
Soil					
Sediment					

Temperature:

Level of Multi-media Model: I

Model Input (Water Solubility):

Model Input (Vapor Pressure):

Model Input (log Kow):

Model Input (Melting Point):

Henry's Law Constant:

Model Concentration -- Air:

Model Concentration -- Water:

Model Concentration -- Soil:

Model Concentration -- Sediment:

Results Remarks:

Study/Method - Transport Between Environmental Compartments Fugacity/Dist

Key Study Sponsor Indicator:

Year Study Performed: 2000

Method/Guideline Followed:	Other
Deviations from Method/Guideline:	
Method/Guideline Description:	Calculated according to Mackay Level 1
Method/Guideline and Test Condition Remarks:	Model based on chemical fugacity. Physical properties input are those calculated by the EPIWIN Estimation 3.04 program and included in this summary Values represent the spread of calculated values for C5 to C9 hydrocarbon components found in LSRN, CAS No 64741-46-4. Detailed hydrocarbon analysis was used to identify the components of this specific low naphthenic LSRN sample. The majority of LSRN components will partition rapidly to air, where these hydrocarbons will be rapidly oxidized by OH radicals.
GLP:	
Study Reference:	CONCAWE (1995) Physico-chemical characterization of gasoline samples, study no. 104990C. Study conducted by Exxon Biomedical Sciences Inc CONCAWE, Brussels, 1995. Mackay, D, A. DiGuardo, S. Paterson, & C. Cowan (1997) EQC Model, ver. 1.01, 1997, available from the Environmental Modelling Centre, Trent University, Canada.

Reliability/Data Quality - Transport Between Environmental Compartments Fugacity/Dist

Reliability:	2 - Valid With Restrictions
Reliability Remarks:	(2) Valid with restrictions

Transport Between Environmental Compartments Fugacity/Dist

Test Substance - Transport Between Environmental Compartments Fugacity/Dist

Category Chemical: (64741-66-8) Naphtha, petroleum, light alkylate

Test Substance: (64741-66-8) Naphtha, petroleum, light alkylate

Test Substance Purity/Composition and Other Test Substance Comments: Substance type : Petroleum product
Physical status : Liquid
Remark: Paraffinic naphtha streams are obtained by alkylation (catalytic reaction), isomerisation (catalytic conversion) and solvent extraction. They contain mostly saturated hydrocarbons, generally in the range C5 to C10 and boil in the range of approximately 90 to 160°C The paraffinic naphthas typically are composed of the following hydrocarbon classes
 Content (volume %)
Paraffins 99.4
Olefins 0
Naphthenics 0.6
Aromatics 0
Light Alkylate Naphtha (CAS 64741-66-8) is a typical paraffinic naphtha stream
The American Petroleum Institute have reported a thorough characterization of a specific sample (API 83-19) of Light Alkylate Naphtha (LAN). The results of this characterization are found in the attached revised robust summary (page 2).

Category Chemical Result Type: Estimated by Calculation

Test Substance Result Type: Estimated

Results - Transport Between Environmental Compartments Fugacity/Dist

Fugacity/Distribution Result Description: Multimedia (Fugacity) Modeling

Test Results: Media: Soil, air, water, suspended sediment and sediment

Medium % distribution
Air 99.4 to 100
Soil 0.01 to 0.27
Water 0.001 to 0.02
Sediment <0.001
Suspended sediment

Transport Table:

	Emissions (kg/h)	Half-life (hr)	Mass Distribution (percent)	Loss by Reaction (percent)	Loss by Advection (percent)
Air					
Water					
Soil					
Sediment					

Temperature:

Level of Multi-media Model: I

Model Input (Water Solubility):

Model Input (Vapor Pressure):

Model Input (log Kow):

Model Input (Melting Point):

Henry's Law Constant:

Model Concentration -- Air:

Model Concentration -- Water:

Model Concentration -- Soil:

Model Concentration -- Sediment:

Results Remarks:	This complex petroleum mixture is expected to partition primarily to air

Study/Method - Transport Between Environmental Compartments Fugacity/Dist

Key Study Sponsor Indicator:	
Year Study Performed:	
Method/Guideline Followed:	Other
Deviations from Method/Guideline:	
Method/Guideline Description:	Type: Calculated according to Mackay Level 1
Method/Guideline and Test Condition Remarks:	Model based on chemical fugacity Multimedia distribution was calculated for the C5 to C9 hydrocarbon components found in LAN, CAS No 64741-66-8. Detailed hydrocarbon analysis performed by Chevron Research was used to identify the components of this specific LAN sample. Mobility in the aquatic and terrestrial environment is low due to low water solubility and high vapor pressure. The naphtha components will partition rapidly to air, where for the majority of these hydrocarbons will be rapidly oxidized by OH radicals
GLP:	
Study Reference:	Mackay, D, A. DiGuardo, S. Paterson, & C. Cowan (1997) EQC Model, ver. 1.01, 1997, available from the Environmental Modelling Centre, Trent University, Canada.

Reliability/Data Quality - Transport Between Environmental Compartments Fugacity/Dist

Reliability:	2 - Valid With Restrictions
Reliability Remarks:	(2) Valid with restrictions

Transport Between Environmental Compartments Fugacity/Dist

Test Substance - Transport Between Environmental Compartments Fugacity/Dist

Category Chemical: (64741-63-5) Naphtha, petroleum, light catalytic reformed

Test Substance: (64741-63-5) Naphtha, petroleum, light catalytic reformed

Test Substance Purity/Composition and Other Test Substance Comments: AROMATIC NAPHTHAS
Substance type: Petroleum product
Physical status: Liquid
Remark: Aromatic naphtha streams are obtained from the catalytic reforming of mainly n-alkane and cycloparaffinic feedstocks into aromatic and branched chain hydrocarbons. The hydrocarbons are mainly in the range C5 to C12 and boil in the range of approximately 30 to 220°C. A typical aromatic naphtha is composed of the following hydrocarbon classes in the approximate proportions shown:
Content (volume %)
Paraffins 32
Olefins 0.5
Naphthenics 4
Aromatics 63.5
Light Catalytically Reformed Naphtha
Sample identified by Chevron Research as a light catalytically reformed naphtha CAS No 64741-63-5
Detailed hydrocarbon analysis

 Olefins Naphthenes Aromatics Paraffins
 total n-
total%
0 90 2.36 39 40 57 34 17.51
C4 0.00 0 00
0 00 0 81 0.78
C5 0.34 0.26 0.00 19 45
8 05
C6 0 27 0.62 8 37 16.23 4.69
C7
0.28 1.18 29.77 17 70 3 59
C8 0 01 0.27
1.26 3.12 0.40

Category Chemical Result Type: Estimated by Calculation

Test Substance Result Type: Estimated

Results - Transport Between Environmental Compartments Fugacity/Dist

Fugacity/Distribution Result Description: Multimedia (Fugacity) Modeling

Test Results: Media: Soil, air, water, suspended sediment and sediment

Medium % distribution
Air 97 to 99.98
Soil 0.01 to 0.8
Water 0.01 to 2 7
Sediment 0.00
Suspended sediment 0 00

Transport Table:

	Emissions (kg/h)	Half-life (hr)	Mass Distribution (percent)	Loss by Reaction (percent)	Loss by Advection (percent)
Air					
Water					
Soil					
Sediment					

Temperature:

Level of Multi-media Model: I

Model Input (Water Solubility):

Model Input (Vapor Pressure):

Model Input (log K_{ow}):

Model Input (Melting Point):

Henry's Law Constant:

Model Concentration -- Air:

Model Concentration -- Water:

Model Concentration -- Soil:	
Model Concentration -- Sediment:	
Results Remarks:	The constituents of this complex petroleum mixture are expected to partition primarily to air.

Study/Method - Transport Between Environmental Compartments Fugacity/Dist

Key Study Sponsor Indicator:	
Year Study Performed:	2000
Method/Guideline Followed:	Other
Deviations from Method/Guideline:	
Method/Guideline Description:	Calculated according to Mackay Level I Type: Calculated according to Mackay Level 1
Method/Guideline and Test Condition Remarks:	Model based on chemical fugacity. Physical properties input are those calculated by the EPIWIN Estimation 3.04 program and included in this summary. Values represent the spread of calculated values for C5 to C8 hydrocarbon components found in LCRN, CAS No 64741-63-5. Detailed hydrocarbon analysis performed by Chevron Research was used to identify the components of this specific LCRN sample (see section 1.1.1.). The majority of LCRN components will partition rapidly to air, where these hydrocarbons will be rapidly oxidized by OH radicals
GLP:	
Study Reference:	Mackay, D, A. DiGuardo, S Paterson, & C. Cowan (1997) EQC Model, ver. 1.01, 1997, available from the Environmental Modelling Centre, Trent University, Canada.

Reliability/Data Quality - Transport Between Environmental Compartments Fugacity/Dist

Reliability:	2 - Valid With Restrictions
Reliability Remarks:	(2) Valid with restrictions

Transport Between Environmental Compartments Fugacity/Dist

Test Substance - Transport Between Environmental Compartments Fugacity/Dist

Category Chemical: (64741-55-5) Naphtha, petroleum, light catalytic cracked

Test Substance: (64741-55-5) Naphtha, petroleum, light catalytic cracked

Test Substance Purity/Composition and Other Test Substance Comments: Olefinic naphtha
Substance type : Petroleum product
Physical status : Liquid
Remark : The naphtha streams obtained from the catalytic cracking of heavy distillates into lighter fractions contain saturated, olefinic and aromatic hydrocarbons. However, their olefins content is higher than any of the naphtha streams derived by other processes. The catalytically cracked naphthas boil in the range of approximately -20 to 230°C and contain hydrocarbons in the range C4 to C10. The catalytically cracked naphthas typically are composed of the following hydrocarbon classes:
Approx. Content (volume %)
Paraffins 30
Olefins 46
Naphthenics 10
Aromatics 14
Light catalytically cracked naphtha (LCCN) (CAS 64741-55-5) is a typical olefinic naphtha stream. The American Petroleum Institute have reported (API, 1987) a thorough characterization of a specific sample of a light catalytically cracked naphtha (API 83-20), which has a high olefinic content and which was used in many of the mammalian toxicity studies. The characterization of this sample are found in the attached revised robust summary (page 43).

Category Chemical Result Type: Estimated by Calculation

Test Substance Result Type: Estimated

Results - Transport Between Environmental Compartments Fugacity/Dist

Fugacity/Distribution Result Description: Multimedia (Fugacity) Modeling

Test Results: Media: Soil, air, water, suspended sediment and sediment

Medium % distribution
Air 97 to 100

Soil 0.00 to 1.2
Water 0.01 to 2.7

Sediment <0.001 to 0.02
Suspended sediment <0.001 to 0.02

Transport Table:

	Emissions (kg/h)	Half-life (hr)	Mass Distribution (percent)	Loss by Reaction (percent)	Loss by Advection (percent)
Air					
Water					
Soil					
Sediment					

Temperature:

Level of Multi-media Model: I

Model Input (Water Solubility):

Model Input (Vapor Pressure):

Model Input (log K_{ow}):

Model Input (Melting Point):

Henry's Law Constant:

Model Concentration -- Air:

Model Concentration -- Water:

Model Concentration -- Soil:

Model Concentration -- Sediment:	
Results Remarks:	This complex petroleum mixture is expected to partition primarily to air.

Study/Method - Transport Between Environmental Compartments Fugacity/Dist

Key Study Sponsor Indicator:	
Year Study Performed:	2000
Method/Guideline Followed:	Other
Deviations from Method/Guideline:	
Method/Guideline Description:	Type: Calculated according to Mackay Level 1
Method/Guideline and Test Condition Remarks:	Model based on chemical fugacity. Physical properties input are those calculated by the EPIWIN Estimation 3.04 program and included in this summary. Values represent the spread of calculated values for C5 to C9 hydrocarbon components found in LCCN, CAS No 64741-55-5. Detailed hydrocarbon analysis performed by Chevron Research was used to identify the components of this specific LCCN sample. The majority of LCCN components will partition rapidly to air, where these hydrocarbons will be rapidly oxidized by OH radicals and ozone.
GLP:	
Study Reference:	Mackay, D, A. DiGuardo, S. Paterson, & C. Cowan (1997) EQC Model, ver. 1.01, 1997, available from the Environmental Modelling Centre, Trent University, Canada.

Reliability/Data Quality - Transport Between Environmental Compartments Fugacity/Dist

Reliability:	2 - Valid With Restrictions
Reliability Remarks:	(2) Valid with restrictions

Transport Between Environmental Compartments Fugacity/Dist

Test Substance - Transport Between Environmental Compartments Fugacity/Dist

Category Chemical: (68955-35-1) Naphtha, petroleum, catalytic reformed

Test Substance: (68955-35-1) Naphtha, petroleum, catalytic reformed

Test Substance Purity/Composition and Other Test Substance Comments: Full -Range Catalytically Reformed Naphtha (FRCRN) -CAS No.
68955-35-1; API sample 83-05.
AROMATIC NAPHTHAS
Substance type Petroleum product
Physical status: Liquid
Remark: Aromatic naphtha streams are obtained from the catalytic reforming of mainly n-alkane and cycloparaffinic feedstocks into aromatic and branched chain hydrocarbons. The hydrocarbons are mainly in the range C5 to C12 and boil in the range of approximately 30 to 220°C. A typical aromatic naphtha is composed of the following hydrocarbon classes in the approximate proportions shown:
Content (volume %)
Paraffins 32
Olefins 0.5
Naphthenics 4
Aromatics 63.5
Full range catalytically reformed naphtha (CAS 64741-66-8) is a typical aromatic naphtha stream and the American Petroleum Institute (API, 1987) have characterized a specific sample (API 83-05) of a Full range catalytic reformed naphtha. The results of this characterization are in the attached revised robust summary, page 128.

Category Chemical Result Type: Estimated by Calculation

Test Substance Result Type: Estimated

Results - Transport Between Environmental Compartments Fugacity/Dist

Fugacity/Distribution Result Description: Multimedia (Fugacity) Modeling

Test Results: Media: Soil, air, water, suspended sediment and sediment

Medium % distribution
Air 96.5 to 99.98
Soil 0.01 to 1 83
Water 0 01 to 2.7
Sediment <0.001 to 0.03
Suspended sediment <0.001

Transport Table:

	Emissions (kg/h)	Half-life (hr)	Mass Distribution (percent)	Loss by Reaction (percent)	Loss by Advection (percent)
Air					
Water					
Soil					
Sediment					

Temperature:

Level of Multi-media Model: I

Model Input (Water Solubility):

Model Input (Vapor Pressure):

Model Input (log Kow):

Model Input (Melting Point):

Henry's Law Constant:

Model Concentration -- Air:

Model Concentration -- Water:

Model Concentration -- Soil:

Model Concentration -- Sediment:	
Results Remarks:	The constituents of this complex petroleum mixture are expected to partition primarily to air.

Study/Method - Transport Between Environmental Compartments Fugacity/Dist

Key Study Sponsor Indicator:	
Year Study Performed:	2000
Method/Guideline Followed:	Other
Deviations from Method/Guideline:	
Method/Guideline Description:	Calculated according to Mackay Level I Type: Calculated according to Mackay Level 1
Method/Guideline and Test Condition Remarks:	Model based on chemical fugacity Physical properties input are those calculated by the EPIWIN Estimation 3.04 program and included in this summary. Values represent the spread of calculated values for C5 to C8 hydrocarbon components found in LCRN, CAS No 64741-63-5. Detailed hydrocarbon analysis performed by Chevron Research was used to identify the components of this specific LCRN sample (see section 1 1.1.). The majority of LCRN components will partition rapidly to air, where these hydrocarbons will be rapidly oxidized by OH radicals
GLP:	
Study Reference:	Mackay, D, A. DiGuardo, S. Paterson, & C. Cowan (1997) EQC Model, ver. 1 01, 1997, available from the Environmental Modelling Centre, Trent University, Canada

Reliability/Data Quality - Transport Between Environmental Compartments Fugacity/Dist

Reliability:	2 - Valid With Restrictions
Reliability Remarks:	(2) Valid with restrictions

Biodegradation

Test Substance - Biodegradation

Category Chemical: (64741-55-5) Naphtha, petroleum, light catalytic cracked

Test Substance: (64741-55-5) Naphtha, petroleum, light catalytic cracked

Test Substance Purity/Composition and Other Test Substance Comments: Olefenic naphtha
Substance type : Petroleum product
Physical status : Liquid
Remark : The naphtha streams obtained from the catalytic cracking of heavy distillates into lighter fractions contain saturated, olefinic and aromatic hydrocarbons. However, their olefins content is higher than any of the naphtha streams derived by other processes. The catalytically cracked naphthas boil in the range of approximately -20 to 230°C and contain hydrocarbons in the range C4 to C10. The catalytically cracked naphthas typically are composed of the following hydrocarbon classes:
Approx. Content (volume %)
Paraffins 30
Olefins 46
Naphthenics 10
Aromatics 14
Light catalytically cracked naphtha (LCCN) (CAS 64741-55-5) is a typical olefinic naphtha stream. The American Petroleum Institute have reported (API, 1987) a thorough characterization of a specific sample of a light catalytically cracked naphtha (API 83-20), which has a high olefinic content and which was used in many of the mammalian toxicity studies. The characterization of this sample are found in the attached revised robust summary (page 43).

Category Chemical Result Type: Measured

Test Substance Result Type: Measured

Results - Biodegradation

Biodegradability Indicator: Inherently Biodegradable

Effect :

Concentration Value	Time in Days	Biodegradation Value	Biodegradation Value Range
	28	= 74 % Degradation	
	42	= 75 % Degradation	
	56	= 79 % Degradation	

Half Life:

Rate Constant:

Temperature:

Incubation Condition: Aerobic

Inoculum Type: Other

Inoculum Concentration:

Inoculum Remarks: Mixed, adapted inoculum of domestic activated sludge and soil
Contact time: 56 day(s)

Pre-Exposure Indicator:

Pre-Exposure Remarks:

Theoretical Carbon DiOxide:

Theoretical Oxygen Demand:

Chemical Oxygen Demand:

Control Substance Remarks:

Breakdown Products Description:

Results Remarks: Test material was inherently biodegradable since it achieved >20% biodegradability based on CO2 production. By day 28 approximately 74% of the test material was degraded, then essentially reached a plateau in degradation rate until day 56. The test was considered valid according to CONCAWE criteria, as >60% biodegradation of positive control (63% actual) was observed by day 14, and total blank CO2 production at termination was less than 15% of the organic carbon added as test substance. Temperature ranged from 18 to 21 °C, which deviated from the protocol value of 22 ±2°C. This deviation was not expected to have affected the outcome of this study.

% Degradation (sd)
Test Day Hexadecane Test Material
3 13.93 (1.85) 16.83 (9.56)
7 34.40 (4.54) 30.99 (0.56)
14 63.17 (0.94) 51.66 (3.33)
21 77.26 (6.52) 54.82 (6.24)
28 90.35 (7.14) 74.30 (1.24)
35 85.13 (n=1) 65.02 (1.37)
42 85.21 (n=1) 74 82 (0.54)
49 96.93 (8 94) 70.78 (6.48)
56 94.69 (4.10) 79.22 (12.28)

Study/Method - Biodegradation

Key Study Sponsor Indicator:

Year Study Performed: 1999

Method/Guideline Followed: Other

Deviations from Method/Guideline:

Method/Guideline Description: CONCAWE test method for determining the inherent aerobic biodegradability of oil products. 1996/1997, and modification of ISO/DIS 14593

Type (test type): Water quality-Evaluation of ultimate aerobic biodegradability of organic compounds in aqueous medium-Method by analysis of inorganic carbon in sealed vessels (CO2 headspace test)

Method/Guideline and Test Condition Remarks: Mixed inoculum prepared from soil and activated sludge was incubated with test substance or hexadecane (positive control) during a two week adaptation period Triplicate test systems were incubated for both the test substance and hexadecane fed inoculum. Two additional, similar test substances were concurrently incubated in separate 160 ml test systems using the same inoculum and acclimation procedure. Duplicate blank control test systems were prepared which consisted of the mixed inocula in mineral medium but no test or positive control substance. Test medium consisted of glass distilled water and mineral salts (phosphate buffer, ferric chloride, magnesium sulfate, calcium chloride) prepared as described in ISO method.
Acclimation procedure-Activated sludge from aeration basin of Wareham Wastewater Treatment Plant (Mass., U.S.A.) was sieved through 2 mm and centrifuged at 1000 rpm for 10 minutes. After removal of supernatant the concentrated solids were diluted to 5 mg/ml suspended solids with reagent grade water. Soil was collected from a site located in a mixed hardwood and pine forest (Mass , U S.A.). Site of sampling was cleared of debris and approximately 500 g of soil was obtained at a depth between 5-10 cm from the soil surface. Soil was air-dried, sieved through a 2 mm sieve, and analyzed for moisture content (38%).
Test vessels (160 ml serum bottles) were filled with 103 ml of mineral medium containing 50 mg/l of yeast extract and 50 mg/l (dry weight) washed activated sludge, then approximately 0.16g of sieved soil (0.1 g dry wt) was added to each bottle Test or reference substance were added directly to test systems using a 10 microliter Hamilton gas-tight syringe. The volume required to achieve the specified mg carbon/l concentrations were calculated based on % carbon and specific gravity of the respective substance. The test substance % carbon (0.8724) and specific gravity (0.7220 mg/ul) information was supplied by the Sponsor. Hexadecane % carbon (0.8496) was calculated from the empirical formula and specific gravity (0.7749 mg/ul) was obtained from Verschueren (1983). Addition of respective substance was performed on an incremental basis to the appropriate vessels as follows: 4, 8 and 8 mg C/l were added on days 0, 7 and 11, respectively. Test vessels

	were sealed with butyl rubber septa/aluminum crimp caps and incubated at 22 (±2°C) in the dark. Biodegradation by CO2 determination-test initiation and procedure. On day 14 of the acclimation phase, all test system inoculum from blanks, positive control, and each of the three test substances was combined and filtered through glass wool, and aerated prior to use. The aerated mixed inoculum was then added to mineral medium to achieve 10% concentration based on total volume (100 ml inoculum/1). Test vessels (160 ml serum bottles) were filled with 103 ml of inoculated mineral medium. Respective test systems were dosed with either test substance or hexadecane as described for the acclimation procedure to achieve 20 mg carbon/l concentration. Duplicate test systems for each test substance, positive control and blank treatments were prepared for sacrifice at weekly sampling intervals for subsequent CO2 analysis. After test system preparation, all vessels were placed in a walk-in chamber and incubated in the dark at 22°C (±2°). On days 3, 7, 14, 21, 28, 35, 42, 49 and 56, 1ml of conc. H3PO4 was injected through the septum of each sacrificed test vessel. The acidified samples were shaken for 1 hr at 200 ppm, then analyzed for CO2 using gas chromatography-thermal conductivity detection. Quantitation of inorganic mg C/l evolved was determined by linear regression analysis based on response factors for sodium carbonate standards spanning 1-30 mg carbon/l concentrations.
GLP:	Yes
Study Reference:	Springborn Laboratories, Inc. (1999) Light Catalytically Cracked Naphtha-Determination of Inherent Biodegradability. Study No. 13687.6109

Reliability/Data Quality - Biodegradation

Reliability:	1 - Valid Without Restrictions
Reliability Remarks:	(1) Valid without restriction

Biodegradation

Test Substance - Biodegradation

Category Chemical: (64741-66-8) Naphtha, petroleum, light alkylate

Test Substance: (64741-66-8) Naphtha, petroleum, light alkylate

Test Substance Purity/Composition and Other Test Substance Comments: Paraffinic naphtha
Substance type : Petroleum product
Physical status : Liquid
Remark: Paraffinic naphtha streams are obtained by alkylation (catalytic reaction), isomerisation (catalytic conversion) and solvent extraction. They contain mostly saturated hydrocarbons, generally in the range C5 to C10 and boil in the range of approximately 90 to 160°C. The paraffinic naphthas typically are composed of the following hydrocarbon classes:
 Content (volume %)
Paraffins 99.4
Olefins 0
Naphthenics 0.6
Aromatics 0
Light Alkylate Naphtha (CAS 64741-66-8) is a typical paraffinic naphtha stream.
The American Petroleum Institute have reported a thorough characterization of a specific sample (API 83-19) of Light Alkylate Naphtha (LAN) The results of this characterization are found in the attached revised robust summary (page 2).

Category Chemical Result Type: Measured

Test Substance Result Type: Measured

Results - Biodegradation

Biodegradability Indicator: Inherently Biodegradable

Effect :

Concentration Value	Time in Days	Biodegradation Value	Biodegradation Value Range
	28	= 42 % Degradation	
	42	= 48 % Degradation	
	56	= 40 % Degradation	

Half Life:

Rate Constant:

Temperature:

Incubation Condition: Aerobic

Inoculum Type: Other

Inoculum Concentration:

Inoculum Remarks: Mixed, adapted inoculum of domestic activated sludge and soil
Contact time: 56 day(s)

Pre-Exposure Indicator:

Pre-Exposure Remarks:

Theoretical Carbon DiOxide:

Theoretical Oxygen Demand:

Chemical Oxygen Demand:	
Control Substance Remarks:	
Breakdown Products Description:	
Results Remarks:	Test material was inherently biodegradable since it achieved >20% biodegradability based on CO2 production. By day 21 approximately 40% of the test material was degraded, a slight increase to 48% was observed by day 42, but by day 56 degradation had leveled back down to 40%. The test was considered valid according to CONCAWE criteria, as >60% biodegradation of positive control (63% actual) was observed by day 14, and total blank CO2 production at termination was less than 15% of the organic carbon added as test substance. Temperature ranged from 18 to 21 °C, which deviated from the protocol value of 22 ±2°C. This deviation was not expected to have affected the outcome of this study % Degradation (sd) Test Day Hexadecane Test Material 3 13.93 (1.85) 0.12 (0.07) 7 34.40 (4.54) 7.84 (7.80) 14 63.17 (0.94) 26 59 (0.85) 21 77.26 (6.52) 40.24 (5.00) 28 90.35 (7.14) 42.41 (2.54) 35 85.13 (n=1) 41.53 (9.90) 42 85.21 (n=1) 48.12 (1.77) 49 96.93 (8.94) 46.55 (1.04) 56 94.69 (4.10) 40.44 (0.76)

Study/Method - Biodegradation

Key Study Sponsor Indicator:	
Year Study Performed:	1999
Method/Guideline Followed:	Other
Deviations from Method/Guideline:	
Method/Guideline Description:	CONCAWE. Test method for determining the inherent aerobic biodegradability of oil products. 1996/1997, and modification of ISO/DIS 14593 Test type: Water quality-Evaluation of ultimate aerobic biodegradability of organic compounds in aqueous medium-Method by analysis of inorganic carbon in sealed vessels (CO2 headspace test)
Method/Guideline and Test Condition Remarks:	Mixed inoculum prepared from soil and activated sludge was incubated with test substance or hexadecane (positive control) during a two week adaptation period. Triplicate test systems were incubated for both the test substance and hexadecane fed inoculum. Two additional, similar test substances were concurrently incubated in separate 160 ml test systems using the same inoculum and acclimation procedure. Duplicate blank control test systems were prepared which consisted of the mixed inocula in mineral medium but no test or positive control substance. Test medium consisted of glass distilled water and mineral salts (phosphate buffer, ferric chloride, magnesium sulfate, calcium chloride) prepared as described in ISO method. Acclimation procedure-Activated sludge from aeration basin of Wareham Wastewater Treatment Plant (Mass., U.S A.) was sieved through 2 mm and centrifuged at 1000 rpm for 10 minutes. After removal of supernatant the concentrated solids were diluted to 5 mg/ml suspended solids with reagent grade water. Soil was collected from a site located in a mixed hardwood and pine forest (Mass., U.S.A.) Site of sampling was cleared of debris and approximately 500 g of soil was obtained at a depth between 5-10 cm from the soil surface. Soil was air-dried, sieved through a 2 mm sieve, and analyzed for moisture content (38%). Test vessels (160 ml serum bottles) were filled with 103 ml of mineral medium containing 50 mg/l of yeast extract and 50 mg/l (dry weight) washed activated sludge, then approximately 0.16g of sieved soil (0.1 g dry wt) was added to each bottle. Test or reference substance were added directly to test systems using a 10 microliter Hamilton gas-tight syringe. The volume required to achieve the specified mg carbon/l concentrations were calculated based on % carbon and specific gravity of the respective substance. The test substance % carbon (0.8505) and specific gravity (0.6690 mg/il) information was supplied by the Sponsor. Hexadecane % carbon (0 8496) was calculated from the empirical formula and specific gravity (0.7749 mg/il) was obtained from Verschueren (1983). Addition of respective substance was performed on an incremental basis to the appropriate vessels as follows: 4, 8 and 8 mg C/l were added on days 0, 7 and 11, respectively. Test vessels were sealed with butyl rubber septa/aluminum crimp caps and incubated at 22 (±2°C) in the dark. Biodegradation by CO2 determination-test initiation and

	procedure On day 14 of the acclimation phase, all test system inoculum from blanks, positive control, and each of the three test substances was combined and filtered through glass wool, and aerated prior to use. The aerated mixed inoculum was then added to mineral medium to achieve 10% concentration based on total volume (100 ml inoculum/l). Test vessels (160 ml serum bottles) were filled with 103 ml of inoculated mineral medium. Respective test systems were dosed with either test substance or hexadecane as described for the acclimation procedure to achieve 20 mg carbon/l concentration. Duplicate test systems for each test substance, positive control and blank treatments were prepared for sacrifice at weekly sampling intervals for subsequent CO2 analysis. After test system preparation, all vessels were placed in a walk-in chamber and incubated in the dark at 22°C (±2°). On days 3, 7, 14, 21, 28, 35, 42, 49 and 56, 1ml of conc. H3PO4 was injected through the septum of each sacrificed test vessel. The acidified samples were shaken for 1 hr at 200 ppm, then analyzed for CO2 using gas chromatography-thermal conductivity detection. Quantitation of inorganic mg C/l evolved was determined by linear regression analysis based on response factors for sodium carbonate standards spanning 1-30 mg carbon/l concentrations
GLP:	Yes
Study Reference:	Springborn Laboratories, Inc (1999) Light Alkylate Naphtha-Determination of Inherent Biodegradability. Study No 13687.6111

Reliability/Data Quality - Biodegradation

Reliability:	1 - Valid Without Restrictions
Reliability Remarks:	(1) Valid without restriction

Biodegradation

Test Substance - Biodegradation

Category Chemical: (64741-63-5) Naphtha, petroleum, light catalytic reformed

Test Substance: (64741-63-5) Naphtha, petroleum, light catalytic reformed

Test Substance Purity/Composition and Other Test Substance Comments: Aromatic naphtha
Light Catalytically Reformed Naphtha.
Sample identified by Chevron Research as a light catalytically reformed naphtha CAS No. 64741-63-5
Detailed hydrocarbon analysis

 Olefins Naphthenes Aromatics Paraffins
 total n-
total% 0.90 2.36 39.40 57.34 17.51
C4 0.00 0.00 0 00 0.81 0 78
C5 0.34 0.26 0.00 19.45 8 05
C6 0.27 0.62 8.37 16.23 4 69
C7 0.28 1.18 29.77 17.70 3.59
C8 0.01 0 27 1.26 3.12 0 40

Category Chemical Result Type: Measured

Test Substance Result Type: Measured

Results - Biodegradation

Biodegradability Indicator: Inherently Biodegradable

Effect :

Concentration Value	Time in Days	Biodegradation Value	Biodegradation Value Range
	28	= 96 % Degradation	
	42	= 97 % Degradation	
	56	= 85 % Degradation	

Half Life:

Rate Constant:

Temperature:

Incubation Condition: Aerobic

Inoculum Type: Other

Inoculum Concentration:

Inoculum Remarks: Mixed, adapted inoculum of domestic activated sludge and soil
Contact time: 56 day(s)

Pre-Exposure Indicator:

Pre-Exposure Remarks:

Theoretical Carbon DiOxide:

Theoretical Oxygen Demand:

Chemical Oxygen Demand:

Control Substance Remarks:	Hexadecane was used as positive control and the blank control test systems consisted of the mixed inocula in mineral medium but no test or positive control substance.
Breakdown Products Description:	
Results Remarks:	Test material was inherently biodegradable since it achieved >20% biodegradability based on CO2 production. By day 28 approximately 96% of the test material was degraded, then essentially reached a plateau in degradation rate until day 56 The test was considered valid according to CONCAWEcriteria, as >60% biodegradation of positive control (63% actual) was observed by day 14, and total blank CO2 production at termination was less than 15% of the organic carbon added as test substance. Temperature ranged from 18 to 21° C, which deviated from the protocol value of 22 ± 2°C This deviation was not expected to have affected the outcome of this study. % Degradation (sd) Test Day Hexadecane Test Material 3 13 93 (1.85) 30.85 (3 85) 7 34 40 (4.54) 53.71 (3 52) 14 63 17 (0.94) 77 25 (3.65) 21 77.26 (6.52) 87 17 (8.87) 28 90.35 (7 14) 96.17 (5.26) 35 85.13 (n=1) 107 9 (n=1) 42 85.21 (n=1) 96 95 (6.37) 49 96.93 (8.94) 92.02 (n=1) 56 94 69 (4 10) 84.92 (0.51)

Study/Method - Biodegradation

Key Study Sponsor Indicator:	
Year Study Performed:	1999
Method/Guideline Followed:	Other
Deviations from Method/Guideline:	
Method/Guideline Description:	CONCAWE. Test method for determining the inherent aerobic biodegradability of oil products. 1996/1997, and modification of ISO/DIS 14593 Test type: Water quality-Evaluation of ultimate aerobic biodegradability of organic compounds in aqueous medium-Method by analysis of inorganic carbon in sealed vessels (CO2 headspace test)
Method/Guideline and Test Condition Remarks:	Mixed inoculum prepared from soil and activated sludge was incubated with test substance or hexadecane (positive control) during a two-week adaptation period. Triplicate test systems were incubated for both the test substance and hexadecane fed inoculum. Two additional, similar test substances were concurrently incubated in separate 160 ml test systems using the same inoculum and acclimation procedure. Duplicate blank control test systems were prepared which consisted of the mixed inocula in mineral medium but no test or positive control substance. Test medium consisted of glass-distilled water and mineral salts (phosphate buffer, ferric chloride, magnesium sulfate, calcium chloride) prepared as described in ISO method. Acclimation procedure-Activated sludge from aeration basin of Wareham Wastewater Treatment Plant (Mass., U S A.) was sieved through 2 mm and centrifuged at 1000 rpm for 10 minutes. After removal of supernatant the concentrated solids were diluted to 5 mg/ml suspended solids with reagent grade water. Soil was collected from a site located in a mixed hardwood and pine forest (Mass , U S.A.). Site of sampling was cleared of debris and approximately 500 g of soil was obtained at a depth between 5-10cm from the soil surface Soil was air-dried, sieved through a 2 mm sieve, and analyzed for moisture content (38%). Test vessels (160 ml serum bottles) were filled with 103 ml of mineral medium containing 50 mg/l of yeast extract and 50 mg/l (dry weight) washed activated sludge, then approximately 0.16g of sieved soil (0 1 g dry wt) was added to each bottle Test or reference substance were added directly to test systems using a 10 microliter Hamilton gas tight syringe. The volume required to achieve the specified mg carbon/l concentrations were calculated based on % carbon and specific gravity of the respective substance The test substance % carbon (0.8856) and specific gravity (0 7325 mg/il) information was supplied by the Sponsor. Hexadecane % carbon (0.8496) was calculated from the empirical formula and specific gravity (0.7749 mg/il) was obtained from Verschueren (1983). Addition of respective substance was performed on an incremental basis to the appropriate vessels as follows: 4, 8 and 8 mg C/l were added on days 0, 7 and 11, respectively. Test vessels were sealed with butyl rubber septa/aluminum crimp caps and incubated at 22 °C (±-2°C) in the dark. Biodegradation by CO2 determination test initiation and procedure On day 14 of the acclimation phase, all test system inoculum from

	blanks, positive control, and each of the three test substances was combined and filtered through glass wool, and aerated prior to use. The aerated mixed inoculum was then added to mineral medium to achieve 10% concentration based on total volume (100 ml inoculum/l).Test vessels (160 ml serum bottles) were filled with 103 ml of inoculated mineral medium. Respective test systems were dosed with either test substance or hexadecane as described for the acclimation procedure to achieve 20 mg carbon/l concentration. Duplicate test systems for each test substance, positive control and blank treatments were prepared for sacrifice at weekly sampling intervals for subsequent CO2 analysis After test system preparation, all vessels were placed in a walk-in chamber and incubated in the dark at 22 °C (± 2 °C). On days 3, 7, 14, 21, 28, 35, 42, 49 and 56, 1ml of conc H3PO4 was injected through the septum of each sacrificed test vessel. The acidified samples were shaken for 1 hr at 200 ppm, then analyzed for CO2 using gas chromatography-thermal conductivity detection. Quantitation of inorganic mg C/l evolved was determined by linear regression analysis based on response factors for sodium carbonate standards spanning 1-30 mg carbon/l concentrations.
GLP:	Yes
Study Reference:	Springborn Laboratories, Inc. (1999) Light Catalytically Reformed Naphtha-Determination of Inherent Biodegradability. Study No. 13687.6110

Reliability/Data Quality - Biodegradation

Reliability:	1 - Valid Without Restrictions
Reliability Remarks:	(1) Valid without restriction

Biodegradation

Test Substance - Biodegradation

Category Chemical: *No CAS Number Provided*

Test Substance: *No CAS Number Provided*

Test Substance Purity/Composition and Other Test Substance Comments: CAS No 86290-81-5, a commercial unleaded gasoline topped at 76°C by distillation. It was free of hydrocarbons having less than six carbon atoms and contained no oxygenated compounds

Category Chemical Result Type: Measured

Test Substance Result Type: Measured

Results - Biodegradation

Biodegradability Indicator:

Effect :

Concentration Value	Time in Days	Biodegradation Value	Biodegradation Value Range
	25	94 % Degradation	

Half Life:

Rate Constant:

Temperature:

Incubation Condition: Aerobic

Inoculum Type: Other

Inoculum Concentration:

Inoculum Remarks: Activated aerobic sludge obtained from an urban wastewater treatment plant

Pre-Exposure Indicator:

Pre-Exposure Remarks:

Theoretical Carbon DiOxide:

Theoretical Oxygen Demand:

Chemical Oxygen Demand:

Control Substance Remarks:

Breakdown Products Description:

Results Remarks: Biodegradation and Mineralization of Gasoline Gasoline was degraded up to 94% under non-limiting conditions after 25 d incubation (500 ml substrate/l medium). The carbon balance of gasoline degradation showed that 61 7% of gasoline was mineralized to CO2 and that microbial cell production accounted for the remaining carbon of gasoline degraded. Biomass formation and mineralization occurred mainly during the initial fast degradation phase whereas essentially mineralization occurred during the second slow degradation phase. Individual classes of hydrocarbons degraded and carbon balance were shown to be:
 Amount in
Hydrocarbon Class Gasoline
 (mg/g) After 2 After 25
 days days
Aromatics 789 88% 99%
Branched alkanes 165 14 74
Linear alkanes 23 17 92
Cyclic alkanes 17 10 99
Alkenes 6 71 99
Carbon balance
Substrate Initial amount Final amount
or Products (mg C/l) (mg C/l)
Gasoline 357 18
Biomass 39 165
CO2 0 204
Total Carbon 396 387
Kinetic Experiments with Gasoline Two main degradation phases were found, one fast degradation phase (FDP), which started after an 18 h lag period and lasted until the 40th hour. The maximum rate of oxygen consumption during the FDP was 44 mg/l/h and the average rate was 24.5 mg/l/h. The FDP was followed by a slow degradation phase (SDP) where the rate of oxygen consumption slowed steadily from the 40th hour till the 25th day. The average rate was 15 mg/l/d, which was approximately 40 times slower than during the FDP.

Activated sludge microorganisms were found to biodegrade unleaded commercial gasoline up to 94% within 25 days. For each hydrocarbon class, degradation occurred at different rates. Aromatic compounds were found to be the most readily consumed, although compounds bearing neighboring substituents and those containing longer alkyl groups were consumed at a slower rate than those with no or only one alkyl chain. Likewise, linear alkanes (exception for
undecane), alkenes with five to nine carbons, cyclohexane and substituted cyclopentanes were biodegraded. Residual components of gasoline most recalcitrant to biodegradation were found to be branched alkanes, particularly those containing a quaternary carbon and/or alkyl chains on consecutive carbon atoms.

Study/Method - Biodegradation

Key Study Sponsor Indicator:

Year Study Performed: 1999

Method/Guideline Followed: Other ,

Deviations from Method/Guideline:

Method/Guideline Description: Non-guideline research method using a closed-system shake flask apparatus
Aerobic Biodegradability -Evaluation of biodegradability of gasoline in aqueous medium. Method by analysis of disappearance of carbon compounds (gas chromatography with flame ionization detector), kinetics of O2 consumption (respirometry), and CO2 production (gas chromatography with thermal conductivity detector)
Exposure period was 16 or 25 days. See test conditions for more details.

Method/Guideline and Test Condition Remarks: Activated sludge containing approximately 3 g/l dry weight was centrifuged at 15000 g for 20 min and re-suspending the biomass in the same volume of nutrient solution. The microbial suspension was used to inoculate nutrient solution at a final concentration of 100 mg dry weight/l. Gasoline (400 mg/l) or individual hydrocarbons (150 mg/l) were added to the medium as the sole carbon source. The nutrient solution was a vitamin-enriched mineral salt medium described by Bouchez et al. Appl. Microbiol. Biotechnol. 43 156-164 (1995).
Biodegradation of Gasoline The biodegradation tests were performed in 500-ml flasks with sidearms equipped with Mininert® valves. 25 ml of gasoline were added to 50 ml of inoculated nutrient medium (i e., 500 ml substrate/l medium) through the valve with a syringe. The flasks were incubated for 25 days at 30°C with alternate shaking (70 strokes per min). After the incubation period, 5 ml of CH2Cl2 containing 600 mg/ml dodecane as internal standard was introduced to the flasks through the valve, and the remaining hydrocarbon compounds were extracted for 1 h under shaking. The flasks were refrigerated overnight at 4°C before opening The suspensions were centrifuged at 35000 g for 30 min at 4°C. The CH2Cl2 phase of each flask was then analyzed by gas chromatography for carbon compounds. Experiments were performed in duplicate and abiotic controls were prepared similarly to the other treatments with the exception that 1 g/l HgCl2 were added to the flasks before incubation
Mineralization of Gasoline Measurements of CO2 evolved during the biodegradation of gasoline were conducted in 240-ml flasks closed by Viton ® stoppers. 18 ml of inoculated culture medium were added to each flask along with 5 ml of gasoline (i.e., 500 ml substrate/l medium). Flasks were incubated at 30°C for 25 days under alternate shaking. At the end of the incubation period the contents of each flask was acidified with 0.5 ml HNO3 (68%) and CO2 was measured by gas chromatography Endogenous respiration of inoculated medium was measured in flasks without gasoline added.
Kinetic

	Experiments with Gasoline Kinetics of O2 consumption during gasoline biodegradation were determined in duplicate at 30°C over 25 d by respirometry. 500 ml stirred culture flasks contained 250 ml of inoculated nutrient medium and 125 ml of gasoline (i.e., 500 ml substrate/l medium). Control experiments without gasoline were also done. Kinetics of hydrocarbon degradation also was monitored by respirometry. Incubation was stopped at selected times and the remaining hydrocarbons were extracted as described above and analyzed by gas chromatography Kinetic Experiments with Individual Hydrocarbons Kinetics of CO2 production during the degradation of individual hydrocarbons was carried out at 30°C over 16 days Treatments were prepared in 125 ml shaken flasks with 25 ml of nutrient solution containing 70 mg/l of inoculum biomass and 5 ml of hydrocarbon (i e , 200 ml substrate/l medium). Flasks were closed with Teflon-coated stoppers and sealed CO2 was measured at various times by gas chromatography. Endogenous respiration was determined in flasks without hydrocarbon added.
GLP:	No Data
Study Reference:	Solano-Serena, F., R Marchal, M. Ropars, J.-M. Lebeault, and J.-P. Vandecasteele. 1999 Biodegradation of Gasoline: Kinetics, Mass Balance and Fate of Individual Hydrocarbons J. Appl. Microbiol. 96:1006-1016.

Reliability/Data Quality - Biodegradation

Reliability:	2 - Valid With Restrictions
Reliability Remarks:	(2) Valid with restrictions

Biodegradation

Test Substance - Biodegradation

Category Chemical: (64741-41-9) Naphtha, petroleum, heavy straight-run

Test Substance: (64741-41-9) Naphtha, petroleum, heavy straight-run

Test Substance Purity/Composition and Other Test Substance Comments: High Naphthenic, Heavy Straight-Run Naphtha:
C6 - C11 aromatics: 13.7 % wt.
C6 - C12 iso-paraffins: 31.2 % wt.
C6 - C10 naphthenes: 29.5 % wt.
C7 - C10 olefins: 5.0 % wt.
C6 - C12 paraffins: 18.9 % wt.
Unidentified: 1.7 % wt.

Category Chemical Result Type: Measured

Test Substance Result Type: Measured

Results - Biodegradation

Biodegradability Indicator: Readily Biodegradable

Effect :

Concentration Value	Time in Days	Biodegradation Value	Biodegradation Value Range
50 mg/L	28	= 77 % Degradation	75 - 78

Half Life:

Rate Constant:

Temperature: 22 °C

Incubation Condition: Aerobic

Inoculum Type: Activated Sludge

Inoculum Concentration: 10 ml/L

Inoculum Remarks: The activated sludge was obtained from a domestic wastewater treatment plant receiving predominantly domestic sewage.

Pre-Exposure Indicator: No

Pre-Exposure Remarks:

Theoretical Carbon DiOxide:

Theoretical Oxygen Demand: 3.41 mg/mg

Chemical Oxygen Demand:

Control Substance Remarks: sodium benzoate served as the positive control substance. The THOD = 1.67 mg/mg, and was used at a concentration of 50 mg/l

Breakdown Products Description:	
Results Remarks:	The average percent biodegradation of triplicate test systems of high naphthenic, heavy, straight-run naphtha was 77% of the THOD over a 28 day test period 10% biodegradation was attained by Day 4 and had attained 60% by Day 12. Based on these results, the test substance passed the OECD criteria for ready biodegradability. Biodegradation of the positive reference substance, sodium benzoate, exceeded 60% of the THOD by Day 2 and 96% by Day 28.

Study/Method - Biodegradation

Key Study Sponsor Indicator:	
Year Study Performed:	2007
Method/Guideline Followed:	OECD 301F
Deviations from Method/Guideline:	No
Method/Guideline Description:	Aerobic Ready Biodegradability: Manometric Respirometry Test Triplicate respirometer flasks were used to evaluate the biodegradability of the test and positive control substances at mean concentrations of 49 mg/L and 50 mg/L, respectively A toxicity control (combination of positive control and test substance) was also evaluated at a mean concentration of 99 mg/L. Duplicate flasks containing test medium and inoculum but no test or positive control substances served as test blanks. Un-acclimated activated sludge was collected the day before test initiation from the Clinton Sanitary Wastewater Treatment Plant, Annandale, NJ, USA, which receives predominantly domestic sewage. The sample was aerated for approximately 24 hours with CO2-free air The total suspended solids (TSS) of the activated sludge measured 3.5 g/L After the aeration period, the sludge was homogenized in a blender for two minutes then allowed to settle for one hour and fifteen minutes The supernatant was decanted and an aliquot of the supernatant was taken for measurement of the microbial activity. The colony-forming-units (CFU) of the supernatant measured 105 CFU/mL. Twenty liters of mineral medium was prepared according to OECD guidelines by adding mineral salt stock solutions to glass distilled water. After adding the mineral salt solutions, the activated sludge inoculum was added at a 1% loading volume of sludge supernatant to mineral medium. The medium was aerated for approximately 24 hours with CO2 free air. One liter of test medium was added to each one liter respirometer flask. The test substance was weighed in an air tight syringe and injected into the test medium. The syringe was re-weighed after dosing and the weight difference equaled the amount of test substance added to the flask. Flasks were sealed immediately after addition of the test substance to minimize loss of volatile components. An aliquot of the positive control stock solution was added to the appropriate test flasks All respirometer flasks were placed on a Coordinated Environmental Services (CES) automated respirometer which automatically recorded the oxygen uptake in general agreement with the OECD guideline. The 28-day study was conducted at a temperature range of approximately 21 to 24°C The composition of the test substance was characterized as follows: C6 - C11 aromatics 13 7 % wt. C6 - C12 iso-paraffins: 31 2 % wt. C6 - C10 naphthenes: 29 5 % wt C7 - C10 olefins. 5 0 % wt. C6 - C12 paraffins. 18.9 % wt. Unidentified. 1.7 % wt. An elemental analysis of the test sample resulted in the following: % Carbon 85.54 % Hydrogen 14 35 % Nitrogen 0.08 % Oxygen <0.1 The Theoretical Oxygen Demand (ThOD) was determined using the elemental analyses data and OECD 301F procedures. ThOD = 3.41 mg O2/mg test substance.
Method/Guideline and Test Condition Remarks:	
GLP:	Yes
Study Reference:	ExxonMobil Biomedical Sciences, Inc. 2006 Ready Biodegradability: Manometric Respirometry test on High Naphthenic, Heavy, Straight-Run Naphtha Study # 0545979. ExxonMobil Biomedical Sciences, Annandale, NJ.

Reliability/Data Quality - Biodegradation

Reliability: 1 - Valid Without Restrictions

Reliability Remarks:

Biodegradation

Test Substance - Biodegradation

Category Chemical:

Test Substance:

Test Substance Purity/Composition and Other Test Substance Comments: readacross example for this endpont

Category Chemical Result Type: Read-Across

Test Substance Result Type:

Results - Biodegradation

Biodegradability Indicator: Inherently Biodegradable

Effect :

Concentration Value	Time in Days	Biodegradation Value	Biodegradation Value Range
	28		42 - 96
	56		40 - 85

Half Life:

Rate Constant:

Temperature:

Incubation Condition:

Inoculum Type:

Inoculum Concentration:

Inoculum Remarks:

Pre-Exposure Indicator:

Pre-Exposure Remarks:

Theoretical Carbon DiOxide:

Theoretical Oxygen Demand:

Chemical Oxygen Demand:

Control Substance Remarks:

Breakdown Products Description:

Results Remarks:

Study/Method - Biodegradation

Key Study Sponsor Indicator:

Year Study Performed:

Method/Guideline Followed:

Deviations from Method/Guideline:

Method/Guideline Description:

Method/Guideline and Test Condition Remarks:

GLP:

Study Reference: see cass # jfuhgdf and Ca9o00kkkkko

Reliability/Data Quality - Biodegradation

Reliability:

Reliability Remarks:

EcoToxicity SIDS

Acute Toxicity to Aquatic Vertebrates

Test Substance - Acute Toxicity To Aquatic Vertebrates

Category Chemical:	*No CAS Number Provided*
Test Substance:	*No CAS Number Provided*
Test Substance Purity/Composition and Other Test Substance Comments:	Gasoline CAS No. 86290-81-5 Gasoline Sample W94/813, Blend Detailed hydrocarbon analysis: N-paraffins: 20% total C3-C8, Iso-paraffins: 28% total C4-C9 Olefins 1%, C5-C7 Naphthenes: 5% C5-C10 Aromatics: 46% C6-C9
Category Chemical Result Type:	Measured
Test Substance Result Type:	Measured

Method - Acute Toxicity To Aquatic Vertebrates

Year Study Performed:	1995
Method/Guideline Followed:	OECD 203
Other Method/Guideline:	
Deviations from Method/Guideline:	
Species:	Oncorhynchus mykiss
GLP:	Yes
Analytical Monitoring:	Yes
Test Type:	Static
Test Vessel:	
Water Media Type:	Freshwater
Test Concentrations:	Nominal
Nominal and Measured Concentrations:	0, 1, 5, 10, 25 and 50 mg/l
Exposure Period:	96 Hours
Vehicle Used:	
Vehicle Name:	
Vehicle Amount and Units:	
Alkalinity:	
Dissolved Oxygen:	7.4 to 9.8 ppm
pH Value:	7.8 Upper Range: 8.1
Test Temperature and Units:	Value/Lower Range: 14.1 °C
Photo (Light/Dark):	16/8
Salinity:	
TOC:	

Water Hardness:

Method/Guideline Test Conditions Remarks: LL50 at 96 hr calculated using Probit procedure (Finney, D.J., 1971. Probit Analysis, Third Edition, London: Cambridge University Press, and SAS computer statistics software

Test solutions were prepared as water accommodated fractions (WAF). The control and dilution water was a laboratory blend water prepared from carbon filtered well water and ion exchange softened, reverse osmosis dialyzed well water aged for >24 hrs. To determine contact time required to achieve maximum solubility between test substance and aqueous solution, samples of WAF test solutions equilibrated for 20, 24 27 and 49 hours at 100 mg/l loading were analyzed by GC-FID for concentrations of the following: benzene, toluene, ethylbenzene, xylene isomers and naphthalene (BTEXN). Maximum WAF solubility for these components reached equilibrium within 24 hrs of stirring. Nominal loading rates of 0, 1, 5, 10, 25 and 50 mg/l were used to prepare test solutions for the fish toxicity tests. Test substance, added volumetrically, was mixed for each individual treatment in dilution water for 24 hours in 20liter stoppered containers with less than 10% headspace volume. The mixtures were allowed to settle for 1-2 hours prior to drawing off the aqueous solutions for testing. Fish were approximately four weeks old at test initiation and were obtained from Thomas Fish company, Anderson, CA, Lot 297. Loading of fish body mass to treatment was 0.2 g fish per liter of aqueous solution, mean length at termination was 2.7 cm (sd=0.2), and mean weight was 0.136 g (sd=0.034). Test vessels were 4 liter glass aspirator bottles with foil covered neoprene stoppers. Three replicates per treatment and 5 organisms per replicate were tested for each treatment and the control. Exposure containers were filled (no headspace volume) and tightly sealed to prevent volatilization. Test solution renewal was performed daily by removing 80% of the test solution and replacing it with fresh WAF solution prepared at least 24 hrs prior to use Freshly prepared and old WAF test solutions were analyzed by GC-FID for concentrations of BTEXN. Water temperature was 14.1 °C (0.03sd). Test photoperiod was 16 hrs. light and 8 hr dark, light intensity approx 619-622 Lux during full daylight periods. Dissolved oxygen measurements ranged from 7.4 to 9.8 ppm, pH values between 7.8 and 8.1

Limit Test: No

Test Results - Acute Toxicity To Aquatic Vertebrates

NOEC Exposure Duration:

NOEC:

LOEC Exposure Duration:

LOEC:

NOELR Exposure Duration: 96 Hours

NOELR: = 5 mg/L

LOELR Exposure Duration:

LOELR:

LC/EC Mean Value :

Exposure Duration	Exposure Units	LC/EC	%	Value Description	Mean Value or Lower Mean Value	Upper Mean Value	Units	Effect Observed	Basis for Concentration
96	Hours	LL	50 %	=	11		mg/L		

Results Remarks: Mortality (no. of deaths/treatment) at 96 hrs:
Treatment No. of deaths
0 0
1
1 0
0
5
0
10
7
25
15
50
5

96-hr LL50 = 11 mg/l, 95% C.I: 8.7-16 mg/l (as nominal loading rate) 96-hour No Observed Effect Loading (NOEL) was 5 mg/l, both calculated (Dunnett's Procedure) and observed Results are quoted in terms of 50% Lethal

Loading (LL50), the loading rate of test substance resulting in 50% mortality of the test species exposed to the WAF At termination, abnormal behavior/appearance (lethargy, erratic swimming) was observed in all surviving fish at the 10 mg/l treatment. Losses of the soluble components from the WAF over each 24 hour period ranged from 5 to 25% for the 5, 10 and 25 mg/l loadings. Up to 57% loss was observed in the 1.0 mg/l treatment in 24 hrs samples. BETXN concentrations on 24hour samples of the 50 mg/l treatments due to complete mortality on day 0 were not determined

Analytical results Measured BTEXN

(mg/l) 	Nominal loading rate (mg/l) Day	Control	1.0	5.0	10
25	50 0 (new)	ND	0.54	2.3	4.2
9.5	20 1 (old)	ND	0.50	2.3	4.0
10	NA 1 (new)	ND	0.47	1.7	4.2
NA	NA 2 (old)	ND	0 20	2.1	4.0
NA	NA 2 (new)	ND	0.52	2.0	4.1
NA	NA 3 (old)	ND	0.25	2.0	4.3
NA	NA 3 (new)	ND	0.57	1.6	4.0
NA	NA 4 (old)	ND	0.38	1 2	3.2
NA					

NA

ND=not detected, NA=not analyzed due to 100% mortality
Guideline/protocol deviations: Body length (2.7cm av.) smaller than recommended range of 4-6 cm; smaller fish used to minimize DO depletion in closed vessel (no-headspace) systems

Reliability/Data Quality - Acute Toxicity To Aquatic Vertebrates

Reliability: 1 - Valid Without Restrictions

Reliability Remarks:

Key Study Sponsor Indicator:

Reference - Acute Toxicity To Aquatic Vertebrates

Reference: CONCAWE (1995) Fish -acute toxicity test: study no. 104858, test substance MRD-95-048. Study conducted by Exxon Biomedical Sciences Inc. CONCAWE, Brussels, 1995.

Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

Acute Toxicity to Aquatic Vertebrates

Test Substance - Acute Toxicity To Aquatic Vertebrates

Category Chemical:	(64741-66-8) Naphtha, petroleum, light alkylate
Test Substance:	(64741-66-8) Naphtha, petroleum, light alkylate
Test Substance Purity/Composition and Other Test Substance Comments:	Paraffinic naphtha
Category Chemical Result Type:	Measured
Test Substance Result Type:	Measured

Method - Acute Toxicity To Aquatic Vertebrates

Year Study Performed:	1994
Method/Guideline Followed:	
Other Method/Guideline:	
Deviations from Method/Guideline:	
Species:	Pimephales promelas
GLP:	Yes
Analytical Monitoring:	Yes
Test Type:	Semi-Static
Test Vessel:	Closed
Water Media Type:	
Test Concentrations:	Nominal
Nominal and Measured Concentrations:	0, 1.1, 5.2, 9.7, 19 and 74 mg/l
Exposure Period:	96 Hours
Vehicle Used:	
Vehicle Name:	
Vehicle Amount and Units:	
Alkalinity:	
Dissolved Oxygen:	7.7 and 8.6
pH Value:	7.844 Upper Range: 8 23
Test Temperature and Units:	Value/Lower Range: 21.2 °C
Photo (Light/Dark):	16/8
Salinity:	
TOC:	

Water Hardness:

Method/Guideline Test Conditions Remarks:

No specific guideline was described as being used to conduct the test, however report references 1991 ASTM method E729-88a and 1982 EPA Support Documents for Environmental Testing: EPA 560/6-82-002. LL 50 calculated using binomial probability analysis. ASTM Special Technical Publication 634. 1977, pp 65-84. All NOEC values calculated using Fisher's exact test.

Test solutions were prepared as water accommodated fractions (WAF). Control and dilution water was Mobil Technical Center well water. Nominal loading rates of 0, 1.1, 5.2, 9.7, 19 and 74 mg/l were used to prepare test solutions.

WAFS were prepared for each test concentration by mixing the appropriate mass of substance in 9.4 liters of water for 24 hr in 9 liter glass bottles. The bottles were filled to neck height with water to minimize volatility. A measured amount of test substance was added into each bottle, and the
bottles were capped tightly with a positive pressure siphoning apparatus. The siphoning apparatus consisted of a teflon lined neoprene stopper housing two teflon tubes. One tube extended to the bottom of the bottle for removal of the WAF solution, the other tube ended above the WAF surface, and was used to control air pressure during siphoning. During WAF preparation, parafilm was used to seal the external joint between the neoprene stopper and glass bottle. After stirring for 24 hrs using 25% or less vortex, the contents of the WAF solution bottles were allowed to settle for approximately 45 minutes to two hours, then siphoned by the positive pressure apparatus port and used for testing. Samples were also analyzed by Purge & trap/GC-FID for concentrations of the following: 2,3 dimethyl butane; 2,4 dimethyl pentane; 2,2,4 trimethyl pentane; 2,5 dimethyl hexane; 2,3,4 trimethyl pentane, 2,3,3 trimethyl pentane and 1-methyl-1-ethyl cyclopentane, which represent 68% composition of the test substance. Measured test concentrations of the light alkylate naphtha were based on the total combined concentrations of all analytes.

Fish were hatched and raised in-house, and were acclimated prior to experimentation for a minimum of 14 days on a 16/8hr light/dark cycle. Test vessels were 3.8 liter glass containers with teflon lined caps. Two replicates per treatment and 10 organisms per replicate were tested for each treatment and the control. Exposure containers were filled with no headspace and tightly sealed to prevent volatilization. Test solution renewal was performed daily by removal of most of the test solution (leaving adequate volume to avoid stressing test organisms) and replacing it with fresh WAF solution prepared at least 24 hrs prior to use.

Water temperature was 21.2 °C (0.2 °C sd).
Test photoperiod was 16 hrs. light and 8 hr dark.
Dissolved oxygen measurements were between 7.7 and 8.6,
pH values between 7.844 and 8.23.

Limit Test:

Test Results - Acute Toxicity To Aquatic Vertebrates

NOEC Exposure Duration:

NOEC:

LOEC Exposure Duration:

LOEC:

NOELR Exposure Duration: 96 Hours

NOELR: = 5.2 mg/L Nominal

LOELR Exposure Duration:

LOELR:

LC/EC Mean Value :

Exposure Duration	Exposure Units	LC/EC	%	Value Description	Mean Value or Lower Mean Value	Upper Mean Value	Units	Effect Observed	Basis for Concentration
96	Hours	LL	50 %	=	8.2		mg/L		Nominal

Results Remarks: Mortality (no. of deaths/treatment) at 96 hrs: 0, 0, 0, 15, 20 and 20, respectively in 0, 1 1, 5.2, 9.7, 19 and 74 mg/l treatments. All surviving organisms exhibited normal behavior.

96-hr LL50 = 8.2 mg/l, (5.2-9 7 mg/l w/ 95% C.I.) as nominal loading rate 96-hr LC50 = 305 ppb, (164-384 ppb w/ 95% C.I.) measured concentrations
96-hr NOEL = 5.2 mg/l (as nominal loading rate)
96-hr NOEC = 166 ppb (measured concentrations)

Measured concentrations represented the sum of seven specific hydrocarbon compounds measured in the WAF solutions. However, these compounds do not represent 100% of the hydrocarbons in the dissolved fraction. Therefore, test endpoints calculated from measured values would be expected to be lower than if all dissolved components were included in the measurements. Additionally, there was insufficient information regarding the analytical measurements. It was not reported how many sample measurements were taken, nor whether the reported values were based on fresh or old solutions, initial measurements, or a mean of all measurements. Additionally, it was not reported to what degree measured concentrations declined between solution renewals Because of the uncertainty in what the measured values represented, test endpoints based on measured data should be viewed and interpreted with an understanding of this limitation.

Reliability/Data Quality - Acute Toxicity To Aquatic Vertebrates

Reliability: 2 - Valid With Restrictions

Reliability Remarks: Measured concentrations may not represent 100% of components, remaining hydrocarbon components in WAFs may be equally toxic and should have been quantitated to determine total measured concentrations.

Key Study Sponsor Indicator:

Reference - Acute Toxicity To Aquatic Vertebrates

Reference: Stonybrook Laboratories, Inc. (1995) Static Renewal 96-hour acute toxicity of the water accomodated fraction (WAF) of Whole Light Alkylate Naphtha
(LAN) Product to Fathead Minnow. Study No. 65908. Stonybrook Laboratories, Inc. Princeton, NJ 1995.

Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

Acute Toxicity to Aquatic Vertebrates

Test Substance - Acute Toxicity To Aquatic Vertebrates

Category Chemical:	(64741-46-4) Naphtha, petroleum, light straight-run
Test Substance:	(64741-46-4) Naphtha, petroleum, light straight-run
Test Substance Purity/Composition and Other Test Substance Comments:	LSRN-Moderate naphthenic content
Category Chemical Result Type:	Measured
Test Substance Result Type:	Measured

Method - Acute Toxicity To Aquatic Vertebrates

Year Study Performed:	1996
Method/Guideline Followed:	
Other Method/Guideline:	
Deviations from Method/Guideline:	
Species:	Pimephales promelas
GLP:	Yes
Analytical Monitoring:	Yes
Test Type:	Semi-Static
Test Vessel:	Closed
Water Media Type:	Freshwater
Test Concentrations:	Nominal
Nominal and Measured Concentrations:	0, 3.1, 6.3, 13, 25, 50 mg/L
Exposure Period:	96 Hours
Vehicle Used:	
Vehicle Name:	
Vehicle Amount and Units:	
Alkalinity:	144 to 154 mg/l
Dissolved Oxygen:	7.3 and 8.8
pH Value:	8.1 Upper Range: 8.3
Test Temperature and Units:	Value/Lower Range: 21 Upper Range: 22 °C
Photo (Light/Dark):	16/8
Salinity:	
TOC:	

Water Hardness: 134 - 144 mg/L

Method/Guideline Test Conditions Remarks: No specific guideline was described as being used to conduct the test, however report references 1991 ASTM method E729-88a and 1982 EPA Support Documents for Environmental Testing: EPA 560/6-82-002. LL50 and LC50 calculated using binomial probability analysis. ASTM Special Technical Publication 634 1977, pp 65-84.

Test solutions were prepared as water accommodated fractions (WAF). Control and dilution water was prepared by blending naturally hard well water with water that had been demineralized by reverse osmosis. Nominal loading rates of 0, 3.1, 6.3, 13, 25 and 50 mg/l were used to prepare test solutions.

WAFS were prepared for each test concentration by mixing the appropriate mass of substance in 9.4 liters of water for 24 hr in 9 liter glass bottles. The bottles were filled to neck height with water to minimize volatility. A measured amount of test substance was added into each bottle, and the
bottles were capped tightly with a positive pressure siphoning apparatus. The siphoning apparatus consisted of a teflon lined neoprene stopper housing two teflon tubes. One tube extended to the bottom of the bottle for removal of the
WAF solution, the other tube ended above the WAF surface, and was used to control air pressure during siphoning. During WAF preparation, parafilm was used to seal the external joint between the neoprene stopper and glass bottle, and the bottles were covered with aluminum foil. After stirring for 24 hrs using 25% or less vortex, the contents of the WAF solution bottles were allowed to settle for approximately 45 minutes to two hours, then siphoned by the positive pressure apparatus port and used for testing Samples were also analyzed by Purge & trap/GC-FID for concentrations of the following: 2-methyl-pentane, cyclohexane, benzene, toluene, ethylbenzene, ortho, meta and para-xylene Measured test concentrations of the light straight run naphtha were based on the total combined concentrations of all analytes.

Fish were hatched and raised from ABC Laboratories' in-house culture, and were acclimated prior to experimentation for a minimum of 14 days on a 16/8hr light/dark cycle. Test vessels were 3.8 liter glass containers with teflon lined caps. Fish were acclimated to the test water and temperature approximately 72 hr before the test, and were not fed during this 72 hr period. Two replicates per treatment and 10 organisms per replicate were tested for each treatment and the control, with the exception of the 50 mg/l treatment, where 11 organisms instead of 10 were placed in one replicate. Exposure containers were filled with no headspace and tightly sealed to prevent volatilization Test solution renewal was performed daily by removal of most of the test solution (leaving approximately one liter of solution to avoid stressing test organisms) and replacing it with fresh WAF solution prepared at least 24 hrs prior to use.

Water temperature was 21-22 °C Test photoperiod was 16 hrs. light and 8 hr dark. Dissolved oxygen measurements were between 7.3 and 8.8, pH values between 8.1 and 8 3. Hardness values ranged from 134 to 144 mg/l; alkalinity values ranged from 144 to 154 mg/l and conductivity values ranged from 300 to 340 microsiemens.

Limit Test:

Test Results - Acute Toxicity To Aquatic Vertebrates

NOEC Exposure Duration:

NOEC:

LOEC Exposure Duration:

LOEC:

NOELR Exposure Duration: 96 Hours

NOELR: = 6 3 mg/L Nominal

LOELR Exposure Duration:

LOELR:

LC/EC Mean Value :

Exposure Duration	Exposure Units	LC/EC	%	Value Description	Mean Value or Lower Mean Value	Upper Mean Value	Units	Effect Observed	Basis for Concentration
96	Hours	LL	50 %	=	15		mg/L		Nominal

Results Remarks: Mortality (no. of deaths/treatment) at 96 hrs: 0, 0, 0, 6, 20 and 21 in 0, 3.1, 6.3, 13, 25 and 50 mg/l treatments. Abnormal behavior (surfacing, erratic swimming, quiescence) was observed at 96 hrs for 6 organisms in the 13 mg/l
treatment.
96-hr LL50 = 15 mg/l, 6.3-25 mg/L w/ 95% C.I. (as nominal loading rate)
96-hr LC50 = 0.689 mg/l, 0.289-0.962 mg/l w/ 95% C.I. (measured concentrations) 96-hr NOEL = 6.3 mg/l (nominal)
96-hr NOEC =0.287 mg/l (measured) based on lack of mortality and abnormal effects for these treatments.

Measured concentrations represented the sum of six specific hydrocarbon compounds measured in the WAF solutions. However, these compounds do not represent 100% of the hydrocarbons in the dissolved fraction. Therefore, test endpoints calculated from measured values would be expected to be lower than if all dissolved components were included in the measurements. Additionally, there was insufficient information regarding the analytical measurements. It was not reported how many sample measurements were taken, nor whether the reported values were based on fresh or old solutions, initial measurements, or a mean of all measurements. Additionally, it was not reported to what degree measured concentrations declined between solution renewals. Because of the uncertainty in what the measured values represented, test endpoints based on measured data should be viewed and interpreted with an understanding of this limitation.

A low boiling point naphtha sample w/ CAS no. 8030-30-6 (different from the sample used in toxicity testing, but similar in composition) was used to validate the analytical method being developed to identify water soluble hydrocarbons in aqueous 24 hour equilibrated samples. This does not appear to have affected the results of the study.

Reliability/Data Quality - Acute Toxicity To Aquatic Vertebrates

Reliability: 2 - Valid With Restrictions

Reliability Remarks: Measured concentrations may not represent 100% of components, remaining hydrocarbon components in WAF may be equally toxic and should have been quantitated to determine total measured concentrations

Key Study Sponsor Indicator:

Reference - Acute Toxicity To Aquatic Vertebrates

Reference: ABC Laboratories, Inc. (1998) Static Renewal 96 Hour-Acute Toxicity of the Water Accomodated Fraction (WAF) of Light Straight Run Naphtha, LSRN to Fathead Minnow (Pimephales promelas). Project ID. 43152. Environmental Toxicology, 7200 E. ABC Lane, Columbia, Missouri.

Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

Acute Toxicity to Aquatic Vertebrates

Test Substance - Acute Toxicity To Aquatic Vertebrates

Category Chemical:	(64741-63-5) Naphtha, petroleum, light catalytic reformed
Test Substance:	(64741-63-5) Naphtha, petroleum, light catalytic reformed
Test Substance Purity/Composition and Other Test Substance Comments:	Aromatic naphtha
Category Chemical Result Type:	Measured
Test Substance Result Type:	Measured

Method - Acute Toxicity To Aquatic Vertebrates

Year Study Performed:	1998
Method/Guideline Followed:	
Other Method/Guideline:	
Deviations from Method/Guideline:	
Species:	Pimephales promelas
GLP:	Yes
Analytical Monitoring:	Yes
Test Type:	Semi-Static
Test Vessel:	Closed
Water Media Type:	Freshwater
Test Concentrations:	Nominal
Nominal and Measured Concentrations:	0, 3.1, 6.3, 13, 25 and 50 mg/l
Exposure Period:	96 Hours
Vehicle Used:	
Vehicle Name:	
Vehicle Amount and Units:	
Alkalinity:	150-158 mg/l
Dissolved Oxygen:	6.0-8 5
pH Value:	7.7 Upper Range: 8.5
Test Temperature and Units:	Value/Lower Range: 21 Upper Range: 22 °C
Photo (Light/Dark):	16/8
Salinity:	
TOC:	

Water Hardness: 138 - 148 mg/L

Method/Guideline Test Conditions Remarks: No specific guideline was described as being used to conduct the test, however report references 1991 ASTM method E729-88a and 1982 EPA Support Documents for Environmental Testing: EPA 560/6-82-002.

Statistical Method: (FT -ME) LL 50 and LC50 calculated using binomial probability analysis. ASTM Special Technical Publication 634. 1977, pp 65-84

Test solutions were prepared as water accommodated fractions (WAF). Control and dilution water was prepared by blending naturally hard well water with water that had been demineralized by reverse osmosis. Nominal loading rates of 0, 3 1, 6.3, 13, 25 and 50 mg/l were used to prepare test solutions.

WAFS were prepared for each test concentration by mixing the appropriate mass of substance in 9.4 liters of water for 24 hr in 9 liter glass bottles. The bottles were filled to neck height with water to minimize volatility A measured amount of test substance was added into each bottle, and the bottles
were capped tightly with a positive pressure siphoning apparatus. The siphoning apparatus consisted of a teflon lined neoprene stopper housing two teflon tubes. One tube extended to the bottom of the bottle for removal of the WAF solution, the other tube ended above the WAF surface, and was used to control air pressure during siphoning. During WAF preparation, parafilm was used to seal the external joint between the neoprene stopper and glass bottle, and the bottles were covered with aluminum foil. After stirring for 24 hrs using 25%or less vortex, the contents of the WAF solution bottles were allowed to settle for approximately 45 minutes to two hours, then siphoned by the positive pressure apparatus port and used for testing. Samples were also analyzed by Purge & trap/GC-FID for concentrations of the following: pentane, 2-methyl pentane, benzene, toluene, ethylbenzene, ortho, meta and para-xylene, which represent more than 50% composition of the test substance. Measured test concentrations of the light catalytically reformed naphtha were based on the total combined concentrations of all analytes.

Fish were hatched and raised from ABC Laboratories' in-house culture, and were acclimated prior to experimentation for a minimum of 14 days on a 16/8hr light/dark cycle. Test vessels were 3.8 liter glass containers with teflon-lined caps. Fish were acclimated to the test water and temperature approximately 72 hr before the test, and were not fed during this 72 hr period. Two replicates per treatment and 10 organisms per replicate were tested for each treatment and the control. Exposure containers were filled with no headspace and tightly sealed to prevent volatilization Test solution renewal was performed daily by removal of most of the test solution (leaving approximately one liter of solution to avoid stressing test organisms) and replacing it with fresh WAF solution prepared at least 24 hrs prior to use.

Water temperature was 21-22 °C. Test photoperiod was 16 hrs. light and 8 hr dark. Dissolved oxygen measurements were between 6.0 and 8.5, pH values between 7.7 and 8.5 Hardness values ranged from 138 to 148 mg/l; alkalinity values ranged from 150 to 158 mg/l and conductivity values ranged from 299 to 313 microsiemens

Limit Test:

Test Results - Acute Toxicity To Aquatic Vertebrates

NOEC Exposure Duration:

NOEC:

LOEC Exposure Duration:

LOEC:

NOELR Exposure Duration: 96 Hours

NOELR: = 3.1 mg/L Nominal

LOELR Exposure Duration:

LOELR:

LC/EC Mean Value :

Exposure Duration	Exposure Units	LC/EC	%	Value Description	Mean Value or Lower Mean Value	Upper Mean Value	Units	Effect Observed	Basis for Concentration
96	Hours	LL	50 %	=	34		mg/L		Nominal

Results Remarks: Mortality (no. of deaths/treatment) at 96 hrs 1, 0, 1, 0, 1 and 20 in 0, 3.1, 6 3, 13, 25 and 50 mg/l treatments. Abnormal behavior (surfacing, erratic swimming) was observed at 96 hrs for 3 organisms in 13 mg/l and 7 fish in 25 mg/l treatments.

96-hr LL50 = 34 mg/l, 25-50 mg/l w/ 95% C I. (as nominal loading rate)
96-hr LC50 = 11 mg/l, 8.2-17.2 mg/l w/ 95% C.I. (measured concentrations)
96-hr NOEL =3 1 mg/l (nominal)
96-hr NOEC =1.03 mg/l (measured) based on lack of mortality and abnormal effects for these treatments.

Measured concentrations represented the sum of six specific hydrocarbon compounds measured in the WAF solutions However, these compounds do not represent 100% of the hydrocarbons in the dissolved fraction. Therefore, test endpoints calculated from measured values would be expected to be lower than if all dissolved components were included in the measurements. Additionally, there was insufficient information regarding the analytical measurements It was not reported how many sample measurements were taken, nor whether the reported values were based on fresh or old solutions, initial measurements, or a mean of all measurements. Additionally, it was not reported to what degree measured concentrations declined between solution renewals. Because of the uncertainty in what the measured values represented, test endpoints based on measured data should be viewed and interpreted with an understanding of this limitation.

Reliability/Data Quality - Acute Toxicity To Aquatic Vertebrates

Reliability: 2 - Valid With Restrictions

Reliability Remarks: Measured concentrations may not represent 100% of components, remaining hydrocarbon components in WAFs may be equally toxic and should have been quantitated to determine total measured concentrations.

Key Study Sponsor Indicator:

Reference - Acute Toxicity To Aquatic Vertebrates

Reference: ABC Laboratories, Inc. (1998) Static Renewal 96 Hour Acute Toxicity of the Water
Accomodated Fraction (WAF) of Light Catalytically Reformed Naphtha, LCRN to Fathead Minnow (Pimephales promelas). Project ID. 43578 Environmental Toxicology, 7200 E ABC Lane, Columbia, Missouri.

Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

Acute Toxicity to Aquatic Vertebrates

Test Substance - Acute Toxicity To Aquatic Vertebrates

Category Chemical: (68955-35-1) Naphtha, petroleum, catalytic reformed

Test Substance: *No CAS Number Provided*

Test Substance Purity/Composition and Other Test Substance Comments:

Category Chemical Result Type: Estimated by Calculation

Test Substance Result Type: Estimated

Method - Acute Toxicity To Aquatic Vertebrates

Year Study Performed:

Method/Guideline Followed:

Other Method/Guideline:

Deviations from Method/Guideline:

Species:

GLP:

Analytical Monitoring:

Test Type:

Test Vessel:

Water Media Type:

Test Concentrations:

Nominal and Measured Concentrations:

Exposure Period: 96 Hours

Vehicle Used:

Vehicle Name:

Vehicle Amount and Units:

Alkalinity:

Dissolved Oxygen:

pH Value:

Test Temperature and Units:

Photo (Light/Dark):

Salinity:

TOC:

Water Hardness:

Method/Guideline Test Conditions Remarks: Calculated based on hydrocarbon block principle. In this procedure, the dissolved concentrations of individual hydrocarbons from a petroleum substance are estimated for a given loading rate and then normalised by their acute toxicity to yield Toxic Units (TU) which can be summed to predict the toxicity of the parent material (see below)

Limit Test:

Test Results - Acute Toxicity To Aquatic Vertebrates

NOEC Exposure Duration:

NOEC:

LOEC Exposure Duration:

LOEC:

NOELR Exposure Duration:

NOELR:

LOELR Exposure Duration:

LOELR:

LC/EC Mean Value :

Exposure Duration	Exposure Units	LC/EC	%	Value Description	Mean Value or Lower Mean Value	Upper Mean Value	Units	Effect Observed	Basis for Concentration
96	Hours	LL	50 %	=	2.09		mg/L		

Results Remarks: Estimated 96 hour(s) fish acute toxicity LL50: 2.09 mg/l

Reliability/Data Quality - Acute Toxicity To Aquatic Vertebrates

Reliability: 2 - Valid With Restrictions

Reliability Remarks:

Key Study Sponsor Indicator:

Reference - Acute Toxicity To Aquatic Vertebrates

Reference: Peterson, D.R., (1994) Calculating the aquatic toxicity of hydrocarbon mixtures Chemosphere Vol.29, 12, pp. 2493-2506

Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

Acute Toxicity to Aquatic Vertebrates

Test Substance - Acute Toxicity To Aquatic Vertebrates

Category Chemical:	*No CAS Number Providec*
Test Substance:	*No CAS Number Providec*
Test Substance Purity/Composition and Other Test Substance Comments:	Gasoline CAS No. 86290-81-5 Gasoline Sample W94/814, Blend; Detailed hydrocarbon analysis: N-paraffins: 16% total C4-C8 Iso-paraffins: 25% total C4-C11 Olefins: 12%, C4-C7 Naphthenes: 5% C6-C10 Aromatics: 42% C6-C11
Category Chemical Result Type:	Measured
Test Substance Result Type:	Measured

Method - Acute Toxicity To Aquatic Vertebrates

Year Study Performed:	1995
Method/Guideline Followed:	OECD 203
Other Method/Guideline:	
Deviations from Method/Guideline:	
Species:	Oncorhynchus mykiss
GLP:	Yes
Analytical Monitoring:	Yes
Test Type:	Static
Test Vessel:	
Water Media Type:	Freshwater
Test Concentrations:	Nominal
Nominal and Measured Concentrations:	0, 0.1, 1, 5, 10, and 25 mg/l
Exposure Period:	96 Hours
Vehicle Used:	
Vehicle Name:	
Vehicle Amount and Units:	
Alkalinity:	
Dissolved Oxygen:	5.4 to 9.7 ppm
pH Value:	6.8 Upper Range: 8.2
Test Temperature and Units:	Value/Lower Range. 15 °C
Photo (Light/Dark):	16/8
Salinity:	
TOC:	

Water Hardness:

Method/Guideline Test Conditions Remarks: LL50 at 96 hr calculated using binomial probability analysis. ASTM Special Technical Publication 634. 1977, pp 65-84

Test solutions were prepared as water accommodated fractions (WAF). The control and dilution water was a laboratory blend water prepared from carbon filtered well water and ion exchange softened, reverse osmosis dialyzed well water aged for >24 hrs. To determine contact time required to achieve maximum solubility between test substance and aqueous solution, samples of WAF test solutions equilibrated for 20, 24 27 and 49 hours at 100 mg/l loading were analyzed by GC-FID for concentrations of the following. benzene, toluene, ethylbenzene, xylene isomers and naphthalene (BTEXN). Maximum WAF solubility for these components reached equilibrium within 24 hrs of stirring. Nominal loading rates of 0, 0.1, 1, 5, 10, and 25 mg/l were used to prepare test solutions for the fish toxicity tests. Test substance, added volumetrically, was mixed for each liter stoppered containers with less than 10% headspace volume. The mixtures were allowed to settle for 1-2 hours prior to drawing off the aqueous solutions for testing. Fish were approximately five weeks old at test initiation and were obtained from Thomas Fish company, Anderson, CA, Lot 297. Loading of fish body mass to treatment was 0.3 g fish per liter of aqueous solution, mean length at termination was 3.3 cm (sd=0.2), and mean weight was 0.271 g (sd=0.064). Test vessels were 4 liter glass aspirator bottles with foil covered neoprene stoppers. Three replicates per treatment and 5 organisms per replicate were tested for each treatment and the control. Exposure containers were filled (no headspace volume) and tightly sealed to prevent volatilization. Test solution renewal was performed daily by removing 80% of the test solution and replacing it with fresh WAF solution prepared at least 24 hrs prior to use. Freshly prepared and old WAF test solutions were analyzed by GC-FID for concentrations of BTEXN. Water temperature was 15 °C (0.1sd). Test photoperiod was 16 hrs. light and 8 hr dark, light intensity approx 609-614 Lux during full daylight periods. Dissolved oxygen measurements ranged from 5.4 to 9.7 ppm, pH values between 6.8 and 8.2

Limit Test: No

Test Results - Acute Toxicity To Aquatic Vertebrates

NOEC Exposure Duration:

NOEC:

LOEC Exposure Duration:

LOEC:

NOELR Exposure Duration: 96 Hours

NOELR: = 10 mg/L

LOELR Exposure Duration:

LOELR:

LC/EC Mean Value :

Exposure Duration	Exposure Units	LC/EC	%	Value Description	Mean Value or Lower Mean Value	Upper Mean Value	Units	Effect Observed	Basis for Concentration
96	Hours	LL	50 %	=	16		mg/L		

Results Remarks: Mortality (no. of deaths/treatment) at 96 hrs:
Treatment No. of deaths (mg/l)
 0 0
 0.1 0
 1 0
 5.0 0
 10 0
 25 15

96-hr LL50 = 16 mg/l, 99% C I: 10-25 mg/l (as nominal loading rate) 96-hour No Observed Effect Loading (NOEL) was 10 mg/l, based on mortality, both calculated (Dunnett's Procedure) and observed.Results are quoted in terms of 50% Lethal Loading (LL50), the loading rate of test substance resulting in 50% mortality of the test species exposed to the WAF. At termination,

loss of equilibrium was observed in all surviving fish at the 10 mg/l treatment.

Analytical results Losses of the soluble BETXN components from the WAF over each 24 hour period ranged from 0 to 8% for the 1.0, 5, 10 and 25 mg/l loadings Up to 100% loss was observed in the 0.1 mg/l treatment in 24 hrs samples.

Analytical
results Measured BTEXN (mg/l)
 Nominal
rate
(mg/l) loading
Day Control 0.1 1.0 5.0 10 25
0 (new)
ND 0.12 0.31 1.7 3.1 7.7
1 (old) ND 0.12 0.41 1.6
3 3 7.1
1 (new) ND 0.16 0.44 1.7 1.9 6.5
2 (old)
ND 0.15 0.45 1.6 2.1 6.8
2 (new) ND 0.07 0 43 1 6 3.2
NA
3 (old) ND 0.12 0.43 1.6 3.1 NA
3 (new)
ND 0.16 0 57 1.8 3.3 NA
4 (old) ND ND 0.56 1.8 3.5
NA

ND=not detected, NA=not analyzed due to 100% mortality
Guideline/protocol deviations: Body length smaller than recommended range of 4-6 cm, smaller fish used to minimize DO depletion in closed vessel (no-headspace) systems.

Reliability/Data Quality - Acute Toxicity To Aquatic Vertebrates

Reliability: 1 - Valid Without Restrictions

Reliability Remarks:

Key Study Sponsor Indicator:

Reference - Acute Toxicity To Aquatic Vertebrates

Reference: Study conducted by Exxon Biomedical Sciences Inc. Fish acute toxicity test: study no. 104958, test substance MRD-95-049. CONCAWE, Brussels, 1995

Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

Acute Toxicity to Aquatic Vertebrates

Test Substance - Acute Toxicity To Aquatic Vertebrates

Category Chemical:	(64741-55-5) Naphtha, petroleum, light catalytic cracked
Test Substance:	(64741-55-5) Naphtha, petroleum, light catalytic cracked
Test Substance Purity/Composition and Other Test Substance Comments:	Olefenic naphthas
Category Chemical Result Type:	Measured
Test Substance Result Type:	Measured

Method - Acute Toxicity To Aquatic Vertebrates

Year Study Performed:	1995
Method/Guideline Followed:	
Other Method/Guideline:	
Deviations from Method/Guideline:	
Species:	Pimephales promelas
GLP:	Yes
Analytical Monitoring:	Yes
Test Type:	Semi-Static
Test Vessel:	Closed
Water Media Type:	Freshwater
Test Concentrations:	Nominal
Nominal and Measured Concentrations:	0, 3.0, 7 4, 15, 37 and 74 mg/l
Exposure Period:	96 Hours
Vehicle Used:	
Vehicle Name:	
Vehicle Amount and Units:	
Alkalinity:	
Dissolved Oxygen:	5.2 and 8 6
pH Value:	7.61 Upper Range. 8.2
Test Temperature and Units:	Value/Lower Range 21 4 Upper Range 21.8 °C
Photo (Light/Dark):	16/8
Salinity:	
TOC:	

Water Hardness:

Method/Guideline Test Conditions Remarks:

No specific guideline was described as being used to conduct the test, however report references 1991 ASTM method E729-88a and 1982 EPA Support Documents for Environmental Testing. EPA 560/6-82-002.

Statistical Method: (FT -ME) LL50 and LC50 calculated using binomial probability analysis ASTM Special Technical Publication 634. 1977, pp 65-84.

Test solutions were prepared as water accommodated fractions (WAF). Control and dilution water was Mobil Technical Center well water. Nominal loading rates of 0, 3.0, 7.4, 15, 37 and 74 mg/l were used to prepare test solutions.

WAFS were prepared for each test concentration by mixing the appropriate mass of substance in 9.4l of water for 24 hr in 9l glass bottles. The bottles were filled to neck height with water to minimize volatility. A measured amount of test substance was added into each bottle, and the bottles were capped tightly with a positive pressure siphoning apparatus. The siphoning apparatus consisted of a teflon lined neoprene stopper housing two teflon tubes. One tube extended to the bottom of the bottle for removal of the WAF solution, the other tube ended above the WAF surface, and was used to control air pressure during siphoning. During WAF preparation, parafilm was used to seal the external joint between the neoprene stopper and glass bottle. After stirring for 24 hrs using 25% or less vortex, the contents of the WAF solution bottles were allowed to settle for approximately 45 minutes to two hours, then siphoned by the positive pressure apparatus port and used for testing Samples were also analyzed by Purge & trap/GC-PID for concentrations of the following: benzene, toluene, ethylbenzene, and p-xylene, which represent 13% composition of the test substance. Measured test concentrations of the light catalytically cracked naphtha were based on the total combined concentrations of all analytes.

Fish were hatched and raised in-house, and were acclimated prior to experimentation for a minimum of 14 days on a 16/8hr light/dark cycle. Test vessels were 3.8l glass containers with teflon lined caps Two replicates per treatment and 10 organisms per replicate were tested for each treatment and the control. Exposure containers were filled with no headspace and tightly sealed to prevent volatilization Test solution renewal was performed daily by removal of most of the test solution (leaving adequate volume to avoid stressing test organisms) and replacing it with fresh WAF solution prepared at least 24 hrs prior to use.

Water temperature was 21.4-21.8 °C. Test photoperiod was 16 hrs. light and 8 hr dark. Dissolved oxygen measurements were between 5 2 and 8.6, pH values between 7.61 and 8.2.

Limit Test: No

Test Results - Acute Toxicity To Aquatic Vertebrates

NOEC Exposure Duration:

NOEC:

LOEC Exposure Duration:

LOEC:

NOELR Exposure Duration: 96 Hours

NOELR: = 15 mg/L Nominal

LOELR Exposure Duration:

LOELR:

LC/EC Mean Value :

Exposure Duration	Exposure Units	LC/EC	%	Value Description	Mean Value or Lower Mean Value	Upper Mean Value	Units	Effect Observed	Basis for Concentration
96	Hours	LL	50 %	=	46		mg/L		Nominal

Results Remarks: Mortality (no of deaths/treatment) at 96 hrs: 0, 1, 0, 0, 4 and 20, respectively 0, 3 0, 7.4, 15, 37 and 74 mg/l treatments. All surviving organisms exhibited normal behavior.
96-hr LL50 = 46 mg/l, 37-74 mg/l w/ 95% C.I (as nominal loading rate)
96-hr LC50 = 4.1 mg/l, 3.2-7.0 mg/l mg/l w/ 95% C I (measured concentrations)

Measured concentrations represented the sum of four specific hydrocarbon compounds measured in the WAF solutions. However, these compounds do not represent 100% of the hydrocarbons in the dissolved fraction. Therefore, test endpoints calculated from measured values would be expected to be lower than if all dissolved components were included in the measurements. Additionally, there was insufficient information regarding the analytical measurements It was not reported how many sample measurements were taken, nor whether the reported values were based on fresh or old solutions, initial measurements, or a mean of all measurements. Additionally, it was not reported to what degree measured concentrations declined between solution renewals. Because of the uncertainty in what the measured values represented, test endpoints based on measured data should be viewed and interpreted with an understanding of this limitation.

Reliability/Data Quality - Acute Toxicity To Aquatic Vertebrates

Reliability: 2 - Valid With Restrictions

Reliability Remarks: Measured concentrations may not represent 100% of components. Remaining hydrocarbon components in WAFs may be equally toxic and should have been quantitated to determine total measured concentrations.

NOEC values not reported as sublethal effects and moderate mortality (20%) were observed at the 37 ppm (nominal loading) treatment which is reported to be the NOEC.

Key Study Sponsor Indicator:

Reference - Acute Toxicity To Aquatic Vertebrates

Reference: Stonybrook Laboratories, Inc. (1995) Static Renewal 96-hour acute toxicity of the water accomodated fraction (WAF) of FR 15799 FCC Light to Fathead Minnow. Study No. 66234 Stonybrook Laboratories Inc. Princeton, NJ.1995.

Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS. 10/28/2003

Acute Toxicity to Aquatic Invertebrates

Test Substance - Acute Toxicity To Aquatic Invertebrates

Category Chemical:	*No CAS Number Providec*
Test Substance:	*No CAS Number Providec*
Test Substance Purity/Composition and Other Test Substance Comments:	Gasoline CAS No. 86290-81-5 Gasoline Sample W94/814, Blend Detailed hydrocarbon analysis: N-paraffins: 16% total C4-C8 Iso-paraffins: 25% total C4-C11 Olefins: 12% C4-C7 Naphthenes: 5% C6-C10 Aromatics. 42% C6-C11
Category Chemical Result Type:	Measured
Test Substance Result Type:	Measured

Method - Acute Toxicity To Aquatic Invertebrates

Year Study Performed:	1995
Method/Guideline Followed:	OECD 202
Other Method/Guideline:	
Deviations from Method/Guideline:	
Species/In Vitro System:	Daphnia magna
GLP:	Yes
Analytical Monitoring:	Yes
Test Type:	Static
Test Vessel:	Closed
Water Media Type:	Freshwater
Test Concentrations:	Nominal
Nominal and Measured Concentrations:	0, 0.1, 1, 5, 10, and 25 mg/l
Exposure Period:	48 Hours
Vehicle Used:	
Vehicle Name:	
Vehicle Amount and Units:	
Alkalinity:	
Dissolved Oxygen:	7 2-9.2
pH Value:	7.5 Upper Range: 7.8
Test Temperature and Units:	Value/Lower Range: 19 °C
Photo (Light/Dark):	
Salinity:	

TOC:

Water Hardness:

Method/Guideline Test Conditions Remarks:

EL50 calculated using the probit procedure (Finney, D.J., 1971. Probit Analysis, 3rd Ed. London: Cambridge Univ. Press)

Test solutions were prepared as water accommodated fractions (WAF). The control and dilution water was a laboratory blend water prepared from carbon filtered well water and ion exchange softened, reverse osmosis dialyzed well water aged for >24 hrs. To determine contact time required to achieve maximum solubility between test substance and aqueous solution, samples of WAF test solutions equilibrated for 20, 24, 27 and 49 hours at 100 mg/l loading were analyzed by GC-FID for concentrations of the following: benzene, toluene, ethylbenzene, xylene isomers and naphthalene (BTEXN). Maximum WAF solubility for these components reached equilibrium within 24 hrs of stirring. Nominal loading rates of 0, 0.1, 1, 5, 10, and 25 mg/l were used to prepare test solutions for the toxicity tests. Test substance, added volumetrically, was mixed for each individual treatment in dilution water for 24 hours in 4 liter stoppered containers with less than 10% headspace volume. The WAF mixtures were allowed to settle for 1-2 hours prior to drawing off the aqueous solutions for testing. WAF test solutions were analyzed by GC-FID for concentrations of BTEXN on day 0 and at termination. Test vessels for daphnid testing were 125 ml glass erlenmeyer flasks with foil covered neoprene stoppers. Four replicates per treatment and 5 organisms per replicate were tested for each treatment and the control. Exposure containers were filled (no headspace volume) and tightly sealed to prevent volatilization. During the study test system solutions: dissolved oxygen concentration range: 7.2 to 9.2; pH ranged from 7.5 to 7.8; temperature was 19 °C (sd 0.2).Daphnia magna were supplied by testing laboratory; age < 24 hours old; obtained from culture maintained in-house.

Limit Test:

Test Results - Acute Toxicity To Aquatic Invertebrates

NOEC Exposure Duration:

NOEC:

LOEC Exposure Duration:

LOEC:

NOELR Exposure Duration:

NOELR:

LOELR Exposure Duration:

LOELR:

LC/EC Mean Value :

Exposure Duration	Exposure Units	LC/EC	%	Value Description	Mean Value or Lower Mean Value	Upper Mean Value	Units	Effect Observed	Basis for Concentration
48	Hours	EL	50 %	=	12		mg/L		

Results Remarks:

48 hr results-number of organisms affected and analytical results
 Measured Measured
Treatment Immobilization BTEXN
 -day 0 -day 2
Control 2 ND ND
0.1 mg/l 1 0 12 0 20
1.0 mg/l 1 0.31 0.42
5.0 mg/l 1 1.7 1.4
10 mg/l 5 3.1 3 2
25 mg/l 20 7.7 7.1
based upon nominal loading rate 48-hr EL50 = 12 mg/l (95% C.I. 7.3 to 22 mg/l)

Reliability/Data Quality - Acute Toxicity To Aquatic Invertebrates

Reliability: 2 - Valid With Restrictions

Reliability Remarks: Three previous attempts to conduct study were invalidated due to excessive (>20%) control mortality

Key Study Sponsor Indicator:

Reference - Acute Toxicity To Aquatic Invertebrates

Reference: CONCAWE (1995) Daphnia -acute toxicity test: study no. 104942A, test
substance MRD-95-049 Study conducted by Exxon Biomedical Sciences Inc. CONCAWE, Brussels, 1995

Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS. 10/28/2003

Acute Toxicity to Aquatic Invertebrates

Test Substance - Acute Toxicity To Aquatic Invertebrates

Category Chemical:	(64741-55-5) Naphtha, petroleum, light catalytic cracked
Test Substance:	(64741-55-5) Naphtha, petroleum, light catalytic cracked
Test Substance Purity/Composition and Other Test Substance Comments:	Olefenic naphthas
Category Chemical Result Type:	Measured
Test Substance Result Type:	Measured

Method - Acute Toxicity To Aquatic Invertebrates

Year Study Performed:	1995
Method/Guideline Followed:	
Other Method/Guideline:	
Deviations from Method/Guideline:	
Species/In Vitro System:	Daphnia magna
GLP:	Yes
Analytical Monitoring:	Yes
Test Type:	Semi-Static
Test Vessel:	Closed
Water Media Type:	Freshwater
Test Concentrations:	Nominal
Nominal and Measured Concentrations:	6.4, 13, 25, 51 and 102 mg/l
Exposure Period:	48 Hours
Vehicle Used:	
Vehicle Name:	
Vehicle Amount and Units:	
Alkalinity:	124-132 mg/l
Dissolved Oxygen:	8 06
pH Value:	7 94 Upper Range. 8.4
Test Temperature and Units:	Value/Lower Range: 19 1 Upper Range: 20.2 °C
Photo (Light/Dark):	
Salinity:	

TOC:

Water Hardness: 172 ~ 180 mg/L

Method/Guideline Test Conditions Remarks: No specific guideline was described as being used to conduct the test, however report references 1991 ASTM method E729-88a and 1982 EPA Support Documents for Environmental Testing: EPA 560/6-82-002.

Statistical Method. (FT -ME) EL50 and EC50 calculated using binomial probability analysis. ASTM Special Technical Publication 634. 1977, pp 65-84.

Test solutions were prepared as water accommodated fractions (WAF). Control and dilution water was aged well water

WAFS were prepared for each test concentration by mixing the appropriate mass of substance in 1.2l of water for 24 hr in aluminum foil covered 1l aspirator bottles fitted with a port near the bottle bottom. The bottles were filled to neck height with water to minimize volatility. A measured amount of test substance was pipetted below the water surface. After stirring for 24 hrs using 25%or less vortex, the contents of the aspirator bottles were allowed to settle for approximately 45 minutes, then drained from the port and used for testing. Samples were also analyzed by Purge & trap/GC-FID for concentrations of the following: benzene, toluene, ethylbenzene, and p-xylene, which represent 13% composition of the test substance Measured test concentrations of the light catalytically cracked naphtha were based on the total combined concentrations of all analytes.

Range finding toxicity studies were conducted at 1.3, 10 and 102 mg/l loading, using WAFS which were divided into duplicate aliquots and tested Definitive toxicity studies were conducted at 6 4, 13, 25, 51 and 102 mg/l loading, using WAFS which were divided into duplicate aliquots and tested Test vessels were teflon cap-sealed 265 ml glass jars with 10 daphnids per jar and were completely filled with test solution During the study test system solutions dissolved oxygen concentration range: 8 0 to 8.6; pH ranged from 7.94 to 8.40; temperature was 19.1 to 20.2 °C; hardness (mg/l) ranged from 172 -180; alkalinity (mg/l) was 124-132 and conductivity (imhos) values were 360 -405.

Daphnia magna, were supplied by testing laboratory; age < 24 hours old; obtained from culture maintained in-house since January 1994. The primary culture was obtained from Aquatic Research organisms, Hampton, NH, which was derived from EPA laboratory culture, in Cincinnati, Ohio.

Limit Test:

Test Results - Acute Toxicity To Aquatic Invertebrates

NOEC Exposure Duration:

NOEC:

LOEC Exposure Duration:

LOEC:

NOELR Exposure Duration: 48 Hours

NOELR: = 13 mg/L Nominal

LOELR Exposure Duration:

LOELR:

LC/EC Mean Value :

Exposure Duration	Exposure Units	LC/EC	%	Value Description	Mean Value or Lower Mean Value	Upper Mean Value	Units	Effect Observed	Basis for Concentration
48	Hours	EL	50 %	=	18		mg/L		Nominal
48									

Results Remarks: Mortality (no. of deaths/treatment) at 48 hrs. 0, 0, 0, 20, 20 and 20 for 0, 6 4, 13, 25, 51 and 102 mg/l treatments.
48-hr EL50 = 18 mg/l (95% C.I. 13 to 25 mg/l) based upon nominal loading rate. 48 hr EC50 was 1.4 ppm (95% C.I. 0.99 to 1.95 mg/l); based on total

measured concentrations.
48-hr NOEC = 13 mg/l based upon nominal loading rate.
48 hr EC50 was 0.99 ppm based on total measured concentrations.

Measured concentrations represented the sum of four specific hydrocarbon compounds measured in the WAF solutions. However, these compounds do not represent 100% of the hydrocarbons in the dissolved fraction. Therefore, test endpoints calculated from measured values would be expected to be lower than if all dissolved components were included in the measurements. Additionally, there was insufficient information regarding the analytical measurements. It was not reported how many sample measurements were taken, nor whether the reported values were based on fresh or old solutions, initial measurements, or a mean of all measurements. Additionally, it was not reported to what degree measured concentrations declined between solution renewals. Because of the uncertainty in what the measured values represented, test endpoints based on measured data should be viewed and interpreted with an understanding of this limitation.

Reliability/Data Quality - Acute Toxicity To Aquatic Invertebrates

Reliability: 2 - Valid With Restrictions

Reliability Remarks: Measured concentrations represent only 13-20% of components, remaining hydrocarbon components in WAF may be equally toxic and should have been quantitated to determine total measured concentrations.

Key Study Sponsor Indicator:

Reference - Acute Toxicity To Aquatic Invertebrates

Reference: Stonybrook Laboratories, Inc. (1995) Static Renewal 48-hour Acute Toxicity of the Water Accomodated Fraction (WAF) of FR 15799 FCC Light (Light Catalytically Cracked Naphtha, LCCN) to Daphnia Magna. Study No. 66233. Stonybrook Laboratories Inc. Princeton, NJ.1995

Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

Acute Toxicity to Aquatic Invertebrates

Test Substance - Acute Toxicity To Aquatic Invertebrates

Category Chemical: (68955-35-1) Naphtha, petroleum, catalytic reformed

Test Substance: *No CAS Number Provided*

Test Substance Purity/Composition and Other Test Substance Comments:

Category Chemical Result Type: Estimated by Calculation

Test Substance Result Type: Estimated

Method - Acute Toxicity To Aquatic Invertebrates

Year Study Performed:

Method/Guideline Followed:

Other Method/Guideline:

Deviations from Method/Guideline:

Species/In Vitro System:

GLP:

Analytical Monitoring:

Test Type:

Test Vessel:

Water Media Type:

Test Concentrations:

Nominal and Measured Concentrations:

Exposure Period: 48 Hours

Vehicle Used:

Vehicle Name:

Vehicle Amount and Units:

Alkalinity:

Dissolved Oxygen:

pH Value:

Test Temperature and Units:

Photo (Light/Dark):

Salinity:

TOC:

Water Hardness:

Method/Guideline Test Conditions Remarks: Calculated based on hydrocarbon block principle. In this procedure, the dissolved concentrations of individual hydrocarbons from a petroleum substance are estimated for a given loading rate and then normalized by their acute toxicity to yield Toxic Units (TU) which can be summed to predict the toxicity of the parent material (see below).

Limit Test:

Test Results - Acute Toxicity To Aquatic Invertebrates

NOEC Exposure Duration:

NOEC:

LOEC Exposure Duration:

LOEC:

NOELR Exposure Duration:

NOELR:

LOELR Exposure Duration:

LOELR:

LC/EC Mean Value :

Exposure Duration	Exposure Units	LC/EC	%	Value Description	Mean Value or Lower Mean Value	Upper Mean Value	Units	Effect Observed	Basis for Concentration
48	Hours	EL	50 %	=	0.9		mg/L		Calculated

Results Remarks: Estimated 48 hour(s) Daphnid acute toxicity EL50. 0.9 mg/l

Reliability/Data Quality - Acute Toxicity To Aquatic Invertebrates

Reliability: 2 - Valid With Restrictions

Reliability Remarks:

Key Study Sponsor Indicator:

Reference - Acute Toxicity To Aquatic Invertebrates

Reference: Peterson, D.R., (1994) Calculating the aquatic toxicity of hydrocarbon mixtures
Chemosphere Vol 29, 12, pp. 2493-2506

Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

Acute Toxicity to Aquatic Invertebrates

Test Substance - Acute Toxicity To Aquatic Invertebrates

Category Chemical:	(64741-66-8) Naphtha, petroleum, light alkylate
Test Substance:	(64741-66-8) Naphtha, petroleum, light alkylate
Test Substance Purity/Composition and Other Test Substance Comments:	Paraffinic naphthas
Category Chemical Result Type:	Measured
Test Substance Result Type:	Measured

Method - Acute Toxicity To Aquatic Invertebrates

Year Study Performed:	1994
Method/Guideline Followed:	Other
Other Method/Guideline:	
Deviations from Method/Guideline:	
Species/In Vitro System:	Daphnia magna
GLP:	Yes
Analytical Monitoring:	Yes
Test Type:	Semi-Static
Test Vessel:	Closed
Water Media Type:	
Test Concentrations:	Nominal
Nominal and Measured Concentrations:	9, 18, 35, 70, & 140 mg/l
Exposure Period:	48 Hours
Vehicle Used:	
Vehicle Name:	
Vehicle Amount and Units:	
Alkalinity:	140-156
Dissolved Oxygen:	8.0 to 8.5
pH Value:	8 Upper Range: 8.2
Test Temperature and Units:	Value/Lower Range: 19.1 Upper Range: 21 °C
Photo (Light/Dark):	
Salinity:	

TOC:

Water Hardness: 180 - 204 mg/L

Method/Guideline Test Conditions Remarks: No specific guideline was described as being used to conduct the test, however report references 1991 ASTM method E729-88a and 1982 EPA Support Documents for Environmental Testing: EPA 560/6-82-002.

Statistical Method: (FT -ME) EL50 and EC calculated using binomial probability a
analysis. ASTM Special Technical Publication 634 1977, pp 65-84

Test solutions were prepared as water accommodated fractions (WAF). Control and dilution water was aged well water

WAFS were prepared for each test concentration by mixing the appropriate mass of substance in 1.2 liters of water for 24 hr in aluminum foil covered 1-liter aspirator bottles fitted w/ a port near the bottle bottom. The bottles were filled to neck height with water to minimize volatility. A measured amount of test substance was pipetted below the water surface. After stirring for 24 hrs using 25%or less vortex, the contents of the aspirator bottles were allowed
to settle for approximately 45 minutes, then drained from the port and used for testing. Samples were also analyzed by Purge & trap/GC-FID for concentrations of the following: 2,3 dimethyl butane; 2,4 dimethyl pentane, 2,2,4 trimethyl
pentane; 2,5 dimethyl hexane; 2,3,4 trimethyl pentane, 2,3,3 trimethyl pentane and 1-methyl-1-ethyl cyclopentane, which represent 68% composition of the test substance. Measured test concentrations of the light alkylate naphtha were based
on the total combined concentrations of all analytes

Range finding toxicity studies were conducted at 1.2, 9.9 and 99 mg/l loading, using WAFS which were divided into duplicate aliquots and tested. Definitive toxicity studies were conducted at 9, 18, 35, 70, & 140 mg/l loading, using
WAFS which were divided into duplicate aliquots and tested.

Test vessels were teflon cap-sealed 237 ml glass jars with 10 daphnids per jar and were completely filled with test solution

During the study test system solutions:
dissolved oxygen concentration range 8 0 to 8 5
pH ranged from 8.00 to 8.2
temperature was 19.1 to 21.0 °C
hardness (mg/l) ranged from 180 - 204
alkalinity (mg/l) was 140-156
conductivity (imhos) values were 385 -390

Daphnia magna, were supplied by testing laboratory; age < 24 hours old; obtained from culture maintained in-house since January 1994. The primary culture was obtained from Aquatic Research organisms, Hampton, NH, which was derived from EPA laboratory culture, in Cincinnati, Ohio.

Limit Test:

Test Results - Acute Toxicity To Aquatic Invertebrates

NOEC Exposure Duration:

NOEC:

LOEC Exposure Duration:

LOEC:

NOELR Exposure Duration: 48 Hours

NOELR: = 18 mg/L Nominal

LOELR Exposure Duration:

LOELR:

LC/EC Mean Value :

Exposure Duration	Exposure Units	LC/EC	%	Value Description	Mean Value or Lower Mean Value	Upper Mean Value	Units	Effect Observed	Basis for Concentration
48	Hours	EL	50 %	=	32		mg/L		Nominal

Results Remarks: Immobility (no. of organisms) at 48 hrs: 0, 0, 0, 12, 13 and 20 for 0, 9, 18, 35, 70 and 140 mg/l treatments. At the 35 and 70 mg/l nominal treatments, 8 and 7 organisms were observed to show lethargic movement, respectively.

48-hr EL50 = 32 mg/l (95% C.I. 18 to 140 mg/l) based upon nominal loading rate. 48 hr EC50 was 556 ig/l (95% C I 339 to 1140 ig/l) based on total measured alkyl concentrations.
48-hr NOEL = 18 mg/l based upon nominal loading rate.
48 hr NOEC was 339 ppb based on total measured alkyl concentrations

Measured concentrations represented the sum of seven specific hydrocarbon compounds measured in the WAF solutions However, these compounds do not represent 100% of the hydrocarbons in the dissolved fraction. Therefore, test endpoints calculated from measured values would be expected to be lower than if all dissolved components were included in the measurements. Additionally, there was insufficient information regarding the analytical measurements. It was not reported how many sample measurements were taken, nor whether the reported values were based on fresh or old solutions, initial measurements, or a mean of all measurements. Additionally, it was not reported to what degree measured concentrations declined between solution renewals. Because of the uncertainty in what the measured values represented, test endpoints based on measured data should be viewed and interpreted with an understanding of this limitation

Reliability/Data Quality - Acute Toxicity To Aquatic Invertebrates

Reliability: 2 - Valid With Restrictions

Reliability Remarks: Measured concentrations may not represent 100% of components, remaining hydrocarbon components in WAF may be equally toxic and should have been quantitated to determine total measured concentrations

Key Study Sponsor Indicator:

Reference - Acute Toxicity To Aquatic Invertebrates

Reference: Stonybrook Laboratories, Inc. (1995) Static Renewal 48-hour acute toxicity of the water accomodated fraction (WAF) of Whole Light Alkylate Naphtha
(LAN) Product to Daphnia Magna Study No. 65907. Stonybrook Laboratories Inc Princeton, NJ.

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Acute Toxicity to Aquatic Invertebrates

Test Substance - Acute Toxicity To Aquatic Invertebrates

Category Chemical:	(64741-63-5) Naphtha, petroleum, light catalytic reformed
Test Substance:	(64741-63-5) Naphtha, petroleum, light catalytic reformed
Test Substance Purity/Composition and Other Test Substance Comments:	Aromatic naphthas
Category Chemical Result Type:	Measured
Test Substance Result Type:	Measured

Method - Acute Toxicity To Aquatic Invertebrates

Year Study Performed:	1998
Method/Guideline Followed:	ASTM E 729
Other Method/Guideline:	
Deviations from Method/Guideline:	
Species/In Vitro System:	Daphnia magna
GLP:	Yes
Analytical Monitoring:	Yes
Test Type:	Semi-Static
Test Vessel:	Closed
Water Media Type:	Freshwater
Test Concentrations:	Nominal
Nominal and Measured Concentrations:	0, 3.0, 6.0, 12, 24 and 48 mg/l
Exposure Period:	48 Hours
Vehicle Used:	
Vehicle Name:	
Vehicle Amount and Units:	
Alkalinity:	158-168
Dissolved Oxygen:	8.0-8 5
pH Value:	8.2 Upper Range: 8.4
Test Temperature and Units:	Value/Lower Range: 20 Upper Range: 21 °C
Photo (Light/Dark):	
Salinity:	

TOC:

Water Hardness: 146 - 152 mg/L

Method/Guideline Test Conditions Remarks: Procedure patterned after:1991 ASTM method E729-88a and 1985 USEPA TSCA Test Guidelines: Daphnid Acute Toxicity Test. Fed. Reg., vol. 50 (No 188) Sept 27, 1985, 797.1300.

Statistical Method: (FT -ME) EL50 and EC50 calculated using binomial probability analysis. ASTM Special Technical Publication 634. 1977, pp 65-84.

Test solutions were prepared as water accommodated fractions (WAF). Control and dilution water were a blend of aged well water and reverse osmosis well water.

WAFS were prepared for each test concentration by mixing the appropriate mass of substance in 2.4 liters of water for 24 hr in aluminum foil covered 2.5 liter aspirator bottles fitted w/ a port near the bottle bottom The bottles were filled to neck height with water to minimize volatility. A measured amount of test substance was pipetted below the water surface. After stirring for 24 hrs using 25% or less vortex, the contents of the aspirator bottles were allowed to settle for approximately one hour, then drained from the port and used for testing. Samples were also analyzed by purge & trap/GC-FID for concentrations of the following: pentane, 2-methyl-pentane, benzene, toluene, ethylbenzene, ortho, meta and para-xylene, which represent more than 50% composition of the test substance. Measured test concentrations of the light catalytically reformed naphtha were based on the total combined concentrations of all analytes.

Range finding toxicity studies were conducted at 0.5, 1.0, 10 and 100 mg/l loading, using WAFS which were divided into duplicate aliquots and tested. Definitive toxicity studies were conducted at 3.0, 6.0, 12, 24 and 48 mg/l loading, using WAFS which were divided into duplicate aliquots and tested. Test vessels were teflon cap-sealed 273 ml glass jars with 10 daphnids per jar and were completely filled with test solution

During the study test system solutions. dissolved oxygen concentration range: 8.0 to 8.5; pH ranged from 8 2 to 8.4; temperature was 20 to 21 °C, hardness (mg/l) ranged from 146 -152; alkalinity (mg/l) was 158-168 and conductivity (imhos) values were 312 -317.

Daphnia magna, were supplied by testing laboratory; age < 24 hours old; obtained from culture maintained in-house since January 1998.

Limit Test:

Test Results - Acute Toxicity To Aquatic Invertebrates

NOEC Exposure Duration:

NOEC:

LOEC Exposure Duration:

LOEC:

NOELR Exposure Duration: 48 Hours

NOELR: = 3 mg/L Nominal

LOELR Exposure Duration:

LOELR:

LC/EC Mean Value :

Exposure Duration	Exposure Units	LC/EC	%	Value Description	Mean Value or Lower Mean Value	Upper Mean Value	Units	Effect Observed	Basis for Concentration
48	Hours	EL	50 %	=	10		mg/L		Nominal

Results Remarks: Immobility (no. of organisms) at 48 hrs: 0, 0, 0, 15, 20 and 20 for 0, 3.0, 6.0, 12, 24 and 48 mg/l treatments. At the 6 and 12mg/l nominal treatments, 20 and 5 organisms were observed at the bottom of the test chambers, respectively.

48-hr EL50 = 10 mg/l based upon nominal loading rate (95% C.I. 6 to 12 mg/l);
48 hr EC50 was 2.6 mg/l (95% C.I. 1.06 to

3 6 mg/l); based on total measured concentrations.
48-hr NOEL = 3 mg/l based upon nominal loading rate.
48 hr NOEC was 0.465 ppm based on total measured concentrations.

Measured concentrations represented the sum of six specific hydrocarbon compounds measured in the WAF solutions However, these compounds do not represent 100% of the hydrocarbons in the dissolved fraction. Therefore, test endpoints calculated from measured values would be expected to be lower than if all dissolved components were included in the measurements. Additionally, there was insufficient information regarding the analytical measurements. It was not reported how many sample measurements were taken, nor whether the reported values were based on fresh or old solutions, initial measurements, or a mean of all measurements. Additionally, it was not reported to what degree measured concentrations declined between solution renewals. Because of the uncertainty in what the measured values represented, test endpoints based on measured data should be viewed and interpreted with an understanding of this limitation.

Reliability/Data Quality - Acute Toxicity To Aquatic Invertebrates

Reliability: 2 - Valid With Restrictions

Reliability Remarks: Measured concentrations may not represent 100% of components, remaining hydrocarbon components in WAFs may be equally toxic and should have been quantitiated to determine total measured concentrations.

Key Study Sponsor Indicator:

Reference - Acute Toxicity To Aquatic Invertebrates

Reference: ABC Laboratories, Inc. (1998) Static Renewal 48-hour Acute Toxicity of the Water Accomodated Fraction (WAF) of Light Catalytically Reformed Naphtha, LCRN) to Daphnia Magna. Study No 43577. Environmental Toxicology, 7200 E. ABC Lane, Columbia, Missouri. 1998.

Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

Acute Toxicity to Aquatic Invertebrates

Test Substance - Acute Toxicity To Aquatic Invertebrates

Category Chemical:	*No CAS Number Providec*
Test Substance:	*No CAS Number Providec*
Test Substance Purity/Composition and Other Test Substance Comments:	Gasoline CAS No. 86290-81-5 Gasoline Sample W94/813, Blend Detailed hydrocarbon analysis: N-paraffins: 20% total C3-C8 Iso-paraffins: 28% total C4-C9 Olefins: 1% C5-C7 Naphthenes: 5% C5-C10 Aromatics: 46% C6-C9
Category Chemical Result Type:	Measured
Test Substance Result Type:	Measured

Method - Acute Toxicity To Aquatic Invertebrates

Year Study Performed:	1995
Method/Guideline Followed:	OECD 202
Other Method/Guideline:	
Deviations from Method/Guideline:	
Species/In Vitro System:	Daphnia magna
GLP:	Yes
Analytical Monitoring:	Yes
Test Type:	
Test Vessel:	
Water Media Type:	Freshwater
Test Concentrations:	Nominal
Nominal and Measured Concentrations:	0, 0.1, 1, 5, 10, and 25 mg/l
Exposure Period:	48 Hours
Vehicle Used:	
Vehicle Name:	
Vehicle Amount and Units:	
Alkalinity:	
Dissolved Oxygen:	7 2-9.2
pH Value:	7.5 Upper Range: 7.8
Test Temperature and Units:	Value/Lower Range: 19 °C
Photo (Light/Dark):	
Salinity:	

TOC:

Water Hardness:

Method/Guideline Test Conditions Remarks: EL50 calculated using the probit procedure (Finney, D.J., 1971. Probit Analysis, 3rd Ed. London: Cambridge Univ. Press)

Test solutions were prepared as water accommodated fractions (WAF). The control and dilution water was a laboratory blend water prepared from carbon filtered well water and ion exchange softened, reverse osmosis dialyzed well water aged for >24 hrs. To determine contact time required to achieve maximum solubility between test substance and aqueous solution, samples of WAF test solutions equilibrated for 20, 24, 27 and 49 hours at 100 mg/l loading were analyzed by GC-FID for concentrations of the following: benzene, toluene, ethylbenzene, xylene isomers and naphthalene (BTEXN) Maximum WAF solubility for these components reached equilibrium within 24 hrs of stirring. Nominal loading rates of 0, 0.1, 1, 5, 10, and 25 mg/l were used to prepare test solutions for the toxicity tests. Test substance, added volumetrically, was mixed for each individual treatment in dilution water for 24 hours in 4 liter stoppered containers with less than 10% headspace volume. The WAF mixtures were allowed to settle for 1-2 hours prior to drawing off the aqueous solutions for testing. WAF test solutions were analyzed by GC-FID for concentrations of BTEXN on day 0 and at termination. Test vessels for daphnid testing were 125 ml glass erlenmeyer flasks with foil covered neoprene stoppers. Four replicates per treatment and 5 organisms per replicate were tested for each treatment and the control. Exposure containers were filled (no headspace volume) and tightly sealed to prevent volatilization. During the study test system solutions: dissolved oxygen concentration range. 7.2 to 9.2, pH ranged from 7.5 to 7.8; temperature was 19 °C (sd.0.2).Daphnia magna were supplied by testing laboratory, age < 24 hours old; obtained from culture maintained in-house.

Limit Test:

Test Results - Acute Toxicity To Aquatic Invertebrates

NOEC Exposure Duration:

NOEC:

LOEC Exposure Duration:

LOEC:

NOELR Exposure Duration: 48 Hours

NOELR: = 1 mg/L

LOELR Exposure Duration:

LOELR:

LC/EC Mean Value :

Exposure Duration	Exposure Units	LC/EC	%	Value Description	Mean Value or Lower Mean Value	Upper Mean Value	Units	Effect Observed	Basis for Concentration
48	Hours	EL	50 %	=	7.6		mg/L		

Results Remarks: 48 hr results-number of organisms affected and analytical results
Measured
Measured
Treatment Immobilization BTEXN
BTEXN
-day 0 -day 2

Control 0 ND ND
0.5 mg/l 0 0.29
0.10
1.0 mg/l 0 0.28 0.10
5.0 mg/l 3
2.3 1.7
10 mg/l 16 3.9 3.1
25 mg/l
20 8.8 10

based upon nominal loading rate48-hr EL50 = 7.6 mg/l (95% C.I. 6.4 to 9.3 mg/l) 48-hr NOEL = 1.0 mg/l

Reliability/Data Quality - Acute Toxicity To Aquatic Invertebrates

Reliability: 2 - Valid With Restrictions

Reliability Remarks: Three previous attempts to conduct study were invalidated due to excessive (>20%) control mortality

Key Study Sponsor Indicator:

Reference - Acute Toxicity To Aquatic Invertebrates

Reference: CONCAWE (1995) Daphnia -acute toxicity test: study no. 104842, test
substance MRD-95-048. Study conducted by Exxon Biomedical Sciences Inc. CONCAWE, Brussels, 1995

Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

Acute Toxicity to Aquatic Invertebrates

Test Substance - Acute Toxicity To Aquatic Invertebrates

Category Chemical:	(64741-46-4) Naphtha, petroleum, light straight-run
Test Substance:	(64741-46-4) Naphtha, petroleum, light straight-run
Test Substance Purity/Composition and Other Test Substance Comments:	LSRN-Moderate naphthenic content
Category Chemical Result Type:	Measured
Test Substance Result Type:	Measured

Method - Acute Toxicity To Aquatic Invertebrates

Year Study Performed:	1996
Method/Guideline Followed:	ASTM E 729
Other Method/Guideline:	
Deviations from Method/Guideline:	
Species/In Vitro System:	Daphnia magna
GLP:	Yes
Analytical Monitoring:	Yes
Test Type:	Semi-Static
Test Vessel:	Closed
Water Media Type:	Freshwater
Test Concentrations:	Nominal
Nominal and Measured Concentrations:	3.0, 6.0, 12, 24 and 48 mg/l
Exposure Period:	48 Hours
Vehicle Used:	
Vehicle Name:	
Vehicle Amount and Units:	
Alkalinity:	142-150 mg/l
Dissolved Oxygen:	8.0-8.5
pH Value:	8.3 Upper Range: 8.4
Test Temperature and Units:	Value/Lower Range: 20 Upper Range: 21 °C
Photo (Light/Dark):	
Salinity:	

TOC:

Water Hardness: 132 - 140 mg/L

Method/Guideline Test Conditions Remarks: Procedure patterned after:1991 ASTM method E729-88a and 1985 USEPA
TSCA Test Guidelines: Daphnid Acute Toxicity Test. Fed. Reg., vol. 50 (No. 188) Sept 27, 1985, 797.1300.

Statistical Method: (FT -ME) EL50 and EC50 calculated using binomial probability analysis. ASTM Special Technical Publication 634. 1977, pp 65-84.

Test solutions were prepared as water accommodated fractions (WAF). Control and dilution water were a blend of aged well water and reverse osmosis well water.

WAFS were prepared for each test concentration by mixing the appropriate mass of substance in 2.4l of water for 24 hr in aluminum foil covered 2.5 liter aspirator bottles fitted w/ a port near the bottle bottom. The bottles were filled to neck height with water to minimize volatility. A measured amount of test substance was pipetted below the water surface. After stirring for 24 hrs using 25% or less vortex, the contents of the aspirator bottles were allowed
to settle for approximately one hour, then drained from the port and used for testing. Samples were also analyzed by purge & trap/GC-FID for concentrations of the following: 2-methyl-pentane, cyclohexane, benzene, toluene,
ethylbenzene, ortho, meta and para-xylene. Measured test concentrations of the light straight run naphtha were based on the total combined concentrations of all analytes.

Range finding toxicity studies were conducted at 0.5, 1.0, 10 and 100 mg/l loading, using WAFS which were divided into duplicate aliquots and tested Definitive toxicity studies were conducted at 3.0, 6.0, 12, 24 and 48 mg/l loading, using WAFS which were divided into duplicate aliquots and tested Test vessels were teflon cap-sealed 8 oz. glass jars with1 0 daphnids per jar and were completely filled to overflowing with approximately 273 ml test solution.

During the study test system solutions: dissolved oxygen concentration range: 8.0 to 8.5; pH ranged from 8.3 to 8.4; temperature was 20 to 21 °C; hardness (mg/l) ranged from 132 -140; alkalinity (mg/l) was 142-150 and conductivity
(imhos) values were 280 -300.

Daphnia magna, were supplied by testing laboratory; age < 24 hours old; obtained from 11 day culture maintained in-house since October 1996.

Limit Test:

Test Results - Acute Toxicity To Aquatic Invertebrates

NOEC Exposure Duration:

NOEC:

LOEC Exposure Duration:

LOEC:

NOELR Exposure Duration: 48 Hours

NOELR: = 6 mg/L Nominal

LOELR Exposure Duration:

LOELR:

LC/EC Mean Value :

Exposure Duration	Exposure Units	LC/EC	%	Value Description	Mean Value or Lower Mean Value	Upper Mean Value	Units	Effect Observed	Basis for Concentration
48	Hours	EL	50 %	=	18		mg/L		

Results Remarks: Immobility (no. of organisms) at 48 hrs. 1, 3, 0, 0, 19 and 20 for 0, 3.0, 6.0, 12, 24 and 48 mg/l treatments. At the 3 and 12mg/l nominal treatments, 1 and 20 organisms were observed at the bottom of the test chambers, respectively
48-hr EL50 = 18 mg/l based upon nominal loading rate (95% C.I. 12 to 24 mg/l)
48 hr EC50 was 0.65 mg/l (95% C.I 0 47 to 0.83

mg/l); based on total measured concentrations.
48-hr NOEL = 6.0 mg/l based upon nominal loading rate.
48 hr NOEC was 0.24 ppm based on total measured concentrations.

Measured concentrations represented the sum of six specific hydrocarbon compounds measured in the WAF solutions. However, these compounds do not represent 100% of the hydrocarbons in the dissolved fraction. Therefore, test endpoints calculated from measured values would be expected to be lower than if all dissolved components were included in the measurements. Additionally, there was insufficient information regarding the analytical measurements. It was not reported how many sample measurements were taken, nor whether the reported values were based on fresh or old solutions, initial measurements, or a mean of all measurements. Additionally, it was not reported to what degree measured concentrations declined between solution renewals. Because of the uncertainty in what the measured values represented, test endpoints based on measured data should be viewed and interpreted with an understanding of this limitation.

Reliability/Data Quality - Acute Toxicity To Aquatic Invertebrates

Reliability: 2 - Valid With Restrictions

Reliability Remarks: Measured concentrations may not represent 100% of components, remaining hydrocarbon components in WAF may be equally toxic and should have been quantitated to determine total measured concentrations.

Key Study Sponsor Indicator:

Reference - Acute Toxicity To Aquatic Invertebrates

Reference: ABC Laboratories, Inc. (1998) Static Renewal 48-hour Acute Toxicity of the Water
Accomodated Fraction (WAF) of Light Straight Run Naphtha, LSRN to Daphnia Magna. Study No. 43150. Environmental Toxicology, 7200 E ABC Lane, Columbia, Missouri.

Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

Acute Toxicity to Aquatic Plants

Test Substance - Acute Toxicity To Aquatic Plants

Category Chemical:	(64741-55-5) Naphtha, petroleum, light catalytic cracked
Test Substance:	(64741-55-5) Naphtha, petroleum, light catalytic cracked
Test Substance Purity/Composition and Other Test Substance Comments:	Olefenic naphthas
Category Chemical Result Type:	Measured
Test Substance Result Type:	Measured

Method - Acute Toxicity To Aquatic Plants

Year Study Performed:	1995
Method/Guideline Followed:	Other
Other Method/Guideline:	EPA. 1982. Guidelines and Support Documents for Environmental Effects Testing. EPA 560/6-82-002. Sections EG-8, ES-5.
Deviations from Method/Guideline:	
Species:	Selenastrum capricornutum
GLP:	Yes
Analytical Monitoring:	Yes
Test Type:	Static
Test Vessel:	Closed
Water Media Type:	Freshwater
Test Concentrations:	Nominal
Nominal and Measured Concentrations:	0, 6.4, 13, 25, 51 and 102 mg/l
Exposure Period:	96 Hours
Vehicle Used:	
Vehicle Name:	
Vehicle Amount and Units:	
Alkalinity:	
Dissolved Oxygen:	
pH Value:	7.5
Test Temperature and Units:	Value/Lower Range: 22 Upper Range: 26 °C
Photo (Light/Dark):	
Salinity:	

TOC:

Water Hardness:

Method/Guideline Test Conditions Remarks:

Statistical Method: LL50 and LC50 calculated using probit analysis. ASTM Special Technical Publication 634. 1977, pp 65-84. All NOEL/NOEC values calculated using Fisher's exact test.

Individual test treatment solutions were prepared as Water Accommodated Fractions (WAFs). Test material was added to 4.4 liters of sterilized AAP test media (enriched with 515 mg/l of sodium bicarbonate, pH adjusted to 7.5 ± 0.1 with 0.1NHCl and sterilized by 0.22 micron filtration) in 4.0 liter aspirator bottles. The mixing vessels were sealed with foil covered stoppers and mixed on magnetic stir plates with teflon coated stir bars for approximately 24 hours at room temperature in a hood darkened with aluminum foil. After mixing the solutions were allowed to settle for one hour and the WAF was removed and used for testing. Test vessels were 125ml glass Erlenmeyer flasks that were completely filled (140 ml) with treatment solution and inoculated with algae. Algal cells obtained from testing laboratory cultures grown in sterile, nutrient enriched AAP media, and transferred every 4-8 days to fresh media. Original algal cultures obtained from American Type Culture Collection (ATCC Strain 22662), Rockville, MD, September 1995. Cell density of the algal stock culture inoculate was determined prior to study initiation with a hemacytometer cell and compound microscope. Twelve replicates were prepared for each treatment level. Nominal treatment levels were 0, 6.4, 13, 25, 51 and 102 mg/l. The initial algal concentration was 1.0 x 10^3 cells/ml. All test replicates were placed on a shaker table at 100 oscillations per minute during the study and exposed to continuous fluorescent light, illumination at 400 + 50-ft candles. Triplicate samples were taken daily for cell counts and analytical testing. Cell densities were determined by direct microscopic examination. Samples at 0,24, 48, 72 and 96 hrs were also analyzed by Purge & trap/GC-FID for concentrations of the following: benzene, toluene, ethylbenzene, o-xylene and p-xylene, which represent 13% composition of the test substance. Measured test concentrations of the light catalytically cracked naphtha were based on the total combined concentrations of all analytes.

Test temperature was 24 ±2 °C. The pH was 7.5 at test initiation, pH value at test termination not included in report.

Limit Test:

Test Results - Acute Toxicity To Aquatic Plants

NOEC Exposure Duration:

NOEC:

LOEC Exposure Duration:

LOEC:

NOELR Exposure Duration: 96 Hours

NOELR: = 51 mg/L Nominal

LOELR Exposure Duration:

LOELR:

Effect :

Exposure Duration	Exposure Units	Type	%	Value Description	Mean Value or Lower Mean Value	Upper Mean Value	Units	Basis for Effect	Basis for Concentration
96	Hours	EL	50 %	=	64		mg/L		

Results Remarks: Percent inhibition on growth determined by cell density (cells/ml):
96 hour EL50=64 mg/l (44-111 mg/l CI @95%)
96 hour EC50= 4.6mg/l (2.9-8.8 mg/l CI @95%)
96 hour NOEL=51 mg/l
96 hour NOEC=3.5 mg/l
Subcultures placed in fresh media (no test substance) after acute testing for six days indicated that growth inhibition was algistatic in all treatments, with the exception of the 102 ppm, which was determined to be algicidal. No excursions from the protocol were noted. However, range finding and two previous definitive tests were performed and considered inconclusive due to inconsistencies in control and treatment cell densities, which presumably were resolved by modification of the AAP media. Additionally, control growth showed a lag during the first 72 hours of the study.

 Concentration (mg/l)

Nominal Measured 96hr cell density
 (cells/ml)
(% Inhibition)
Control 8.4
x103 na
 6.4 0.093 3.2 x104 -281.1
13 0.130 9.73x103 -16.00
25 0.429 1.99x104 -136.9
 51 1.87
1.36x103 53 0
102 4.85 2.59x103 69.2

Measured concentrations represented the sum of four specific hydrocarbon compounds measured in the WAF solutions However, these compounds do not represent 100% of the hydrocarbons in the dissolved fraction. Therefore, test endpoints calculated from measured values would be expected to be lower than if all dissolved components were included in the measurements. Additionally, it was not reported to what degree measured concentrations declined between the beginning and end of the test Because of this uncertainty, test endpoints based on the measured components should be viewed and interpreted with an understanding of this limitation

Reliability/Data Quality - Acute Toxicity To Aquatic Plants

Reliability: 2 - Valid With Restrictions

Reliability Remarks: Measured concentrations may not represent 100% of components, remaining hydrocarbon components in WAFs may be equally toxic and should have been quantitated to determine total measured concentrations.

Key Study Sponsor Indicator:

Reference - Acute Toxicity To Aquatic Plants

Reference: Stonybrook Laboratories, Inc. (1995) Static Renewal 96-hour acute toxicity of the water accomodated fraction (WAF) FR 15799 FCC Light (Light Catalytically Cracked Naphtha, LCCN) to a Freshwater Alga, Selenastrum capricornutum, Study No. 66235 Stonybrook Laboratories, Inc Princeton, NJ

Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

Acute Toxicity to Aquatic Plants

Test Substance - Acute Toxicity To Aquatic Plants

Category Chemical:	*No CAS Number Provided*
Test Substance:	*No CAS Number Provided*
Test Substance Purity/Composition and Other Test Substance Comments:	Gasoline CAS No. 86290-81-5 Gasoline Sample W94/813, Blend Detailed hydrocarbon analysis: N-paraffins: 20% total C3-C8 Iso-paraffins. 28% total C4-C9 Olefins. 1% C5-C7 Naphthenes: 5% C5-C10 Aromatics. 46% C6-C9
Category Chemical Result Type:	Measured
Test Substance Result Type:	Measured

Method - Acute Toxicity To Aquatic Plants

Year Study Performed:	1995
Method/Guideline Followed:	OECD 201
Other Method/Guideline:	
Deviations from Method/Guideline:	
Species:	Selenastrum capricornutum
GLP:	Yes
Analytical Monitoring:	Yes
Test Type:	Static
Test Vessel:	Closed
Water Media Type:	Freshwater
Test Concentrations:	Nominal
Nominal and Measured Concentrations:	0, 0.5, 1, 5, 10, and 25 mg/l
Exposure Period:	96 Hours
Vehicle Used:	
Vehicle Name:	
Vehicle Amount and Units:	
Alkalinity:	
Dissolved Oxygen:	
pH Value:	7.5 Upper Range: 9 2
Test Temperature and Units:	Value/Lower Range: 23 °C
Photo (Light/Dark):	
Salinity:	
TOC:	

Water Hardness:

Method/Guideline Test Conditions Remarks:

EL50 values were calculated using the inverse extrapolation method of Snedecor and Cochran, Statistical Methods, 8th Ed., 1989, Iowa State University Press/Ames. NOEL values calculated using ANOVA (Duncan D.B., 1975, Biometrics, 31, 339-359)

Individual test treatment solutions were prepared as Water Accommodated Fractions (WAFs). To determine contact time required to achieve maximum solubility between test substance and aqueous solution, samples of WAF test solutions equilibrated for 20, 24, 27 and 49 hours at 100 mg/l loading were analyzed by GC-FID for concentrations of the following. benzene, toluene, ethylbenzene, xylene isomers and naphthalene (BTEXN). Maximum WAF solubility for these components reached equilibrium within 24 hrs of stirring. Nominal loading rates of 0, 0 5, 1, 5, 10, and 25 mg/l were used to prepare test solutions for the algal toxicity tests Test material was added volumetrically to 2.0 liters of sterilized algal nutrient media (enriched with 100 mg/l of sodium bicarbonate) in 2.0 liter aspirator bottles covered with aluminum foil. The mixing vessels were sealed with foil covered stoppers and mixed on magnetic stir plates with teflon coated stir bars for approximately 24 hours at room temperature After mixing the solutions were allowed to settle for one hour and the WAF was removed and used for testing. Test vessels were 125ml glass Erlenmeyer flasks containing ten 4mm glass balls that were completely filled (140 ml) with treatment solution, inoculated with algae and sealed with glass stoppers Algal cells were obtained from 6 day old laboratory stock cultures maintained in nutrient enriched media, at 24 °C (±2°) C under continuous illumination of 4300(±10%) lux Original algal cultures (Strain 1648) were provided by the Department of Botany, University of Texas Cell density of the algal stock culture inoculum was determined prior to study initiation with a Turner filter-fluorometer Fluorometer readings were converted to cell numbers using a regression formula developed through cell counts. Three replicates were prepared for each treatment level and six replicates were prepared as control systems. The initial algal concentration was approximately 1.0 x 103 cells/ml in each replicate chamber. All test replicates were placed on a shaker table at 150 oscillations per minute during the study and exposed to continuous fluorescent light, illumination at 4300 to 4400 Lux as measured daily using a Licor photometric sensor. A sample volume of 3 5 ml was taken daily for density determinations, and an equivalent volume of reserve 24 hour WAF was used to replenish the displaced sample volume. WAF test solutions were analyzed by GC FID for concentrations of BTEXN at day 0 and 96 hr termination. BTEXN total concentration at termination was at least 80% of the initial concentration for all treatments, with the exception of the 5.0 mg/l exposure, which showed a loss of 73%. This excessive loss compared to the other treatments was determined to be due to sampling technique. Test temperature was 23 °C (sd=0.08 C. The average pH was 7.5 at initiation; and ranged from 9 2 (control) to 7.8 (25 mg/l loading) at termination

Limit Test:

Test Results - Acute Toxicity To Aquatic Plants

NOEC Exposure Duration:

NOEC:

LOEC Exposure Duration:

LOEC:

NOELR Exposure Duration:

NOELR:

LOELR Exposure Duration:

LOELR:

Effect :

Exposure Duration	Exposure Units	Type	%	Value Description	Mean Value or Lower Mean Value	Upper Mean Value	Units	Basis for Effect	Basis for Concentration
72	Hours	EL	50 %	=	3.1		mg/L	Growth Rate	
72	Hours	EL	50 %	=	1.4		mg/L	Other	

96	Hours	EL	50 %	=	3.7		mg/L	Growth Rate	
96	Hours	EL	50 %	=	1.1		mg/L	Other	

Results Remarks: Percent inhibition.
72 hour EL50 for average growth rate=3.1 mg/l (0 15 to >25 mg/l CI @95%)
72 hour EL50 for area under the growth curve=1.4 mg/l (0 to 20 mg/l CI @95%) 96 hour EL50 for average growth rate=3.7 mg/l (0.34 to >25 mg/l CI @95%)
96 hour EL50 for area under the growth curve=1.1 mg/l (0 to 22 mg/l CI @95%)
72 hour NOEL for average growth rate=0.5 mg/l
72 hour NOEL for area under the growth curve =<0 5 mg/l
96 hour NOEL for average growth rate =1 0 mg/l
96 hour NOEL for area under the growth curve =<0.5 mg/l

Nominal (mg/l) % Inhibition
Average Average Area
 cell density growth
rate under
 (cells/ml) growth curve
72hr 96hr 72hr 96 hr 72hr 96hr
Control 1.6E5 3.9E5 0
0 0 0
0.5 1 0E5 2 8E5 6.2 3.4 36
33
1.0 6 8E4 2.6E5 12 5.5 51
44
5 0 4.6E4 1.2E5 21 22 53 65
10
2 4E3 3 7E3 90 89 93 98
25 BMDL BMDL 99 99
98 99

Analytical results
Nominal (mg/l) Measured Concentration (mg/l as
BTEXN)
 Day 0 Day 4
Control none
detected none detected
0.5 0.12
0 30
1.0 0.58
0.67
5.0 2.4 0.65
10
5.2 4.72
5 12 9.6

Reliability/Data Quality - Acute Toxicity To Aquatic Plants

Reliability: 1 - Valid Without Restrictions

Reliability Remarks:

Key Study Sponsor Indicator:

Reference - Acute Toxicity To Aquatic Plants

Reference: CONCAWE (1995) Algal, Growth Inhibition Test: study no 104867, test
substance MRD-95-048. Study conducted by Exxon Biomedical Sciences Inc.
CONCAWE, Brussels, 1995

Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

Acute Toxicity to Aquatic Plants

Test Substance - Acute Toxicity To Aquatic Plants

Category Chemical:	(64741-66-8) Naphtha, petroleum, light alkylate
Test Substance:	(64741-66-8) Naphtha, petroleum, light alkylate
Test Substance Purity/Composition and Other Test Substance Comments:	Paraffinic naphthas
Category Chemical Result Type:	Measured
Test Substance Result Type:	Measured

Method - Acute Toxicity To Aquatic Plants

Year Study Performed:	1995
Method/Guideline Followed:	Other
Other Method/Guideline:	EPA. 1982 Guidelines and Support Documents for Environmental Effects Testing. EPA 560/6-82-002. Sections EG-8, ES-5.
Deviations from Method/Guideline:	
Species:	Selenastrum capricornutum
GLP:	Yes
Analytical Monitoring:	Yes
Test Type:	Static
Test Vessel:	Closed
Water Media Type:	
Test Concentrations:	Nominal
Nominal and Measured Concentrations:	0, 18, 70, 146, 292 and 1157 mg/l
Exposure Period:	96 Hours
Vehicle Used:	
Vehicle Name:	
Vehicle Amount and Units:	
Alkalinity:	
Dissolved Oxygen:	
pH Value:	7.5
Test Temperature and Units:	Value/Lower Range: 22 Upper Range: 26 °C
Photo (Light/Dark):	
Salinity:	

TOC:

Water Hardness:

Method/Guideline Test Conditions Remarks:

Statistical Method: EL50 and EC50 calculated using binomial probability analysis ASTM Special Technical Publication 634. 1977. pp 65-84. All NOEL/NOEC values calculated using Fisher's exact test.

Individual test treatment solutions were prepared as Water Accommodated Fractions (WAFs). Test material was added to 2.3 liters of sterilized AAP test media (enriched with 515 mg/l of sodium bicarbonate, pH adjusted to 7.5 ± 0.1 with 0.1 NHCl and sterilized by 0.22 micron filtration) in 2.0 liter aspirator bottles, covered with aluminum foil. The mixing vessels were sealed with foil covered stoppers and mixed on magnetic stir plates with teflon coated stir bars for approximately 24 hours at room temperature. After mixing the solutions were allowed to settle for one hour and the WAF was removed and used for testing Test vessels were 125ml glass Erlenmeyer flasks that were completely filled (135 ml) with treatment solution and inoculated with algae. Algal cells obtained from testing laboratory cultures grown in sterile, nutrient enriched AAP media, and transferred every 5-9 days to fresh media. Original algal cultures obtained from American Type Culture Collection (ATCC Strain 22662), Rockville, MD, June 1994. Cell density of the algal stock culture inoculate was determined prior to study initiation with a hemacytometer cell and compound microscope. Twelve replicates were prepared for each treatment level. Nominal treatment levels were 0, 18, 70, 146, 292 and 1157 mg/l The initial algal concentration was 1.0 x 103 cells/ml. All test replicates were placed on a shaker table at 100 oscillations per minute during the study and exposed to continuous fluorescent light, illumination at 400 ± 50-ft candles. Triplicate samples were taken daily for cell counts and analytical testing. Cell densities were determined by direct microscopic examination Samples at 0,24, 48, 72 and 96 hrs were also analyzed by Purge & trap/GC-FID for concentrations of the following. 2,3 dimethyl butane; 2,4 dimethyl pentane; 2,2,4 trimethyl pentane; 2,5 dimethyl hexane; 2,3,4 trimethyl pentane, 2,3,3 trimethyl pentane and 1-methyl-1-ethyl cyclopentane, which represent 68% composition of the test substance. Measured test concentrations of the light alkylate naphtha were based on the total combined concentrations of all analytes.

Test temperature was 24 ± 2°C. The pH was 7.5 at test initiation, pH value at test termination not included in report.

Limit Test:

Test Results - Acute Toxicity To Aquatic Plants

NOEC Exposure Duration:

NOEC:

LOEC Exposure Duration:

LOEC:

NOELR Exposure Duration: 96 Hours

NOELR: = 18 mg/L Nominal

LOELR Exposure Duration:

LOELR:

Effect :

Exposure Duration	Exposure Units	Type	%	Value Description	Mean Value or Lower Mean Value	Upper Mean Value	Units	Basis for Effect	Basis for Concentration
96	Hours	EL	50 %	=	45		mg/L		

Results Remarks: Percent inhibition on growth determined by cell density (cells/ml)
96 hour EL50=45mg/l (18-70 mg/l CI @95%)
96 hour NOEL=18 mg/l

Subcultures placed in fresh media (no test substance) after acute testing for nine days indicated that growth inhibition was algistatic in all treatments. No excursions from the protocol were noted. However, range finding and two previous definitive tests were performed and considered inconclusive due to inconsistencies in control and treatment cell densities, which presumably were resolved by modification of the AAP media. Additionally, control growth showed a lag during the first 48 hours of the study.

 Concentration (mg/l)
 Nominal Measured 96hr cell density (% Inhibition)
 mg/L ug/L (cells/ml)
 Control 5.7x104 na
 18 0 112 5.53x104 3 1
 70 0.305 1.27x104 77.7
 146 0.498 3 46x103 93.9
 292 0 610 1.36x103 97.6
 1157 0.612 1.60x103 97.2

Measured concentrations represented the sum of seven specific hydrocarbon compounds measured in the WAF solutions. However, these compounds do not represent 100% of the hydrocarbons in the dissolved fraction Therefore, test endpoints calculated from measured values would be expected to be lower than if all dissolved components were included in the measurements. Additionally, it was not reported to what degree measured concentrations declined between the beginning and end of the test. Because of this uncertainty, test endpoints based on the measured components should be viewed and interpreted with an understanding of this limitation.

Reliability/Data Quality - Acute Toxicity To Aquatic Plants

Reliability: 2 - Valid With Restrictions

Reliability Remarks: Measured concentrations may not represent 100% of components, remaining hydrocarbon components in WAFs may be equally toxic and should have been quantitated to determine total measured concentrations.

Key Study Sponsor Indicator:

Reference - Acute Toxicity To Aquatic Plants

Reference: Stonybrook Laboratories, Inc. (1995) Static Renewal 96-hour acute toxicity of the water accomodated fraction (WAF) of Whole Light Alkylate Naphtha (LAN) Product to a Freshwater Alga, Selenastrum capricornutum, Study No. 65909. Stonybrook Laboratories Inc. Princeton, NJ.1995.

Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS· 10/28/2003

Acute Toxicity to Aquatic Plants

Test Substance - Acute Toxicity To Aquatic Plants

Category Chemical:	(64741-63-5) Naphtha, petroleum, light catalytic reformed
Test Substance:	(64741-63-5) Naphtha, petroleum, light catalytic reformed
Test Substance Purity/Composition and Other Test Substance Comments:	Aromatic naphtha
Category Chemical Result Type:	Measured
Test Substance Result Type:	Measured

Method - Acute Toxicity To Aquatic Plants

Year Study Performed:	1998
Method/Guideline Followed:	
Other Method/Guideline:	
Deviations from Method/Guideline:	
Species:	Selenastrum capricornutum
GLP:	Yes
Analytical Monitoring:	Yes
Test Type:	Static
Test Vessel:	Closed
Water Media Type:	Freshwater
Test Concentrations:	Nominal
Nominal and Measured Concentrations:	0, 1.3, 2.5, 5.0, 10, 20 and 40 mg/l
Exposure Period:	96 Hours
Vehicle Used:	
Vehicle Name:	
Vehicle Amount and Units:	
Alkalinity:	
Dissolved Oxygen:	
pH Value:	7.5 Upper Range: 8.9
Test Temperature and Units:	Value/Lower Range: 24 Upper Range: 25 °C
Photo (Light/Dark):	
Salinity:	
TOC:	

Water Hardness:

Method/Guideline Test Conditions Remarks:

No specific guideline was described as being used to conduct the test, however report references 1991 ASTM method E729-88a and 1982 EPA Support Documents for Environmental Testing: EPA 560/6-82-002.

Statistical Method: EL 50 and EC50 calculated using nonlinear logistics sigmoid model (SAS). All NOEL/NOEC values based on visual review and Dunnett's test for significance.

Individual test treatment solutions were prepared as Water Accommodated Fractions (WAFs). Test material was added to 2 4 liters of sterilized AAP test media (enriched with 515 mg/l of sodium bicarbonate, 300 ug/l EDTA chelator, pH adjusted to 7.5 ±0.1 with 0.1NHCl and sterilized by 0 45 micron filtration) in 2.5 liter aspirator bottles. The mixing vessels were sealed with foil covered stoppers, covered with aluminum foil and the contents mixed on magnetic stir plates with teflon coated stir bars for approximately 24 hours at room temperature. After mixing the solutions were allowed to settle for one hour and the WAF was removed from the spout at the base of each bottle and used for testing. Test vessels were 125ml glass Erlenmeyer flasks that were completely filled (148 ml) with treatment solution and inoculated with 6 day old algae. Algal cells obtained from testing laboratory cultures grown in sterile, nutrient
enriched AAP media. Original algal cultures (stock UTEX-1648) obtained from Dept of Botany, Culture Collection of Algae, University of Texas at Austin, 1997. Cell density of the algal stock culture inoculate was determined prior to
study initiation with a hemacytometer cell and compound microscope. Twelve replicates were prepared for each treatment level. Nominal treatment levels were 0, 1.3, 2.5, 5.0, 10, 20 and 40 mg/l The initial algal concentration was 1.0 x 103 cells/ml. All test replicates were placed on a shaker table at 100 oscillations per minute during the study and exposed to continuous fluorescent light, illumination range 371 to 442 ft candles. Triplicate samples were taken daily for cell counts and analytical testing. Cell densities were determined by direct microscopic examination. Samples at 0,24, 48, 72 and 96 hrs were also analyzed by Purge & trap/GC-FID for concentrations of the following pentane, 2 methyl-pentane, benzene, toluene, ethylbenzene, ortho, meta and para-xylene, which represent more than 50% composition of the test substance. Measured test concentrations of the light catalytically reformed naphtha were based on the total combined concentrations of all analytes.

Test temperature was 24-25 °C. Test solution pH ranged from 7.5 to 8.9.

Limit Test:

Test Results - Acute Toxicity To Aquatic Plants

NOEC Exposure Duration:

NOEC:

LOEC Exposure Duration:

LOEC:

NOELR Exposure Duration: 96 Hours

NOELR: = 5 mg/L Nominal

LOELR Exposure Duration:

LOELR:

Effect :

Exposure Duration	Exposure Units	Type	%	Value Description	Mean Value or Lower Mean Value	Upper Mean Value	Units	Basis for Effect	Basis for Concentration
96	Hours	EL	50 %	=	8.5		mg/L		

Results Remarks: Percent inhibition on growth determined by cell density (cells/mL)
96 hour EL10=6.0 mg/l (3.1-8.8 mg/l CI @95%)
96 hour EL50=8.5mg/l (7.3-9.8 mg/l CI @95%)
96 hour EL90=12 mg/l (9.9-14 mg/l CI @95%)
96 hour NOEL=5.0 mg/l

96 hour EC10=1 1 mg/l (0.41-1.8 mg/l CI @95%)
96 hour EC50= 1.7mg/l (1.4-2.1 mg/l CI @95%)
96 hour EC90=2.7 mg/l (2.1-3.4 mg/l CI @95%)
96 hour NOEC=0.866 mg/l

Subcultures of the 10, 20 and 40 mg/l treatment cultures were placed in fresh media (no test substance) after acute testing for ten days indicated that growth inhibition was algistatic in all treatments No excursions from the
protocol were noted which would have affected the integrity of the study

 Concentration
nominal measured 96hr cell density
(mg/l) (mg/l) (cells /ml)
Control 0.0147 40.5 x104
1.3 0.126 40.92 x10^4
2.5 0.211 42.33 x104
5.0 0.866 41.17 x104
10 2.12 11 11 x104
20 5.26 0 70 x104
40 13.3 0.04 x104

Measured concentrations represented the sum of six specific hydrocarbon compounds measured in the WAF solutions. However, these compounds do not represent 100% of the hydrocarbons in the dissolved fraction. Therefore, test endpoints calculated from measured values would be expected to be lower than if all dissolved components were included in the measurements. Additionally, it was not reported to what degree measured concentrations declined between the beginning and end of the test Because of this uncertainty, test endpoints based on the measured components should be viewed and interpreted with an understanding of this limitation

Reliability/Data Quality - Acute Toxicity To Aquatic Plants

Reliability: 2 - Valid With Restrictions

Reliability Remarks: Measured concentrations may not represent 100% of components, remaining hydrocarbon components in WAFs may be equally toxic and should have been quantitated to determine total measured concentrations.

Key Study Sponsor Indicator:

Reference - Acute Toxicity To Aquatic Plants

Reference: ABC Laboratories, Inc (1998). Static Renewal 96 Hour Acute Toxicity of the Water Accomodated Fraction (WAF) of Light Catalytically Reformed Naphtha, LCRN to to a Freshwater Alga, Selenastrum capricornutum Project ID. 43579 ABC Laboratories, Inc Environmental Toxicology, 7200 E ABC Lane, Columbia, Missouri

Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

Acute Toxicity to Aquatic Plants

Test Substance - Acute Toxicity To Aquatic Plants

Category Chemical:	*No CAS Number Provided*
Test Substance:	*No CAS Number Provided*
Test Substance Purity/Composition and Other Test Substance Comments:	Gasoline CAS No. 86290-81-5 Gasoline Sample W94/814, Blend Detailed hydrocarbon analysis: N-paraffins. 16% total C4-C8 Iso-paraffins. 25% total C4-C11 Olefins: 12% C4-C7 Naphthenes: 5% C6-C10 Aromatics: 42% C6-C11
Category Chemical Result Type:	Measured
Test Substance Result Type:	Measured

Method - Acute Toxicity To Aquatic Plants

Year Study Performed:	1995
Method/Guideline Followed:	OECD 201
Other Method/Guideline:	
Deviations from Method/Guideline:	
Species:	Selenastrum capricornutum
GLP:	Yes
Analytical Monitoring:	Yes
Test Type:	Static
Test Vessel:	Closed
Water Media Type:	Freshwater
Test Concentrations:	Nominal
Nominal and Measured Concentrations:	0, 0 5, 1, 5, 10, and 25 mg/l
Exposure Period:	96 Hours
Vehicle Used:	
Vehicle Name:	
Vehicle Amount and Units:	
Alkalinity:	
Dissolved Oxygen:	
pH Value:	7.6 Upper Range: 9.5
Test Temperature and Units:	Value/Lower Range: 23 °C
Photo (Light/Dark):	
Salinity:	
TOC:	

Water Hardness:

Method/Guideline Test Conditions Remarks:

EL50 values were calculated using the inverse extrapolation method of Snedecor and Cochran, Statistical Methods, 8th Ed., 1989, Iowa State University Press/Ames. NOEL values calculated using ANOVA (Duncan D.B., 1975, Biometrics, 31, 339-359)

Individual test treatment solutions were prepared as Water Accommodated Fractions (WAFs). To determine contact time required to achieve maximum solubility between test substance and aqueous solution, samples of WAF test solutions equilibrated for 20, 24, 27 and 49 hours at 100 mg/l loading were analyzed by GC-FID for concentrations of the following: benzene, toluene, ethylbenzene, xylene isomers and naphthalene (BTEXN). Maximum WAF solubility for these components reached equilibrium within 24 hrs of stirring. Nominal loading rates of 0, 0.5, 1, 5, 10, and 25 mg/l were used to prepare test solutions for the algal toxicity tests. Test material was added volumetrically to 2.0 liters of sterilized algal nutrient media (enriched with 100 mg/l of sodium bicarbonate) in 2.0 liter aspirator bottles covered with aluminum foil. The mixing vessels were sealed with foil covered stoppers and mixed on magnetic stir plates with teflon coated stir bars for approximately 24 hours at room temperature. After mixing the solutions were allowed to settle for one hour and the WAF was removed and used for testing. Test vessels were 125ml glass Erlenmeyer flasks containing ten 4mm glass balls that were completely filled (140 ml) with treatment solution, inoculated with algae and sealed with glass stoppers. Algal cells were obtained from 6 day old laboratory stock cultures maintained in nutrient enriched media, at 24 °C (±2°) C under continuous illumination of 4300(±10%) lux. Original algal cultures (Strain 1648) were provided by the Department of Botany, University of Texas. Cell density of the algal stock culture inoculum was determined prior to study initiation with a Turner filter-fluorometer. Fluorometer readings were converted to cell numbers using a regression formula developed through cell counts. Three replicates were prepared for each treatment level and six replicates were prepared as control systems. The initial algal concentration was approximately 1.0 x 103 cells/ml in each replicate chamber. All test replicates were placed on a shaker table at 150 oscillations per minute during the study and exposed to continuous fluorescent light, illumination at 4300 to 4400 Lux as measured daily using a Licor photometric sensor. A sample volume of 3.5 ml was taken daily for density determinations, and an equivalent volume of reserve 24 hour WAF was used to replenish the displaced sample volume. WAF test solutions were analyzed by GC FID for concentrations of BTEXN at day 0 and 96 hr termination. BTEXN total concentration at termination was at least 80% of the initial concentration for all treatments, with the exception of the 5.0 mg/l exposure, which showed a loss of 73%. This excessive loss compared to the other treatments was determined to be due to sampling technique. Test temperature was 23 °C (sd=0.08 C. The average pH was 7.5 at initiation; and ranged from 9.2 (control) to 7.8 (25 mg/l loading) at termination.

Limit Test:

Test Results - Acute Toxicity To Aquatic Plants

NOEC Exposure Duration:

NOEC:

LOEC Exposure Duration:

LOEC:

NOELR Exposure Duration:

NOELR:

LOELR Exposure Duration:

LOELR:

Effect :

Exposure Duration	Exposure Units	Type	%	Value Description	Mean Value or Lower Mean Value	Upper Mean Value	Units	Basis for Effect	Basis for Concentration
72	Hours	EL	50 %	=	3.3		mg/L	Growth Rate	
72	Hours	EL	50 %	=	4.2		mg/L	Other	
96	Hours	EL	50 %	=	2.5		mg/L	Growth Rate	
96	Hours	EL	50 %	=	0.25		mg/L	Other	

Results Remarks: Percent inhibition
72 hour EL50 for average growth rate=3.3 mg/l(0.24 to >25 mg/l CI @95%)
72 hour EL50 for area under the growth curve=4.2 mg/l(0 to 24 mg/l CI @95%)
96 hour EL50 for average growth rate=2.5 mg/l(0.62 to 14 mg/l CI @95%)
96 hour EL50 for area under the growth curve=0.25 mg/l(0 to 26 mg/lL CI @95%)
72 hour NOEL for average growth rate and area under the growth curve =0.5 mg/l
96 hour NOEL for average growth rate =0.5 mg/l
96 hour NOEL for area under the growth curve =0.5 mg/l

Nominal (mg/l) % Inhibition
 Average density Average growth rate Area under
 cell growth curve
 (cells/ml) 72hr 96hr 72hr 96 hr 72hr 96hr
Control 9.9E4 3.8E5 0 0 0 0
0 5 7 7E4 2.6E5 7.7 7.8 21 27
1 0 5 5E4 1 7E5 15 17 36 50
5.0 2.5E4 2.2E4 33 51 54 81
10 3 7E3 2 0E3 76 95 90 97
25 BMDL BMDL 99 100 98 99
BMDL=below method detection limit

Analytical results
Nominal (mg/l) Measured Concentration (mg/l as BTEXN)
 Day 0 Day 4
Control none detected none detected
0.5 0 22 0 23
1 0 0.47 0.51
5.0 1.5 1.3
10 3.5 3 3
25 9 5 7.7

Reliability/Data Quality - Acute Toxicity To Aquatic Plants

Reliability: 1 - Valid Without Restrictions

Reliability Remarks:

Key Study Sponsor Indicator:

Reference - Acute Toxicity To Aquatic Plants

Reference: CONCAWE (1995) Algal, Growth Inhibition Test: study no. 104967, test
substance MRD-95-049. Study conducted by Exxon Biomedical Sciences Inc. CONCAWE, Brussels, 1995

Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

Acute Toxicity to Aquatic Plants

Test Substance - Acute Toxicity To Aquatic Plants

Category Chemical:	(64741-46-4) Naphtha, petroleum, light straight-run
Test Substance:	(64741-46-4) Naphtha, petroleum, light straight-run
Test Substance Purity/Composition and Other Test Substance Comments:	LSRN-Moderate naphthenic content
Category Chemical Result Type:	Measured
Test Substance Result Type:	Measured

Method - Acute Toxicity To Aquatic Plants

Year Study Performed:	1997
Method/Guideline Followed:	
Other Method/Guideline:	
Deviations from Method/Guideline:	
Species:	Selenastrum capricornutum
GLP:	Yes
Analytical Monitoring:	Yes
Test Type:	Static
Test Vessel:	Closed
Water Media Type:	Freshwater
Test Concentrations:	Nominal
Nominal and Measured Concentrations:	0, 1.9, 4.0, 7.8, 16 and 31 mg/l
Exposure Period:	96 Hours
Vehicle Used:	
Vehicle Name:	
Vehicle Amount and Units:	
Alkalinity:	
Dissolved Oxygen:	
pH Value:	8 Upper Range: 8.5
Test Temperature and Units:	Value/Lower Range: 24 Upper Range: 26
Photo (Light/Dark):	
Salinity:	
TOC:	

Water Hardness:

Method/Guideline Test Conditions Remarks:

No specific guideline was described as being used to conduct the test, however report references 1991 ASTM method E729-88a and 1982 EPA Support Documents for Environmental Testing. EPA 560/6-82-002

Statistical Method. EL50 and EC50 calculated using nonlinear logistics sigmoid model (SAS). All NOEL/NOEC values based on visual review and Dunnett's test for
significance

Individual test treatment solutions were prepared as Water Accommodated Fractions (WAFs). Test material was added to 9 4-9.61 of sterilized AAP test media (enriched with 515 mg/l of sodium bicarbonate, 300 ig/l EDTA chelator, pH
adjusted to 7.5 ± 0.1 with 0.1 NHCl and sterilized by 0 45 micron filtration) in 9.5 liter aspirator bottles. A measured amount of test substance was added into each bottle, and the bottles were capped tightly with a positive
pressure siphoning apparatus. The siphoning apparatus consisted of a teflon lined neoprene stopper housing two teflon tubes. One tube extended to the bottom of the bottle for removal of the WAF solution, the other tube ended above
the WAF surface, and was used to control air pressure during siphoning During WAF preparation, parafilm was used to seal The external joint between the neoprene stopper and glass bottle, and the bottles were covered with aluminum foil. The contents were stirred with teflon coated stir bars in the mixing vessels which were placed on magnetic stir plates at room temperature. After stirring for 24 hrs using 25% or less vortex, the contents of the WAF solution bottles were allowed to settle for approximately 45 minutes to two hours, then siphoned by the positive pressure apparatus port and used for testing Test vessels were 125ml glass Erlenmeyer flasks that were completely filled (148 ml) with treatment solution and inoculated with 3 day old algae. Algal cells
obtained from testing laboratory cultures grown in sterile, nutrient enriched AAP media. Original algal cultures (stock UTEX-1648) obtained from Dept of Botany, Culture Collection of Algae, University of Texas at Austin, 1996 Cell density of the algal stock culture inoculate was determined prior to study initiation with a hemacytometer cell and compound microscope Twelve replicates were prepared for each treatment level. Nominal treatment levels were 0, 1.9, 4.0, 7.8, 16 and 31 mg/l The initial algal concentration was 1 0 x 103 cells/ml.
All test replicates were placed on a shaker table at 100 oscillations per minute during the study and exposed to continuous fluorescent light, illumination 400 +50 ft candles. Triplicate samples were taken daily for cell counts and analytical testing. Cell densities were determined by direct
microscopic examination. Samples at 0,24, 48, 72 and 96 hrs were also analyzed by Purge & trap/GC-FID for concentrations of the following: 2-methyl-pentane, cyclohexane, benzene, toluene, ethylbenzene, ortho, meta and para-xylene. Measured test concentrations of the light straight run naphtha were based on the total combined concentrations of all analytes

Test temperature was 24-26 °C. Test solution pH ranged from 8 0 to 8.5.

Limit Test:

Test Results - Acute Toxicity To Aquatic Plants

NOEC Exposure Duration:

NOEC:

LOEC Exposure Duration:

LOEC:

NOELR Exposure Duration: 96 Hours

NOELR: = 1.9 mg/L Nominal

LOELR Exposure Duration:

LOELR:

Effect :

Exposure Duration	Exposure Units	Type	%	Value Description	Mean Value or Lower Mean Value	Upper Mean Value	Units	Basis for Effect	Basis for Concentration
96	Hours	EL	50 %	=	6.4		mg/L		
96	Hours	EL	10 %	=	2.7		mg/L		

Results Remarks: Percent inhibition on growth determined by cell density (cells/ml):
96 hour EL10=2.7 mg/l (1.9-3.5 mg/l CI @95%)
96 hour EL50=6.4mg/l (5 7-7 1 mg/l CI @95%)
96 hour EL90=15 mg/l (12-18 mg/l CI @95%)
96 hour NOEL=1.9 mg/L

96 hour EC10=0.1 mg/l (0.061-0.15 mg/l CI @95%)
96 hour EC50= 0.26 mg/l (0.22-0.30 mg/l CI @95%)
96 hour EC90=0.66 mg/l (0.50-0.83 mg/l CI @95%)
96 hour NOEC=0.0326 mg/l

Subcultures of the 31 mg/l treatment cultures were placed in fresh media (no test substance) after acute testing for ten days and indicated that growth inhibition was algistatic in this treatment. Conduct of the range-finder and definitive tests were acceptable (no repeats) No excursions from the protocol were noted which would have affected the integrity of the study.

 Concentration
Nominal Measured 96hr cell density
(mg/L) (mg/L) (cells/ml)
Control (<LOQ) 43.58 x104
1 9 0.0322 42.33 x104
4.0 0.130 29.25 x104
7 8 0.329 18.42 x104
16 0.704 1.74 x104
31 1.29 0.04 x104

Measured concentrations represented the sum of six specific hydrocarbon compounds measured in the WAF solutions. However, these compounds do not represent 100% of the hydrocarbons in the dissolved fraction. Therefore, test endpoints calculated from measured values would be expected to be lower than if all dissolved components were included in the measurements. Additionally, it was not reported to what degree measured concentrations declined between the beginning and end of the test. Because of this uncertainty, test endpoints based on the measured components should be viewed and interpreted with an understanding of this limitation.

Reliability/Data Quality - Acute Toxicity To Aquatic Plants

Reliability: 2 - Valid With Restrictions

Reliability Remarks: Measured concentrations may not represent 100% of components, remaining hydrocarbon components in WAFs may be equally toxic and should have been quantitated to determine total measured concentrations.

Key Study Sponsor Indicator:

Reference - Acute Toxicity To Aquatic Plants

Reference: ABC Laboratories, Inc. (1998) Static Renewal 96 Hour Acute Toxicity of the Water Accomodated Fraction (WAF) of Light Straight Run Naphtha, LSRN to a Freshwater Alga, Selenastrum capricornutum. Project ID. 43151. Environmental Toxicology, 7200 E. ABC Lane, Columbia, Missouri.

Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

EcoToxicity Other

Chronic Aquatic Vertebrate Toxicity

Test Substance - Chronic Aquatic Vertebrate Toxicity

Category Chemical:	(64741-63-5) Naphtha, petroleum, light catalytic reformed
Test Substance:	(64741-63-5) Naphtha, petroleum, light catalytic reformed
Test Substance Purity/Composition and Other Test Substance Comments:	Aromatic naphtha
Category Chemical Result Type:	Measured
Test Substance Result Type:	Measured

Method - Chronic Aquatic Vertebrate Toxicity

Year Study Performed:	1999
Method/Guideline Followed:	OECD 204
Other Method/Guideline:	
Deviations from Method/Guideline:	
Species/In Vitro System:	Pimephales promelas
GLP:	Yes
Analytical Monitoring:	Yes
Test Type:	Semi-Static
Test Vessel:	Closed
Test Concentrations:	Nominal
Nominal and Measured Concentrations:	0, 0.39, 1.0, 2.6, 6 3, 16, and 40mg/l
Exposure Period:	14 Days
Vehicle Used:	
Vehicle Name:	
Vehicle Amount and Units:	
Alkalinity:	
Dissolved Oxygen:	8.2 to 8.9 in the new solutions and 3.6 to 5.8 in the old solutions
pH Value:	7.2 Upper Range. 8 2
Test Temperature and Units:	Value/Lower Range: 24 Upper Range: 26 °C
Photo (Light/Dark):	16/8
Salinity:	
TOC:	

Water Hardness:

Method/Guideline Test Conditions Remarks:

LL50/LC50 and EL50/EC50 calculated using linear interpolation. NOEL/NOEC for survival determined by Steel's Many-One Rank Test NOEL/NOEC for growth determined by Williams Test. TOXSTAT program was used to determine endpoints.

Test solutions were prepared as water accommodated fractions (WAF). Control and dilution water was prepared by fortifying well water according to the formula for hard water (USEPA, 1975, EPA-660/3-75-009) and filtering through Amberlite
XAD-7 resin to remove potential organic contaminants. The water used in this study had a total hardness range of 160-170 mg/l as CaCO3, total alkalinity of 120 mg/l as CaCO3, pH range of 7.9 to 8.1, and a specific conductivity range of 480 to 500 mmhos/cm. Nominal loading rates of 0, 0.39, 1.0, 2.6, 6.3, 16, and 40mg/l were used to prepare test solutions. WAFS were prepared for each test concentration by mixing the appropriate volume of substance in 9.4l of fortified well water for 24 hr in 9.5l screw-capped glass jars. The volume of test substance added was based on the experimentally determined density of 0.742
g/ml. After stirring for 24 hrs with a vortex of no more than 25% of the solution depth, the contents of the WAF solution bottles were allowed to settle for 1 to 1.5 hrs prior to use. The WAF was removed from an outlet port located 2 cm from the bottom of the jar directly into each exposure vessel. A control solution was prepared similarly except without test substance addition. Test solutions were renewed daily with fresh WAFs in which 80% of the old solutions were siphoned and excess debris removed from the exposure vessel prior to refilling with fresh WAF Renewed solutions were then siphoned again and refilled a second time to achieve an exposure solution of ~96% fresh WAF.
Duplicate samples of freshly prepared WAFs and composited replicate old test solutions were collected each day and analyzed by Purge & trap/GC-FID for concentrations of the following: pentane, methylpentane, benzene, toluene, ethylbenzene, ortho, meta and para-xylene. Measured test concentrations of the light catalytically reformed naphtha were based on the concentrations of all analytes.Fish were hatched and raised from laboratory in-house culture. Fish
were 8 days old at the start of the test. Test vessels were 1l screw-capped glass jars containing 980 ml of WAF with minimal headspace Four replicates per treatment and 10 organisms per replicate were tested for each treatment and
the control Fish were fed 0.15 ml of live brine shrimp nauplii (<48 hr old) twice daily during the test. Water temperature was 24 to 26° C. Test photoperiod was 16 hrs light and 8 hrs dark. Dissolved oxygen concentrations were 8.2 to 8.9 in the new solutions and 3.6 to 5.8 in the old solutions. pH values were 7.2 to 8.2.

Limit Test:

Test Results - Chronic Aquatic Vertebrate Toxicity

NOEC Exposure Duration:

NOEC:

LOEC Exposure Duration:

LOEC:

NOELR Exposure Duration: 14 Days

NOELR: = 2.6 mg/L Nominal

LOELR:

LOELR Exposure Duration:

LC/EC Mean Value :

Exposure Duration	Exposure Units	LC/EC	%	Value Description	Mean Value or Lower Mean Value	Upper Mean Value	Units	Effect Observed	Basis for Concentration
14	Days	LL	50 %	=	5.2		mg/L	Other	

Results Remarks: The mean measured concentrations for nominal loading rates of 0 39, 1.0, 2.6, 6.3, 16, and 40 mg/l were 0.079, 0.15, 0.38, 0.80, 5.2, and 15 mg/l representing the average of total analytes measured in the new and old WAFs. The average total analyte concentration in the controls was 0.030 mg/l.
14-d LL50 for survival = 5.2 mg/l (95% C.I. 4.4 -7.0)
14-d LC50 for survival = 0.67 mg/l (95% C.I. 0.58 -0.93)
14-d NOEL for survival = 2.6 mg/l
14-d NOEC for survival =0.38 mg/l.

Mortality (no. of deaths/treatment) at 14 days: 1, 0, 0, 2, 28, 40, and 40 in the 0, 0.39, 1.0, 2.6, 6 3, 16, and 40 mg/l treatments.
14-d NOEL for growth = 2.6 mg/l
14-d NOEC for growth = 0.38 mg/l.
14-d EL50 and EC50 for growth could not be calculated because none of the treatment group means were <50% of control.

Since there were significant mortality at the three highest treatments, these treatments were excluded in the analysis.

Measured concentrations represented the sum of six specific hydrocarbon compounds measured in the WAF solutions. However, these compounds do not represent 100% of the hydrocarbons in the dissolved fraction. Therefore, test endpoints calculated from measured values would be expected to be lower than if all dissolved components were included in the measurements. Additionally, the stability of the dissolved componetns between renewals was not reported. Because of the uncertainty in what the measured values represented, test endpoints based on measured data should be viewed and interpreted with an understanding of this limitation

Reliability/Data Quality - Chronic Aquatic Vertebrate Toxicity

Reliability: 2 - Valid With Restrictions

Reliability Remarks: Measured concentrations may not represent 100% of components, remaining hydrocarbon components in WAFs may be equally toxic and should have been quantitated to determine total measured concentrations. Low dissolved oxygen could have contributed to fish mortality.

Key Study Sponsor Indicator:

Reference - Chronic Aquatic Vertebrate Toxicity

Reference: Springborn Laboratories, Inc.(1999) Light Catalytically Reformed Naphtha -Prolonged (14-Day) Toxicity Test with Fathead Minnow, Pimephales promelas,
Under Static-Renewal Conditions Following OECD Guideline 204. Project ID. No. 13687 0598.6107.124.

Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

Chronic Aquatic Vertebrate Toxicity

Test Substance - Chronic Aquatic Vertebrate Toxicity

Category Chemical:	(64741-66-8) Naphtha, petroleum, light alkylate
Test Substance:	(64741-66-8) Naphtha, petroleum, light alkylate
Test Substance Purity/Composition and Other Test Substance Comments:	Paraffinic naphtha
Category Chemical Result Type:	Measured
Test Substance Result Type:	Measured

Method - Chronic Aquatic Vertebrate Toxicity

Year Study Performed:	1999
Method/Guideline Followed:	
Other Method/Guideline:	
Deviations from Method/Guideline:	
Species/In Vitro System:	Pimephales promelas
GLP:	Yes
Analytical Monitoring:	Yes
Test Type:	Semi-Static
Test Vessel:	Closed
Test Concentrations:	Nominal
Nominal and Measured Concentrations:	0, 0 44, 1 0, 2.6, 6.4, 16, and 40 mg/L
Exposure Period:	14 Days
Vehicle Used:	
Vehicle Name:	
Vehicle Amount and Units:	
Alkalinity:	120mg/l as CaCO3
Dissolved Oxygen:	8.7 to 8.9 in the new solutions and 5.7 to 7.8 in the old solutions
pH Value:	7.3 Upper Range: 8.2
Test Temperature and Units:	Value/Lower Range: 24 Upper Range. 26 °C
Photo (Light/Dark):	16/8
Salinity:	
TOC:	

Water Hardness: 170 - 180 mg/L

Method/Guideline Test Conditions Remarks: LL50/LC50 and EL50/EC50 calculated using linear interpolation. NOEL/NOEC for survival determined by Steel's Many-One Rank Test. NOEL/NOEC for growth determined by Williams Test. TOXSTAT program was used to determine endpoints.

Test solutions were prepared as water accommodated fractions (WAF). Control and dilution water was prepared by fortifying well water according to the formula for hard water (USEPA, 1975, EPA-660/3-75-009) and filtering through Amberlite XAD-7 resin to remove potential organic contaminants. The water used in this study had a total hardness range of 170-180 mg/l as CaCO3, total alkalinity of 120mg/l as CaCO3, pH range of 8.0 to 8 2, and a specific conductivity of 490-500 mmhos/cm. Nominal loading rates of 0, 0 44, 1 0, 2 6, 6.4, 16, and 40mg/l were used to prepare test solutions. WAFS were prepared for each test concentration by mixing the appropriate volume of substance in 9.4l of fortified well water for 24 hr in 9.5l screw-capped glass jars. The volume of test substance added was based on the experimentally determined density of 0.69 g/ml. After stirring for 24 hrs with a vortex of no more than 25% of the solution depth, the contents of the WAF solution bottles were allowed to settle for 1 to 1.25 hrs prior to use. The WAF was removed from an outlet port located 2 cm from the bottom of the jar directly into each exposure vessel. A control solution was prepared similarly except without test substance addition. Test solutions were renewed daily with fresh WAFs in which 80% of the old solutions were siphoned and excess debris removed from the exposure vessel prior to refilling with fresh WAF. Renewed solutions were then siphoned again and refilled a second time to achieve an exposure solution of ~96% fresh WAF. Duplicate samples of freshly prepared WAFs and composited replicate old test solutions were collected each day and analyzed by Purge & trap/GC-FID for concentrations of the following: 2,3-dimethylbutane, 2,4-dimethylpentane, 2,2,4-trimethylpentane, 2,5-dimethylhexane, 2,3,3-trimethylpentane, and 2,3,4-trimethylpentane. Measured test concentrations of the light alkylate naphtha were based on the concentrations of all analytes. Fish were hatched and raised from laboratory in-house culture. Fish were 8 days old at the start of the test. Test vessels were 1 liter screw-capped glass jars containing 980 ml of WAF with minimal headspace. Four replicates per treatment and 10 organisms per replicate were tested for each treatment and the control. Fish were fed 0.15 ml of live brine shrimp nauplii (<48 hr old) twice daily during the test. Water temperature was 24 to 26° C. Test photoperiod was 16 hrs light and 8 hrs dark. Dissolved oxygen concentrations were 8.7 to 8.9 in the new solutions and 5.7 to 7.8 in the oldsolutions. pH values were 7.3 to 8.2.

Limit Test:

Test Results - Chronic Aquatic Vertebrate Toxicity

NOEC Exposure Duration:

NOEC:

LOEC Exposure Duration:

LOEC:

NOELR Exposure Duration: 14 Days

NOELR: = 2.6 mg/L Nominal

LOELR:

LOELR Exposure Duration:

LC/EC Mean Value :

Exposure Duration	Exposure Units	LC/EC	%	Value Description	Mean Value or Lower Mean Value	Upper Mean Value	Units	Effect Observed	Basis for Concentration
14	Days	LL	50 %	=	8		mg/L	Mortality	Nominal

Results Remarks: The mean measured concentrations for nominal loading rates of 0.44, 1.0, 2.6, 6.4, 16, and 40 mg/l were 0.011, 0.021, 0.041, 0.10, 0.38, and 0.62 mg/l representing the average of total analytes measured in the new and old WAFs The average total analyte concentration in the controls was 0.005 mg/l.

14-d LL50 for survival = 8.0 mg/l (95% C.I. 5.4 -9.8),
14-d LC50 for survival = 0.15 mg/l (95% C.I. 0.073 -0.20)
14-d NOEL for survival = 2.6 mg/l,
14-d NOEC for survival =0.041 mg/l.
Mortality (no. of deaths/treatment) at 14 days: 0, 0, 3, 2, 16, 40, and 40 in the 0, 0.44, 1.0, 2.6, 6.4, 16, and 40 mg/l treatments. All surviving fish in the 6.4 mg/l treatment were lethargic.
14-d NOEL for growth = 2.6 mg/l,
14-d NOEC for growth = 0.041 mg/l.
14-d EL50 and EC50 for growth could not be calculated because none of the treatment group means were <50% of control.

Since there were significant mortality at the three highest treatments, these treatments were excluded in the analysis of growth data. The mean (standard deviation) for dry weights were 4.08 (0.26), 4 28 (0.20), 4.69 (0.43), and 4.85 (0.38) in the 0, 0.44, 1.0, and 2.6 mg/l treatments. Dissolved oxygen concentrations in the aged exposure solutions at all loading rates were occasionally below 60% of saturation between day 10 and day 14 due to oxygen consumption by fish and bacteria in the closed test systems and could not be avoided. Light intensity was not measured during the study due to an oversight and had no impact on the results of the study.

Measured concentrations represented the sum of seven specific hydrocarbon compounds measured in the WAF solutions. However, these compounds do not represent 100% of the hydrocarbons in the dissolved fraction. Therefore, test endpoints calculated from measured values would be expected to be lower than if all dissolved components were included in the measurements. Additionally, the stability of the dissolved components between renewals was not reported. Because of the uncertainty in what the measured values represented, test endpoints based on measured data should be viewed and interpreted with an understanding of this limitation.

Reliability/Data Quality - Chronic Aquatic Vertebrate Toxicity

Reliability: 2 - Valid With Restrictions

Reliability Remarks: Measured concentrations may not represent 100% of components, remaining hydrocarbon components in WAFs may be equally toxic and should have been quantitated to determine total measured concentrations. Dissolved oxygen in the test solutions were occasionally below 60% of saturation.

Key Study Sponsor Indicator:

Reference - Chronic Aquatic Vertebrate Toxicity

Reference: Springborn Laboratories, Inc.(1999) Light Alkylate Naphtha -Prolonged (14-Day) Toxicity Test with Fathead Minnow, Pimephales promelas, Under Static-Renewal Conditions Following OECD Guideline 204. Project ID. No. 13687.0598.6108.124.

Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

Chronic Aquatic Vertebrate Toxicity

Test Substance - Chronic Aquatic Vertebrate Toxicity

Category Chemical: (64741-55-5) Naphtha, petroleum, light catalytic cracked

Test Substance: (64741-55-5) Naphtha, petroleum, light catalytic cracked

Test Substance Purity/Composition and Other Test Substance Comments: Olefenic naphtha

Category Chemical Result Type: Measured

Test Substance Result Type: Measured

Method - Chronic Aquatic Vertebrate Toxicity

Year Study Performed: 1999

Method/Guideline Followed:

Other Method/Guideline:

Deviations from Method/Guideline:

Species/In Vitro System: Pimephales promelas

GLP: Yes

Analytical Monitoring: Yes

Test Type: Semi-Static

Test Vessel: Closed

Test Concentrations: Nominal

Nominal and Measured Concentrations: 0, 0.38, 0.99, 2.6, 6.4, 16, and 40 mg/l

Exposure Period: 14 Days

Vehicle Used:

Vehicle Name:

Vehicle Amount and Units:

Alkalinity:

Dissolved Oxygen: 8.1 to 8.5 in the new solutions and 3.7 to 5.9 in the old solutions

pH Value: 7.2 Upper Range: 8.3

Test Temperature and Units: Value/Lower Range: 24 Upper Range: 26 °C

Photo (Light/Dark): 16/8

Salinity:

TOC:

Water Hardness:

Method/Guideline Test Conditions Remarks:

Test solutions were prepared as water accommodated fractions (WAF). Control and dilution water was prepared by fortifying well water according to the formula for hard water (USEPA, 1975, EPA-660/3-75-009) and filtering through Amberlite XAD-7 resin to remove potential organic contaminants. The water used in this study had a total hardness range of 170-180 mg/l as CaCO3, total alkalinity of 120-130 mg/l as CaCO3, pH range of 8.0 to 8.2, and a specific conductivity of 500 mmhos/cm. Nominal loading rates of 0, 0.38, 0 99, 2.6, 6 4, 16, and 40mg/l were used to prepare test solutions. WAFS were prepared for each test concentration by mixing the appropriate volume of substance in 9 41 of fortified well water for 24 hr in 9.51 screw-capped glass jars. The volume of test substance added was based on the experimentally determined density of 0.718 g/ml. After stirring for 24 hrs with a vortex of no more than 25% of the solution depth, the contents of the WAF solution bottles were allowed to settle for 0.75 to 1.25 hrs prior to use. The WAF was removed from an outlet port located 2 cm from the bottom of the jar directly into each exposure vessel. A control solution was prepared similarly except without test substance addition. Test solutions were renewed daily with fresh WAFs in which 80% of the old solutions were siphoned and excess debris removed from the exposure vessel prior to refilling with fresh WAF. Renewed solutions were then siphoned again and refilled a second time to achieve an exposure solution of ~96% fresh WAF. Duplicate samples of freshly prepared WAFs and composited replicate old test solutions were collected each day and analyzed by Purge & trap/GC-FID for concentrations of the following: benzene, toluene, ethylbenzene, ortho, meta and para-xylene. Measured test concentrations of the light catalytically cracked naphtha were based on the concentrations of all analytes. Fish were hatched and raised from laboratory in-house culture. Fish were 10 days old at the start of the test. Test vessels were 1l screw-capped glass jars containing 980 ml of WAF with minimal headspace Four replicates per treatment and 10 organisms per replicate were tested for each treatment and the control. Fish were fed 0.15 ml of live brine shrimp nauplii (<48 hr old) twice daily during the test. Water temperature was 24 to 26° C. Test photoperiod was 16 hrs light and 8 hrs dark Dissolved oxygen concentrations were 8.1 to 8.5 in the new solutions and 3.7 to 5.9 in the old solutions pH values were 7.2 to 8.3.

Limit Test:

Test Results - Chronic Aquatic Vertebrate Toxicity

NOEC Exposure Duration:

NOEC:

LOEC Exposure Duration:

LOEC:

NOELR Exposure Duration: 14 Days

NOELR: = 6.4 mg/L Nominal

LOELR:

LOELR Exposure Duration:

LC/EC Mean Value :

Exposure Duration	Exposure Units	LC/EC	%	Value Description	Mean Value or Lower Mean Value	Upper Mean Value	Units	Effect Observed	Basis for Concentration
14	Days	LL	50 %	=	23		mg/L	Mortality	Nominal

Results Remarks:

The mean measured concentrations for nominal loading rates of 0.38, 0.99, 2.6, 6.4, 16, and 40 mg/l were 0.009, 0.024, 0 12, 0.28, 0.64, and 3.4 mg/l representing the average of total analytes measured in the new and old WAFs. The average total analyte concentration in the

controls was 0.004 mg/l.
14-d LL50 for survival = 23 mg/l (95% C I. 19 -26)
14-d LC50 for survival = 1.5 mg/l (95% C.I 1 1 -1.8)
14-d NOEL for survival = 6 4 mg/l
14-d NOEC for survival =0.28 mg/l.
Mortality (no. of deaths/treatment) at 14 days: 0, 1, 0, 0, 3, 11, and 40 in the 0, 0 38, 0.99, 2.6, 6 4, 16, and 40 mg/l treatments

14-d NOEL for growth = 6.4 mg/l
14-d NOEC for growth = 0.28 mg/l
14-d EL50 and EC50 for growth could not be calculated because none of the treatment group means were <50% of control. Since there were significant mortality at the two highest treatments, these treatments were excluded in the analysis of growth data. The mean (standard deviation) for dry weights were 2.49 (0.08), 2 58 (0.21), 2.76 (0.07), 2.67 (0.19), and 2.79 (0 42) in the 0, 0 38, 0.99, 2.6, and 6.4 mg/l treatments. Light intensity was not measured during the study due to an oversight and had no impact on the results of the study.

Measured concentrations represented the sum of four specific hydrocarbon compounds measured in the WAF solutions However, these compounds do not represent 100% of the hydrocarbons in the dissolved fraction. Therefore, test endpoints calculated from measured values would be expected to be lower than if all dissolved components were included in the measurements Additionally, the stability of the dissolved components between renewals was not reported. Because of the uncertainty in what the measured values represented, test endpoints based on the measured data should be viewed and interpreted with an understanding of this limitation

Reliability/Data Quality - Chronic Aquatic Vertebrate Toxicity

Reliability: 2 - Valid With Restrictions

Reliability Remarks: Measured concentrations may not represent 100% of components, remaining hydrocarbon components in WAFs may be equally toxic and should have been quantitated to determine total measured concentrations.

Key Study Sponsor Indicator:

Reference - Chronic Aquatic Vertebrate Toxicity

Reference: Springborn Laboratories, Inc (1999) Light Catalytically Cracked Naphtha -Prolonged (14-Day) Toxicity Test with Fathead Minnow, Pimephales promelas, Under Static-Renewal Conditions Following OECD Guideline 204. Project ID. No. 13687.0598 6106.124.

Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

Chronic Aquatic Invertebrate Toxicity

Test Substance - Chronic Aquatic Invertebrate Toxicity

Category Chemical:	(64741-55-5) Naphtha, petroleum, light catalytic cracked
Test Substance:	(64741-55-5) Naphtha, petroleum, light catalytic cracked
Test Substance Purity/Composition and Other Test Substance Comments:	Olefinic naphtha
Category Chemical Result Type:	Measured
Test Substance Result Type:	Measured

Method - Chronic Aquatic Invertebrate Toxicity

Year Study Performed:	1999
Method/Guideline Followed:	
Other Method/Guideline:	
Deviations from Method/Guideline:	
Species/In Vitro System:	Daphnia magna
GLP:	Yes
Analytical Monitoring:	Yes
Test Type:	Semi-Static
Test Vessel:	Closed
Water Media Type:	Freshwater
Test Concentrations:	Nominal
Nominal and Measured Concentrations:	0, 0 38, 0.99, 2.6, 6.4, 16, and 40 mg/l
Exposure Period:	21 Days
Vehicle Used:	
Vehicle Name:	
Vehicle Amount and Units:	
Alkalinity:	
Dissolved Oxygen:	8.7 to 8.8 in the new solutions and 8 4 to 9.1 in the old solutions.
pH Value:	7.2 Upper Range: 8.2
Test Temperature and Units:	Value/Lower Range: 19 Upper Range: 21 °C
Photo (Light/Dark):	16/8
Salinity:	

TOC:

Water Hardness:

Method/Guideline Test Conditions Remarks:

For NOEL/NOEC, Fisher's Exact Test was used for survival of adult daphnids and Kruskal-Wallis Test with Dunn's Multiple Comparison was used for reproduction. For EL50/EC50, survival data were analyzed using the Spearman-Karber method and reproduction data were analyzed by linear interpolation. TOXSTAT program was used to determine the endpoints.

Test solutions were prepared as water accommodated fractions (WAF). Control and dilution water was prepared by fortifying well water according to the formula for hard water (USEPA, 1975, EPA-660/3-75-009) and filtering through Amberlite XAD-7 resin to remove potential organic contaminants. The water used in this study had a total hardness range of 170-180 mg/l as CaCO3, total alkalinity of 120-130 mg/l as CaCO3, pH range of 8.0 to 8.2, and a specific conductivity of 500 mmhos/cm. Nominal loading rates of 0, 0.38, 0.99, 2.6, 6.4, 16, and 40mg/l were used to prepare test solutions. WAFS were prepared for each test concentration by mixing the appropriate volume of substance in 9.4l of fortified well water for 24 hr in 9.5l screw-capped glass jars. The volume of test substance added was based on the experimentally determined density of 0 718 g/ml After stirring for 24 hrs with a vortex of no more than 25% of the solution depth, the contents of the WAF solution bottles were allowed to settle for 45 min to 1.25 hrs prior to use. The WAF was removed from an outlet port located 2 cm from the bottom of the jar directly into each exposure vessel. A control solution was prepared similarly except without test substance addition. Test solutions were renewed daily with 70 ml of fresh WAFs added to a second set of beakers Food was added to the fresh WAFs and daphnids were then transfrerred from the old test solutions to the fresh WAFs. Duplicate samples of freshly prepared WAFs and composited replicate old test solutions were collected each day and analyzed by Purge & trap/GC-FID for concentrations of the following. benzene, toluene, ethylbenzene, ortho, meta and para-xylene. Measured test concentrations of the light catalytically cracked naphtha were based on the concentrations of all analytes. Daphnids used in the test were from laboratory in-house culture. Daphnids were =24 hrs old at the start of the test. Test vessels were 70 ml screw-capped glass jars containing 70 ml of WAF with minimal headspace. Ten replicates per treatment and 1 daphnid per replicate were tested for each treatment and the control Daphnids were fed 0 2 ml of algal suspension (Ankistrodesmus falcatus, 4 x 107 cells/ml) and 0.05 ml of a yeast, cereal leaves and digested flaked fish food (YCT) suspension daily during the test. Water temperature was 19 to 21° C. Test photoperiod was 16 hrs light and 8 hrs dark. Dissolved oxygen concentrations were 8.7 to 8.8 in the new solutions and 8.4 to 9.1 in the old solutions pH values were 7.2 to 8.2.

Limit Test:

Test Results - Chronic Aquatic Invertebrate Toxicity

NOEC Exposure Duration:

NOEC:

LOEC Exposure Duration:

LOEC:

NOELR Exposure Duration: 21 Days

NOELR: 2 6 mg/L

LOELR Exposure Duration:

LOELR:

LC/EC Mean Value :

Exposure Duration	Exposure Units	LC/EC	%	Value Description	Mean Value or Lower Mean Value	Upper Mean Value	Units	Effect Observed	Basis for Concentration
21	Days	EL	50 %	=	27		mg/L	Mortality	Nominal
21	Days	EL	50 %	=	13		mg/L	Reproduction	Nominal

Results Remarks: The mean measured concentrations for nominal loading rates of 0.38, 0.99, 2.6, 6.4, 16, and 40 mg/l were 0.007, 0.022, 0.11, 0.27, 0.68, and 3.1 mg/l representing the average of total analytes measured in the new and old WAFs The average total analyte concentration in the controls was 0.004 mg/l.
21-d EL50 for survival = 27 mg/l (95% C.I. 26 -29)
21-d EC50 for survival = 1.9 mg/l (95% C I. 1 8 -2 0)
21-d NOEL for survival = 16 mg/l
21-d NOEC for survival = 0.68 mg/l
Daphnid immobilization at 21 days: 0, 1, 0, 0, 0, 0, and 10 in the 0, 0.38, 0.99, 2.6, 6.4, 16, and 40 mg/l treatments.

21-d EL50 for reproduction = 13 mg/l (95% C.I. 12-15)
21-d EC50 for reproduction = 0.55 mg/l (95% C.I. 0.49-0.64)
21-d NOEL for reproduction = 2.6 mg/l
21-d NOEC for reproduction = 0.11 mg/l
Since there was significant immobilization in the highest treatment, it was excluded in the analysis of reproduction data. The mean numbers (standard deviation) of offspring released per female daphnid were 150 (9), 139 (12), 141 (7), 139 (10), 123 (10), and 55 (28) in the 0, 0.38, 0.99, 2.6, 6.4, and 16 mg/l treatments. The numbers of offspring released in the 6.4 and 16 mg/l treatments were significantly less than the controls. First brood release for organisms exposed to =6.4 mg/l and the controls occurred by day 8 First brood release for organisms exposed to 16 mg/l occurred on day 10. From day 17 to day 21, immobilized offspring were released in the 16 mg/l treatment.

Measured concentrations represented the sum of four specific hydrocarbon compounds measured in the WAF solutions. However, these compounds do not represent 100% of the hydrocarbons in the dissolved fraction. Therefore, test endpoints calculated from measured values would be expected to be lower than if all dissolved components were included in the measurements. Additionally, the stability of the dissolved components between renewals was not reported Because of the uncertainty in what the measured values represented, test endpoints based on measured data should be viewed and interpreted with an understanding of this limitation.

Reliability/Data Quality - Chronic Aquatic Invertebrate Toxicity

Reliability: 2 - Valid With Restrictions

Reliability Remarks: Measured concentrations may not represent 100% of components, remaining hydrocarbon components in WAFs may be equally toxic and should have been quantitated to determine total measured concentrations.

Key Study Sponsor Indicator:

Reference - Chronic Aquatic Invertebrate Toxicity

Reference: Springborn Laboratories, Inc.(1999) Light Catalytically Cracked Naphtha -Full Life Cycle Toxicity Test with Water Fleas, Daphnia magna, Under Static-Renewal Conditions Following OECD Guideline 211. Project ID. No. 13687.0598.6103.130.

Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS. 10/28/2003

Chronic Aquatic Invertebrate Toxicity

Test Substance - Chronic Aquatic Invertebrate Toxicity

Category Chemical:	(64741-66-8) Naphtha, petroleum, light alkylate
Test Substance:	(64741-66-8) Naphtha, petroleum, light alkylate
Test Substance Purity/Composition and Other Test Substance Comments:	Paraffinic naphtha
Category Chemical Result Type:	Measured
Test Substance Result Type:	Measured

Method - Chronic Aquatic Invertebrate Toxicity

Year Study Performed:	1999
Method/Guideline Followed:	OECD 211
Other Method/Guideline:	
Deviations from Method/Guideline:	
Species/In Vitro System:	Daphnia magna
GLP:	Yes
Analytical Monitoring:	Yes
Test Type:	Semi-Static
Test Vessel:	Closed
Water Media Type:	Freshwater
Test Concentrations:	Nominal
Nominal and Measured Concentrations:	0, 0.44, 1.0, 2.6, 6.4, 16, and 40 mg/L
Exposure Period:	21 Days
Vehicle Used:	
Vehicle Name:	
Vehicle Amount and Units:	
Alkalinity:	
Dissolved Oxygen:	9.1 to 9.2 in the new solutions and 8.7 to 9.4 in the old
pH Value:	7.5 Upper Range: 8.5
Test Temperature and Units:	Value/Lower Range: 19 Upper Range: 21 °C
Photo (Light/Dark):	16/8
Salinity:	

TOC:

Water Hardness:

Method/Guideline Test Conditions Remarks:

For NOEL/NOEC, Fisher's Exact Test was used for survival of adult daphnids and Kruskal-Wallis Test with Dunn's Multiple Comparison was used for reproduction. For EL50/EC50, reproduction data were analyzed by linear interpolation Survival data were not analyzed because survival was >50% at all loading rates TOXSTAT program was used to determine the endpoints.

Test solutions were prepared as water accommodated fractions (WAF). Control and dilution water was prepared by fortifying well water according to the formula for hard water (USEPA, 1975, EPA-660/3-75-009) and filtering through Amberlite XAD-7 resin to remove potential organic contaminants. The water used in this study had a total hardness range of 170-180 mg/l as CaCO3, total alkalinity of 120-130 mg/l as CaCO3, pH range of 8 0 to 8 2, and a specific conductivity range of 500-550 mmhos/cm Nominal loading rates of 0, 0.44, 1.0, 2 6, 6.4, 16, and 40 mg/l were used to prepare test solutions.WAFS were prepared for each test concentration by mixing the appropriate volume of substance in 9.4l of fortified well water for 24 hr in 9 5l screw-capped glass jars. The volume of test substance added was based on the experimentally determined density of 0.69 g/ml. After stirring for 24 hrs with a vortex of no more than 25% of the solution depth, the contents of the WAF solution bottles were allowed to settle for 1 to 1.5 hrs prior to use. The WAF was removed from an outlet port located 2 cm from the bottom of the jar directly into each exposure vessel. A control solution was prepared similarly except without test substance addition. Test solutions were renewed daily with 70 ml of fresh WAFs added to a second set of beakers. Food was added to the fresh WAFs and daphnids were then transferred from the old test solutions to the fresh WAFs Duplicate samples of freshly prepared WAFs and composited replicate old test solutions were collected each day and analyzed by Purge & trap/GC-FID for concentrations of the following: 2,3-dimethylbutane, 2,4-dimethylpentane, 2,2,4-trimethylpentane, 2,5-dimethylhexane, 2,3,3-trimethylpentane, and 2,3,4-trimethylpentane Measured test concentrations of the light alkylate naphtha were based on the concentrations of all analytes. Daphnids used in the test were from laboratory in-house culture. Daphnids were =24 hrs old at the start of the test. Test vessels were 70 ml screw-capped glass jars containing 70 ml of WAF with minimal headspace. Ten replicates per treatment and 1 daphnid per replicate were tested for each treatment and the control Daphnids were fed 0.2 ml of algal suspension (Ankistrodesmus falcatus, 4 x 107 cells/ml) and 0 05 ml of a yeast, cereal leaves and digested flaked fishfood (YCT) suspension daily during the test Water temperature was 19 to 21° C. Test photoperiod was 16 hrs light and 8 hrs dark. Dissolved oxygen concentrations were 9.1 to 9.2 in the new solutions and 8.7 to 9.4 in the old solutions. pH values were 7.5 to 8.5.

Limit Test:

Test Results - Chronic Aquatic Invertebrate Toxicity

NOEC Exposure Duration:

NOEC:

LOEC Exposure Duration:

LOEC:

NOELR Exposure Duration: 21 Days

NOELR: = 2.6 mg/L Nominal

LOELR Exposure Duration:

LOELR:

LC/EC Mean Value :

Exposure Duration	Exposure Units	LC/EC	%	Value Description	Mean Value or Lower Mean Value	Upper Mean Value	Units	Effect Observed	Basis for Concentration
21	Days	EL	50 %	>=	40		mg/L	Mortality	Nominal
21	Days	EL	50 %	=	10		mg/L	Reproduction	Nominal

Results Remarks: The mean measured concentrations for nominal loading rates of 0.44, 1.0, 2.6, 6.4, 16, and 40 mg/l were 0 010, 0 016, 0.032, 0.084, 0.23, and 0 46 mg/l representing the average of total analytes measured in the new and old WAFs. The average total analyte concentration in the controls was 0.005 mg/l

21-d EL50 for survival = >40 mg/l
21-d EC50 for survival = >0.46 mg/l
21-d NOEL for survival = 16 mg/l
21-d NOEC for survival = 0.23 mg/l.

Daphnid immobilization at 21 days: 0, 2, 0, 0, 0, 1, and 4 in the 0, 0.44, 1.0, 2.6, 6.4, 16, and 40 mg/l treatments.

21-d EL50 for reproduction = 10 mg/l (95% C.I. 8.7-11)
21-d EC50 for reproduction = 0.14 mg/l (95% C.I. 0.12-0.16)
21-d NOEL for reproduction = 2.6 mg/l
21-d NOEC for reproduction = 0.032 mg/l.

Since there was significant immobilization in the highest treatment, it was excluded in the analysis of reproduction data. The mean numbers (standard deviation) of offspring released per female daphnid were 137 (11), 125 (7), 125 (6), 117 (20), 96 (21), and 28 (10) in the 0, 0.44, 1 0, 2 6, 6.4, and 16 mg/l treatments. The numbers of offspring released in the 6.4 and 16 mg/l treatments were significantly less than the controls. First brood release for organisms exposed to =16 mg/l and the controls occurred by day 8.

Measured concentrations represented the sum of seven specific hydrocarbon compounds measured in the WAF solutions However, these compounds do not represent 100% of the hydrocarbons in the dissolved fraction. Therefore, test endpoints calculated from measured values would be expected to be lower than if all dissolved components were included in the measurements. Additionally, the stability of the dissolved components between renewals was not reported. Because of the uncertainty in what the measured values represented, test endpoints based on measured data should be viewed and interpreted with an understanding of this limitation.

Reliability/Data Quality - Chronic Aquatic Invertebrate Toxicity

Reliability: 2 - Valid With Restrictions

Reliability Remarks: Measured concentrations may not represent 100% of components, remaining hydrocarbon components in WAFs may be equally toxic and should have been quantitated to determine total measured concentrations

Key Study Sponsor Indicator:

Reference - Chronic Aquatic Invertebrate Toxicity

Reference: Springborn Laboratories, Inc , (1999) Light Alkylate Naphtha -Full Life Cycle Toxicity Test with Water Fleas, Daphnia magna, Under Static-Renewal Conditions
Following OECD Guideline 211. Project ID. No. 13687.0598 6105.130.

Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

Chronic Aquatic Invertebrate Toxicity

Test Substance - Chronic Aquatic Invertebrate Toxicity

Category Chemical:	(64741-63-5) Naphtha, petroleum, light catalytic reformed
Test Substance:	(64741-63-5) Naphtha, petroleum, light catalytic reformed
Test Substance Purity/Composition and Other Test Substance Comments:	aromatic naphtha C4-C8 paraffins = 57.3% C4-C8 olefins = 0.9% C4-C8 naphthenes = 2.3% C4-C8 aromatics = 39 4%
Category Chemical Result Type:	Measured
Test Substance Result Type:	Measured

Method - Chronic Aquatic Invertebrate Toxicity

Year Study Performed:	1999
Method/Guideline Followed:	OECD 211
Other Method/Guideline:	
Deviations from Method/Guideline:	
Species/In Vitro System:	Daphnia magna
GLP:	Yes
Analytical Monitoring:	Yes
Test Type:	Semi-Static
Test Vessel:	Closed
Water Media Type:	Freshwater
Test Concentrations:	Nominal
Nominal and Measured Concentrations:	0, 0.39, 1 0, 2 6, 6.3, 16, and 40 mg/l
Exposure Period:	21 Days
Vehicle Used:	No
Vehicle Name:	
Vehicle Amount and Units:	
Alkalinity:	120 mg/l
Dissolved Oxygen:	8.6 - 9 1 mg/l in new solutions; 8.4 - 10 mg/l in old solutions
pH Value:	Value/Lower Range: = 7.1 Upper Range: 8.4
Test Temperature and Units:	
Photo (Light/Dark):	16/8
Salinity:	

TOC:

Water Hardness: 160 - 170 mg/L

Method/Guideline Test Conditions Remarks: Test solutions were prepared as water accommodated fractions (WAF). Control and dilution water was prepared by fortifying well water according to the formula for hard water (USEPA, 1975, EPA-660/3-75-009) and filtering through Amberlite XAD-7 resin to remove potential organic contaminants.

WAFS were prepared for each test concentration by mixing the appropriate volume of substance in 9.4l of fortified well water for 24 hr in 9.5l screw-capped glass jars. The volume of test substance added was based on the experimentally determined density of 0.742 g/ml. After stirring for 24 hrs with a vortex of no more than 25% of the solution depth, the contents of the WAF solution bottles were allowed to settle for 1 to 1.5 hrs prior to use The WAF was removed from an outlet port located 2 cm from the bottom of the jar directly into each exposure vessel. A control solution was prepared similarly
except without test substance addition

Daphnids used in the test were from laboratory in-house culture. Daphnids were 24 hrs old at the start of the test. Test vessels were 70 ml screw-capped glass jars containing 70 ml of WAF with minimal headspace. Ten replicates per treatment and 1 daphnid per replicate were tested for each treatment and the control. Test solutions were renewed daily with 70 ml of fresh WAFs added to a second set of beakers Food was added to the fresh WAFs and daphnids were then transfrerred from the old test solutions to the fresh WAFs. Daphnids were fed 0 2 ml of algal suspension (Ankistrodesmus falcatus, 4 x 107 cells/ml) and 0.05 ml of a yeast, cereal leaves and digested flaked fish food (YCT) suspension daily during the test.

Duplicate samples of freshly prepared WAFs and composited replicate old test solutions were collected each day and analyzed by Purge & trap/GC-FID for concentrations of the following. pentane, methylpentane, benzene, toluene,
ethylbenzene, ortho, meta and para-xylene. Measured test concentrations of the light catalytically reformed naphtha were based on the concentrations of all analytes.

Limit Test: No

Test Results - Chronic Aquatic Invertebrate Toxicity

NOEC Exposure Duration:

NOEC:

LOEC Exposure Duration:

LOEC:

NOELR Exposure Duration: 21 Days

NOELR: < 0.39 mg/L Nominal

LOELR Exposure Duration:

LOELR:

LC/EC Mean Value :

Exposure Duration	Exposure Units	LC/EC	%	Value Description	Mean Value or Lower Mean Value	Upper Mean Value	Units	Effect Observed	Basis for Concentration
21	Days	EL	50 %	=	26		mg/L	Mortality	Nominal
21	Days	EL	50 %	=	14		mg/L	Reproduction	Nominal

Results Remarks: The mean measured concentrations for nominal loading rates of 0 39, 1.0, 2.6, 6 3, 16, and 40 mg/l were 0.069, 0 15, 0.36, 0 80, 3 8, and 13 mg/l representing the average of total analytes measured in the new and old WAFs. The average total analyte concentration in the controls was 0.026 mg/l.

21-d EL50 for survival = 26 mg/l (95% C.I. 22 - 29),
21-d EC50 for survival = 7.5 mg/l (95% C.I 6.3 - 8.7)
21-d NOEL for survival = 16 mg/l,
21-d NOEC for survival = 3 8 mg/l.

Daphnid immobilization at 21 days: 0, 1, 0, 0, 1, 1, and 10 in the 0, 0.39, 1.0, 2.6, 6.3, 16, and 40 mg/l treatments.

21-d EL50 for reproduction = 14

mg/l (95% C I. 12-16),
21-d EC50 for reproduction = 3.2 mg/l (95% C.I. 2.3-3 7)
21-d NOEL for reproduction = <0.39 mg/l, 21-d NOEC for
reproduction = <0.069 mg/l.

Since there was significant immobilization in the highest treatment, it was excluded in the analysis of reproduction data. The mean numbers (standard deviation) of offspring released per female daphnid were 122 (14), 94 (32), 87 (21), 113 (30), 92 (17), and 53 (26) in the 0, 0.39, 1.0, 2.6, 6 3, and 16 mg/l treatments. The numbers of offspring released at all loading rates were significantly less than the controls. First brood release for organisms exposed to ¡Ü6.3 mg/l and the controls generally occurred by day 8. Some or all
offspring from 4 broods (1 brood at 0.39 mg/l, 2 broods at 1 0 mg/l, 1 brood at 2 6 mg/l) were immobile at the observation time

Measured concentrations represented the sum of eight C4 - C8 specific hydrocarbon compounds measured in the WAF solutions However, these components do not represent 100% of the hydrocarbons in the dissolved fraction. Therefore, test endpoints calculated from measured values would be expected to be lower than if all dissolved components were included in the measurements Additionally, the stability of the dissolved components between renewals was not reported Because of the uncertainty in what the measured values represented, test endpoints based on measured data should be viewed and interpreted with an understanding of this limitation.

Reliability/Data Quality - Chronic Aquatic Invertebrate Toxicity

Reliability: 2 - Valid With Restrictions

Reliability Remarks: Measured concentrations may not represent 100% of components, remaining hydrocarbon components in WAFs may be equally toxic and should have been quantitiated to determine total measured concentrations.

Key Study Sponsor Indicator:

Reference - Chronic Aquatic Invertebrate Toxicity

Reference: Springborn Laboratories, Inc. (1999) Light Catalytically Reformed Naphtha - Full Life Cycle Toxicity Test with Water Fleas, Daphnia magna, Under Static-Renewal Conditions Following OECD Guideline 211. Project ID. No. 3687.0598.6104.130

Other

Category Chemical: *No CAS Number Providec*

Test Substance: *No CAS Number Providec*

Test Substance Purity/Composition and Other Test Substance Comments:

Other End Point Name: Ecotoxicity

Other End Point Description:

Reference: CONCAWE (1996) Acute aquatic toxicity of gasolines: report on CONCAWE test programme. CONCAWE Report No. 96/57.

Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

Description: Experimental studies with fish, invertebrates and algae tested in closed systems with minimal head-space were performed on WAFS of low boiling point naphthas prepared at maximum loadings of 50 mg/l or less. Results show that acute aquatic toxicity lethal loading (LL), effective loading (EL) or inhibition of growth rate values (IrL) affecting 50% of the organism population are greater than 1 mg/l and mostly in the range 1-100 mg/l. Summarized CONCAWE test data indicating the extent of aquatic toxicity are as follows, and 95% confidence intervals are included in parentheses:

Results: PARAFFINIC NAPHTHA CAS 64741-70-4, CONCAWE sample W94/810
Fish (Oncorhynchus mykiss) LL50, 96h 10 mg/l (5-23)
Invertebrate (Daphnia magna) EL50, 48h 10 mg/l (8.5-13)
Algae (Selenastum capricornutum) IrL50, 72h >50 mg/l (not calculable)

OLEFINIC NAPHTHA CAS . 64741-54-4, CONCAWEe sample W94/811
Fish (Oncorhynchus mykiss) LL50, 96h 15 mg/l (10-23)
Invertebrate (Daphnia magna) EL50, 48h 13 mg/l (12-15)
Algae (Selenastum capricornutum) IrL50, 72h 3.1 mg/l (3.6-14)

NAPHTHENIC NAPHTHA, CAS 64741-46-4, CONCAWE sample W94/809
Fish (Oncorhynchus mykiss) LL50, 96h 18 mg/l (15-20)
Invertebrate (Daphnia magna) EL50, 48h 4 5 mg/l (not calculable)
Algae (Selenastum capricornutum) IrL50, 72h 4.1 mg/l (not calculable)

AROMATIC NAPHTHA, CAS 64741-63-5, CONCAWE sample W94/812
Fish (Oncorhynchus mykiss) LL50, 96h 12 mg/l (9-16)
Invertebrate (Daphnia magna) EL50, 48h 8.4 mg/l (6 7-11)
Algae (Selenastum capricornutum) IrL50, 72h 6.4 mg/l (1-280)

Mammalian Health Effects
SIDS

High Production Volume Information System (HPVIS)

Acute Toxicity
Gasoline Category

Test Substance

Category Chemical (CAS #):	(68955-35-1) Naphtha, petroleum, catalytic reformed Type in CAS # if not listed:
Test Substance (CAS #):	(68955-35-1) Naphtha, petroleum, catalytic reformed Type in CAS # if not listed:
Test Substance Purity/Composition and Other Test Substance Comments :	Gasoline Blending Streams Category CAS # 68955-35-1 Catalytically Reformed Naphtha API Test Material: API# 83-05 Compositional information can be found on this substance in the Analytical Data attachment for the Gasoline Blending Streams Category
Category Chemical Result Type :	Measured Measured
Unable to Measure or Estimate Justification :	

METHOD

Route of Administration:	Oral
Other Route of Administration:	
Type of Exposure:	Gavage
Species:	Rat
Other Species:	
Mammalian Strain:	Sprague-Dawley
Other Strain:	

Gender:	Both M/F
Number of Animals per Dose:	5
Concentration:	100%
Dose:	Male: 5, 6, 6.5, 7 & 9.8; Females 3.57, 4.29, 5, 7 & 9.8 g/kg
Year Study Performed :	1985
Method/Guideline Followed:	Unknown
GLP:	Yes
Method/Guideline and Test Condition Remarks:	The test material was administered undiluted, as a single oral dose to groups of 5 male 5 female rats at dose levels ranging from 3.57 to 9.8 g/kg. The dose volume varied per dosage level based on an average bulk density of 0.8 g/ml. Food had been withheld from the rats overnight prior to dosing, but they had free access to water. Following dosing, food and water were available ad-lib for a period of 14 days. The animals were observed for clinical signs of toxicity and mortality every hour for the first 6 hours after dosing and twice daily thereafter for 14 days. The rats were weighed the day before dosing and then at 7 and 14 days after dosing. All animals, whether dying during the study or surviving to termination were subjected to a gross necropsy and any abnormalities were recorded.

TEST RESULTS

Concentration (LC/LD)

LC/LD	%:	Value Description:	Value or Lower Concentration:	Upper Concentration:	Units:
LD	50	=	6,620 (males)		mg/kg-bw
LD	50	=	5,390 (females)		mg/kg-bw

Number of Deaths (Male):	
Number of Deaths (Female):	11/25
Number of Deaths (Total):	23/25
Results Remarks:	Clinical signs seen during the study included: hypoactivity, diarrhea, brown-stained anal area, ataxia, prostration, red stained nose and mouth, lacrimation, dyspnea, yellow-stained abdomen, hair loss on abdomen, decreased limb tone, piloerection, hair loss on front legs, excess salivation, yellow- or reddish-brown-stained urogenital region, tremors and death.

	All mortality occurred within the first three days after dosing. All surviving animal had returned to normal by day 11 except for those with hair loss. At necropsy, there were few findings in the animals that survived to termination. Mortalities and body weights were as follows: Dose level (g/kg) / Body weights (g) Initial (fasted) / Terminal / Mortality / No with lesions at necropsy Male 5 — 285 — 336 — 0/5 — 0/5 6 — 315 — 370 — 1/5 — 1/5 6.5 — 324 — 386 — 1/5 — 1/5 7 — 306 — - — 5/5 — 4/5 9.8 — 310 — - — 5/5 — 5/5 Female 3.57 — 212 — 227 — 0/5 — 1/5 4.29 — 199 — 233 — 0/5 — 0/5 5 — 202 — 235 — 3/5 — 3/5 7 — 210 — 213 — 3/5 — 2/5 9.8 — 208 — - — 5/5 — 5/5 Typically at non-lethal dose levels the lesions frequently observed included: presence of dark colored material in the stomach, glandular mucosa of stomach with dark red to black area. Additionally at the highest dose levels the urinary bladder contained a red fluid in 4 of the five males examined. The estimated LD 50 values and 95% confidence limits were: Males: 6.62 g/kg (6.2 - 7.08) Females: 5.39 g/kg (3.23 - 6.8)
Conclusion:	The estimated LD 50 values and 95% confidence limits were: Males: 6.62 g/kg (6.2 - 7.08) Females: 5.39 g/kg (3.23 - 6.86)
RELIABILITY/DATA QUALITY	
Reliability:	1 - Valid Without Restrictions
Reliability Remarks:	
Key Study Sponsor Indicator:	Not Key
REFERENCE	
Reference:	American Petroleum Institute (1985) Acute oral toxicity study in rats, acute dermal toxicity study in rabbits, primary dermal irritation study in rabbits, primary eye irritation study in rabbits of API 83-05 full range catalytically

reformed naphtha.
Study conducted by Hazleton Laboratories America, Inc.
API Med research publication N0.32-31474, April 1985

High Production Volume Information System (HPVIS)

Acute Toxicity
Gasoline Category

Test Substance	
Category Chemical (CAS #):	(68955-35-1) Naphtha, petroleum, catalytic reformed **Type in CAS # if not listed:**
Test Substance (CAS #):	(68955-35-1) Naphtha, petroleum, catalytic reformed **Type in CAS # if not listed:**
Test Substance Purity/Composition and Other Test Substance Comments :	Gasoline Blending Streams Category CAS # 68955-35-1 Catalytically Reformed Naphtha API Test Material: API# 83-05 Compositional information can be found on this substance in the Analytical Data attachment for the Gasoline Blending Streams Category
Category Chemical Result Type :	Measured
Unable to Measure or Estimate Justification :	
METHOD	
Route of Administration:	Dermal
Other Route of Administration:	applied dose was covered with an occlusive dressing of gauze and an impermeable covering
Type of Exposure:	Other
Species:	Rabbit
Other Species:	
Mammalian Strain:	
Other Strain:	New Zealand White
Gender:	Both M/F

Number of Animals per Dose:	2
Concentration:	100%
Dose:	2 g/kg
Year Study Performed :	1985
Method/Guideline Followed:	Unknown
GLP:	Yes
Method/Guideline and Test Condition Remarks:	The skin of the patched area of two rabbits of each sex had been abraded whilst the other two had intact skin. A weighed quantity of undiluted test material (equivalent to a dose of 2 g/Kg) was applied to the dorsal skin of each of 4 male and 4 female rabbits. The applied dose was covered with an occlusive dressing (gauze and an impermeable covering). 24 hours after dosing, the patches were removed, the skin wiped and collars fitted to the rabbits to prevent oral intake of any residual test material. Collars were used to restrain the animals during the application period. The animals were observed for a total of 14 days post-dosing. Body weights were recorded just prior to dosing and again seven and 14 days after dosing. At study termination the animals were killed with carbon dioxide and a gross necropsy was performed. Any abnormalities were recorded.

TEST RESULTS

Concentration (LC/LD)

LC/LD	%:	Value Description:	Value or Lower Concentration:	Upper Concentration:	Units:
LD	50	>	2,000		mg/kg-bw

Number of Deaths (Male):	0
Number of Deaths (Female):	0
Number of Deaths (Total):	0
Results Remarks:	There were no mortalities during the study and there were no clinical signs of toxicity with the exception of one rabbit. This animal had soft stools, diarrhea, hypoactivity and an inflamed urogenital area during the last three days of the study. All animals had gained weight by the end of the study. Dermal irritation occurred during the study and this ranged from slight to severe for erythema, slight to marked for edema and slight to marked for atonia, desquamation, coriaceousness and fissuring.

	At necropsy, the only findings in the males were on the treated area of the skin and were consistent with the gross observations of irritation. In the females similar skin lesions were observed and in addition, the vagina was reddened in 3 of the four animals and in one of these the trachea contained a red liquid on the inside walls and the lungs had multiple red pinpoint foci on all lobes.
Conclusion:	Dermal LD 50 in New Zealand White Rabbits (both sexes) was greater than the limit dose of 2000 mg/kg (2g.kg).

RELIABILITY/DATA QUALITY

Reliability:	1 - Valid Without Restrictions
Reliability Remarks:	
Key Study Sponsor Indicator:	Not Key

REFERENCE

Reference:	American Petroleum Institute (1985) Acute oral toxicity study in rats, acute dermal toxicity study in rabbits, primary dermal irritation study in rabbits, primary eye irritation study in rabbits of API 83-05 full range catalytically reformed naphtha. Study conducted by Hazleton Laboratories America, Inc. API Med research publication N0.32-31474, April 1985.

High Production Volume Information System (HPVIS)

Acute Toxicity
Gasoline Category

Test Substance

Category Chemical (CAS #):	(68955-35-1) Naphtha, petroleum, catalytic reformed **Type in CAS # if not listed:**
Test Substance (CAS #):	(68955-35-1) Naphtha, petroleum, catalytic reformed **Type in CAS # if not listed:**
Test Substance Purity/Composition and Other Test Substance Comments :	Gasoline Blending Streams Category CAS # 68955-35-1 Catalytically Reformed Naphtha API Test Material: API# 83-05 Compositional information can be found on this substance in the Analytical Data attachment for the Gasoline Blending Streams Category
Category Chemical Result Type :	Measured
Unable to Measure or Estimate Justification :	

METHOD

Route of Administration:	Inhalation
Other Route of Administration:	
Type of Exposure:	Gavage
Species:	Rat
Other Species:	
Mammalian Strain:	Sprague-Dawley
Other Strain:	

Gender:	Both M/F
Number of Animals per Dose:	5
Concentration:	5000 mg/m^3
Dose:	5000 mg/m^3
Year Study Performed :	1984
Method/Guideline Followed:	Unknown
GLP:	Yes
Method/Guideline and Test Condition Remarks:	A group of 5 male and 5 female rats were exposed by whole body inhalation to API 83-05 at a nominal concentration of 5mg/l for 4 hours. After the 4 hour exposure the rats were observed twice daily for mortality. The animals were weighed prior to exposure and again on days 7 and 14 post exposure. On day 14 all surviving animals were killed by exsanguination following methoxyflurane anesthesia and were subjected to a full necropsy. For all animals, including those found dead during the study the lungs were removed, fixed and examined histologically.

TEST RESULTS

Concentration (LC/LD)

LC/LD	%:	Value Description:	Value or Lower Concentration:	Upper Concentration:	Units:
LC	50	>	5,220		mg/m^3

Number of Deaths (Male):	0/10
Number of Deaths (Female):	0/10
Number of Deaths (Total):	0/20
Results Remarks:	The exposure chamber TWA concentration was determined to be 5.22 ± 0.14 mg/l. No animal died during the study and no clinical signs of systemic toxicity were observed. There were no significant gross observations at necropsy and no histological changes were observed in the lungs. The 4 hour LC50 was therefore greater than 5,220 mg/m^3
Conclusion:	The 4 hour LC50 was therefore greater than 5,220 mg/m^3

RELIABILITY/DATA QUALITY

Reliability:	1 - Valid Without Restrictions

Reliability Remarks:	
Key Study Sponsor Indicator:	Not Key

REFERENCE

Reference:	American Petroleum Institute (1984) Acute inhalation toxicity evaluation of a petroleum derived hydrocarbon in rats, full range catalytically reformed naphtha, API sample 83-05. Study conducted by Litton Bionetics, Inc. API Medical Research Publication No. 31-30681, February 1984.

Acute Toxicity

Test Substance - Acute Toxicity

Category Chemical: (64741-66-8) Naphtha, petroleum, light alkylate

Test Substance: (64741-66-8) Naphtha, petroleum, light alkylate

Test Substance Purity/Composition and Other Test Substance Comments: Sample API 83-19 is a Light Alkylate Naphtha (LAN). See compositional data file attached to category.

Category Chemical Result Type: Measured

Method - Acute Toxicity

Route of Administration: Dermal

Type of Exposure: Occlusive

Species: Rabbit

Mammalian Strain: New Zealand White

Gender: Both M/F

Number of Animals per Dose: 4

Dose: 2 g/kg

Year Study Performed: 1986

Method/Guideline Followed:

GLP: Yes

Method/Guideline and Test Condition Remarks: The skin of the patched area of two rabbits of each sex had been abraded whilst the other two had intact skin. A weighed quantity of undiluted test material (equivalent to a dose of 2 g/kg) was applied to the dorsal skin of each of 4 male and 4 female rabbits. The applied dose was covered with an occlusive dressing (gauze and an impermeable covering). 24 hours after dosing, the patches were removed, the skin wiped and collars fitted to the rabbits to prevent oral intake of any residual test material The collars were removed 24 hours later and the animals were observed for a total of 14 days post-dosing.

At study termination the animals were killed with carbon dioxide and a gross necropsy was performed. Any abnormalities were recorded.

Test Results - Acute Toxicity

Concentration (LC/LD) :

LC/LD	%	Value Description	Value/Lower Concentration	Upper Concentration	Units
LD	50 %	>	2000		mg/kg-bw

Number of Deaths (Male): 0 of 4

Number of Deaths (Female): 0 of 4

Number of Deaths (Total):	0 of 8
Results Remarks:	A pain response (vocalization) was elicited from all the animals following application of the test material. Apart from skin irritation there were no other clinical signs of toxicity. Skin irritation ranged from slight to severe for erythema and edema, slight to moderate for atonia and coriaceousness and from slight to moderate for desquamation and fissuring. Subcutaneous hemorrhage, blanching and eschar was also observed.
Conclusion:	Occlusive dermal LD50 > 2 g/kg bw in male and female rabbits

Reliability/Data Quality - Acute Toxicity

Reliability:	1 - Valid Without Restrictions
Reliability Remarks:	
Key Study Sponsor Indicator:	Key

Reference - Acute Toxicity

Reference:	American Petroleum Institute (1986) Acute oral toxicity study in rats, acute dermal toxicity study in rabbits, primary dermal irritation study in rabbits, primary eye irritation study in rabbits, dermal sensitization study in guinea pigs on API 83-19, Light Alkylate Naphtha (CAS 64741-66-8) Study conducted by Hazleton Laboratories. Health and Environmental Sciences Dept. Report 33-30594 Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

Acute Toxicity

Test Substance - Acute Toxicity

Category Chemical: (64741-66-8) Naphtha, petroleum, light alkylate

Test Substance: (64741-66-8) Naphtha, petroleum, light alkylate

Test Substance Purity/Composition and Other Test Substance Comments: Sample API 83-19 is a Light Alkylate Naphtha (LAN). See compositional data file attached to category.

Category Chemical Result Type: Measured

Method - Acute Toxicity

Route of Administration: Inhalation

Type of Exposure:

Species: Rat

Mammalian Strain: Sprague-Dawley

Gender: Both M/F

Number of Animals per Dose: 10

Concentration: 5 mg/L

Year Study Performed: 1987

Method/Guideline Followed:

GLP: Yes

Method/Guideline and Test Condition Remarks: A group of 5 male and 5 female rats were exposed by whole body inhalation to API 83-19 at a nominal concentration of 5mg/l for 4 hours. This was achieved by total volatilization of the test material and appropriate dilution with air. After the 4 hour exposure the rats were observed twice daily for mortality. The animals were weighed prior to exposure and again on days 7 and 14 post exposure. On day 14 all surviving animals were killed by exsanguination following sodium pentobarbital anesthesia. For all animals, including those found dead during the study the lungs were removed, fixed and examined histologically.

Test Results - Acute Toxicity

Concentration (LC/LD) :

LC/LD	%	Value Description	Value/Lower Concentration	Upper Concentration	Units
LC	50 %	>	5		mg/L

Number of Deaths (Male): 0 of 5

Number of Deaths (Female): 0 of 5

Number of Deaths (Total):	0 of 10
Results Remarks:	The mean analytical and nominal exposure concentrations were 5.04 ± 0 74 and 6.31 mg/l respectively. All animals survived the study but exhibited languid behavior and a hunched appearance during the exposure. Female body weights were decreased at day 15 but this was attributed to pre-necropsy fasting. At necropsy there were no remarkable findings and histopathology of the lungs was normal.
Conclusion:	Inhalation LD50 > 5 mg/L (5 g/m3) in male and female rats

Reliability/Data Quality - Acute Toxicity

Reliability:	1 - Valid Without Restrictions
Reliability Remarks:	
Key Study Sponsor Indicator:	

Reference - Acute Toxicity

Reference:	American Petroleum Institute (1987) Acute inhalation toxicity evaluation of a petroleum derived hydrocarbon in rats API 83-19 Light Alkylate Naphtha (CAS 64741-66-8). Study conducted by Hazleton laboratories API Health and Environmental Sciences Dept. Report 34-30636 Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

Acute Toxicity

Test Substance - Acute Toxicity

Category Chemical: (64741-87-3) Naphtha, petroleum, sweetened

Test Substance: (64741-87-3) Naphtha, petroleum, sweetened

Test Substance Purity/Composition and Other Test Substance Comments: Test material API #81-08 Sweetened Naphtha. See compositional data file attached to category

Category Chemical Result Type: Measured

Method - Acute Toxicity

Route of Administration: Inhalation

Type of Exposure:

Species: Rat

Mammalian Strain: Sprague-Dawley

Gender: Both M/F

Number of Animals per Dose: 10

Concentration: 5 mg/l

Year Study Performed: 1986

Method/Guideline Followed:

GLP: Yes

Method/Guideline and Test Condition Remarks: A group of 5 male and 5 female rats were exposed by whole body inhalation to API 81-08 at a nominal concentration of 5mg/l for 4 hours.
After the 4 hour exposure the rats were observed twice daily for mortality. The animals were weighed prior to exposure and again on days 7 and 14 post exposure. On day 14 all surviving animals were killed by exsanguination following sodium pentobarbital anesthesia and were subjected to a full necropsy. For all animals,
including those found dead during the study the lungs were removed, fixed and examined histologically.

Test Results - Acute Toxicity

Concentration (LC/LD) :

LC/LD	%	Value Description	Value/Lower Concentration	Upper Concentration	Units
LC	50 %	>	5.2		mg/L

Number of Deaths (Male): 0 of 5

Number of Deaths (Female): 0 of 5

Number of Deaths (Total):	0 of 10
Results Remarks:	The actual chamber concentrations were found to be 5.2 mg/1. No deaths occurred during the study. There were no unusual pharmacotoxic signs or behavior observed in the control animals. There was however, a slight incidence of nasal discharge (2/5 males and 1/5 females) during the exposure period but none during the following 14 day observation period. The body weight gains for the males exposed to API 81-08 was considered normal but the female body weight gains were marginally less than that of the controls on day 14 post exposure (8.2% compared to 13 8% increase over pre-exposure body weight) No significant macro or microscopic changes were observed that were considered to be treatment related
Conclusion:	The inhalation LC50 > 5.2 mg/L (5.2 g/m3) in male and female rats

Reliability/Data Quality - Acute Toxicity

Reliability:	1 - Valid Without Restrictions
Reliability Remarks:	
Key Study Sponsor Indicator:	

Reference - Acute Toxicity

Reference:	American Petroleum Institute (1986) LC50 Acute inhalation toxicity evaluation of a petroleum derived hydrocarbon in rats API 81-08 Sweetened Naphtha CAS 64741-87-3 API Health and Environmental Sciences Dept. Publication No. 33-31827. June 1986 Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS 10/28/2003

Acute Toxicity

Test Substance - Acute Toxicity

Category Chemical: (64741-87-3) Naphtha, petroleum, sweetened

Test Substance: (64741-87-3) Naphtha, petroleum, sweetened

Test Substance Purity/Composition and Other Test Substance Comments: Test material API #81-08, Sweetened Naphtha See compositional data file attached to category.

Category Chemical Result Type: Measured

Method - Acute Toxicity

Route of Administration: Dermal

Type of Exposure: No Data

Species: Rabbit

Mammalian Strain: New Zealand White

Gender: Both M/F

Number of Animals per Dose: 8

Dose: 2 g/kg bw

Year Study Performed: 1982

Method/Guideline Followed:

GLP: Yes

Method/Guideline and Test Condition Remarks: The skin of the patched area of two rabbits of each sex had been abraded whilst the other two had intact skin. A weighed quantity of undiluted test material (equivalent to a dose of 2 g/Kg) was applied to the dorsal skin of each of 4 male and 4 female rabbits The applied dose was covered with an occlusive dressing (gauze and an impermeable covering). 24 hours after dosing, the patches were removed, the skin wiped and collars fitted to the rabbits to prevent oral intake of any residual test material. Collars were used to restrain the animals during the application period. The animals were observed for a total of 14 days post-dosing. Body weights were recorded just prior to dosing and again seven and 14 days after dosing. At study termination the animals were killed with carbon dioxide and a gross necropsy was performed. Any abnormalities were recorded

Test Results - Acute Toxicity

Concentration (LC/LD) :

LC/LD	%	Value Description	Value/Lower Concentration	Upper Concentration	Units
LD	50 %	>	2000		mg/kg-bw

Number of Deaths (Male): 0 of 4

Number of Deaths (Female):	0 of 4
Number of Deaths (Total):	0 of 8
Results Remarks:	No animals died during the study and no clinical signs of intoxication were observed. Normal growth was observed throughout the study. At necropsy, the only visible lesions seen were on the skin of two animals in which the test site was reddened in one together with crusted appearance and mild crusting was observed in the other rabbit.
Conclusion:	Occlusive LD50 > 2g/kg bw in abraded and intact skin of male and female rabbits.

Reliability/Data Quality - Acute Toxicity

Reliability:	1 - Valid Without Restrictions
Reliability Remarks:	
Key Study Sponsor Indicator:	

Reference - Acute Toxicity

Reference:	American Petroleum Institute (1982) Acute toxicity studies, sweetened naphtha Sample 81-08. Study conducted by Hazleton Raltech. API Medicine and biological science department Publication No. 30-31990, August 1982. Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

Acute Toxicity

Test Substance - Acute Toxicity

Category Chemical: (64741-55-5) Naphtha, petroleum, light catalytic cracked

Test Substance: (64741-55-5) Naphtha, petroleum, light catalytic cracked

Test Substance Purity/Composition and Other Test Substance Comments: Test sample API # 83-20 Light Catalytic Cracked Naphtha (ICCN) See compositional data file attached to category.

Category Chemical Result Type: Measured

Method - Acute Toxicity

Route of Administration: Oral

Type of Exposure: Gavage

Species: Rat

Mammalian Strain: Sprague-Dawley

Gender: Both M/F

Number of Animals per Dose: 5

Dose: 5 g/kg

Year Study Performed: 1986

Method/Guideline Followed:

GLP: Yes

Method/Guideline and Test Condition Remarks: Groups of five male and five female fasted rats were given API 83-20 as a single oral dose of 5 g/kg. The animals were then allowed food and water ad libitum and were observed hourly for clinical signs for the first 6 hours after dosing. Observation was twice daily thereafter for 14 days Body weights were recorded at 7 and 14 days after administration of test material. At the end of the study, the animals were killed and subjected to a gross necropsy and any abnormalities were recorded.

Test Results - Acute Toxicity

Concentration (LC/LD) :

LC/LD	%	Value Description	Value/Lower Concentration	Upper Concentration	Units
LD	50 %	>	5000		mg/kg-bw

Number of Deaths (Male): 0 of 5

Number of Deaths (Female): 0 of 5

Number of Deaths (Total): 0 of 10

Results Remarks:	There were no mortalities during the study. Body weights had increased by day 7 after dosing and further increases were recorded 14 days after dosing. Clinical signs of toxicity were observed during the 24 hours immediately after dosing and appeared normal thereafter. Clinical signs included: hypoactivity, ataxia, diarrhea, lacrimation, yellow-stained anal area, excessive salivation and respiratory congestion. There were no treatment-related lesions observed at necropsy.
Conclusion:	Oral LD50 was greater than 5 g/kg for males and females rats.

Reliability/Data Quality - Acute Toxicity

Reliability:	1 - Valid Without Restrictions
Reliability Remarks:	
Key Study Sponsor Indicator:	

Reference - Acute Toxicity

Reference:	American Petroleum Institute (1986) Acute oral toxicity study in rats, acute dermal toxicity study in rabbits, primary dermal irritation study in rabbits, primary eye irritation study in rabbits, dermal sensitization study in guinea pigs Study conducted by Hazleton Laboratories Inc. Health and Environmental Sciences Dept. Publ. No. 33-32722 Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

Acute Toxicity

Test Substance - Acute Toxicity

Category Chemical: *No CAS Number Provided*

Test Substance: *No CAS Number Provided*

Test Substance Purity/Composition and Other Test Substance Comments: Unleaded gasoline; API test material designation "API #PS-6". Detailed compositional analysis is attached as a separate document to the category.

Category Chemical Result Type: Measured

Method - Acute Toxicity

Route of Administration: Oral

Type of Exposure: Gavage

Species: Rat

Mammalian Strain: Sprague-Dawley

Gender: Both M/F

Number of Animals per Dose: 10

Dose: 10, 15, 17.5, 20 and 25 ml/kg

Year Study Performed: 1980

Method/Guideline Followed:

GLP: Yes

Method/Guideline and Test Condition Remarks: Vehicle: Undiluted

Groups of 10 fasted rats (five male and five female) were given API PS-6 at doses of 10, 15, 17.5, 20 and 25 ml/kg as a single oral dose. The animals were then allowed food and water ad libitum and were observed hourly for clinical signs for the first 6 hours after dosing. Observation was twice daily thereafter for 14 days Body weights were recorded at 7 and 14 days after administration of test material. At the end of the study, the animals were killed and subjected to a gross necropsy and any abnormalities were recorded. [In addition 2 extra males and one female were given 15 ml/kg because 3 of the original animals died soon after dosing and this was believed to be due to dosing injury However, at necropsy, no evidence of injury was found and therefore all animals were included in the calculations for an LD50]

Test Results - Acute Toxicity

Concentration (LC/LD) :

LC/LD	%	Value Description	Value/Lower Concentration	Upper Concentration	Units
LD	50 %	=	18.75		Other

Number of Deaths (Male): 14 of 25

Number of Deaths (Female):	8 of 25
Number of Deaths (Total):	22 of 50
Results Remarks:	Toxic signs were the same in all dose groups, increasing in severity with increasing dose. There were oily urine stains, but most of the test material seemed to be excreted via the feces. The area around the anus became very irritated Diarrhea was common in each dose level and blood was commonly seen around the eyes, nose and mouth. Observations at necropsy were similar for all dose groups. Animals surviving to 14 days had very few abnormalities and these were usually of a minor nature such as enlarged Peyer's patches on the intestines. There were numerous instances of lung involvement in both surviving animals and those dying before 14 days. These changes consisted of mild irritation and congestion, to fluid filled abscesses Almost all animals that died before 14 days had intestinal damage. The intestines, and often the stomach, became hemorrhagic and sometimes blood was observed in the intestine or stomach. The intestine wall became thin and there was an increased amount of gas in the gastro intestinal tract. The heart was enlarged or irregularly shaped in some rats. Mortality and body weight changes are summarized in the following table Dose group Mortality Weight change (ml/kg) dying/dosed (over 14days) Males 10 0/5 weight gain 15 2/7 weight loss 17.5 3/5 weight loss 20 4/5 weight loss 25 5/5 weight loss Females 10 0/5 weight gain 15 1/6 weight gain 17.5 3/5 weight loss 20 0/5 weight gain* 25 4/5 weight loss * one animal had a weight loss over the 14 day period. The oral LD50 was determined to be 18.75 ml/kg The 95% confidence limits were 16.3 to 21.6 ml/kg.
Conclusion:	Oral LD50 in rats was 18.75 ml/kg. The 95% confidence limits were 16.3 to 21.6 ml/kg.

Reliability/Data Quality - Acute Toxicity

Reliability:	1 - Valid Without Restrictions
Reliability Remarks:	
Key Study Sponsor Indicator:	

Reference - Acute Toxicity

Reference:	American Petroleum Institute (1980) Acute toxicity tests, API #PS-6 unleaded motor gasoline. Study conducted by Elars Bioresearch Laboratories Inc. API Report No. 27-32130. Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

Acute Toxicity

Test Substance - Acute Toxicity

Category Chemical: *No CAS Number Provided*

Test Substance: *No CAS Number Provided*

Test Substance Purity/Composition and Other Test Substance Comments: Unleaded gasoline, API sample # PS-6. See compositional data file attached to category

Category Chemical Result Type: Measured

Method - Acute Toxicity

Route of Administration: Dermal

Type of Exposure: Occlusive

Species: Rabbit

Mammalian Strain: New Zealand White

Gender: Both M/F

Number of Animals per Dose: 4

Dose: 5 ml/kg

Year Study Performed: 1979

Method/Guideline Followed:

GLP: Yes

Method/Guideline and Test Condition Remarks: The skin of the patched area of two rabbits of each sex had been abraded whilst the other two had intact skin. A single dose of undiluted test material (5 ml/kg) was applied to the dorsal skin of each of 4 male and 4 female rabbits. The applied dose was covered with an occlusive dressing (gauze and an impermeable covering) 24 hours after dosing, the patches were removed, the skin wiped and collars fitted to the rabbits to prevent oral intake of any residual test material. The collars were removed 24 hours later and the animals were observed for a total of 14 days post-dosing.
At study termination the animals were killed with carbon dioxide and a gross necropsy was performed. Any abnormalities were recorded

Test Results - Acute Toxicity

Concentration (LC/LD) :

LC/LD	%	Value Description	Value/Lower Concentration	Upper Concentration	Units
LD	50 %	>	5		Other

Number of Deaths (Male): 0 of 4

Number of Deaths (Female): 1 of 4

Number of Deaths (Total):	1 of 8
Results Remarks:	LD50 > 5 ml/kg bw When the patches were removed following dosing dark red to almost purple skin was seen in all animals. Slight erythema and dry skin was observed in all rabbits during the study. With the exception of one animal all animals weighed more at the end of the study than they did at study commencement One female rabbit died on day 6 of the 14 day study and the gross necropsy revealed slightly congested lungs, no food in the stomach and white areas in the liver. At necropsy of the surviving animals four rabbits had congested lungs, one had pale kidneys, one had an irritated stomach lining and one had enlarged Peyer's patches on the jejunum. These observations were considered to be normal and not dose-related.
Conclusion:	LD50 > 5 ml/kg bw for male and female New Zealand white rabbits

Reliability/Data Quality - Acute Toxicity

Reliability:	1 - Valid Without Restrictions
Reliability Remarks:	
Key Study Sponsor Indicator:	

Reference - Acute Toxicity

Reference:	American Petroleum Institute (1980) Acute toxicity tests, API #PS-s unleaded motor gasoline. Study conducted by Elars Bioresearch Laboratories Inc. API Report No. 27-32130. Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

Acute Toxicity

Test Substance - Acute Toxicity

Category Chemical: (64741-78-2) Naphtha, petroleum, heavy hydrocracked

Test Substance: (64741-78-2) Naphtha, petroleum, heavy hydrocracked

Test Substance Purity/Composition and Other Test Substance Comments: use for read-across template

Category Chemical Result Type: Read-Across

Method - Acute Toxicity

Route of Administration:

Type of Exposure:

Species:

Mammalian Strain:

Gender:

Number of Animals per Dose:

Dose:

Year Study Performed:

Method/Guideline Followed:

GLP:

Method/Guideline and Test Condition Remarks:

Test Results - Acute Toxicity

Concentration (LC/LD) :

LC/LD	%	Value Description	Value/Lower Concentration	Upper Concentration	Units

Number of Deaths (Male):

Number of Deaths (Female):

Number of Deaths (Total):

Results Remarks: See records for CAS 64741-66-8, 64741-55-5, 68955-35-1, and gasoline.

Conclusion:

Reliability/Data Quality - Acute Toxicity

Reliability:

Reliability Remarks:

Key Study Sponsor Indicator:

Reference - Acute Toxicity

Reference:

Acute Toxicity

Test Substance - Acute Toxicity

Category Chemical: (64741-55-5) Naphtha, petroleum, light catalytic cracked

Test Substance: (64741-55-5) Naphtha, petroleum, light catalytic cracked

Test Substance Purity/Composition and Other Test Substance Comments: Test material API #83-20Light Catalytic Cracked Naptha (LCCN). See compositional data file attached to category.
Test material administered undiluted.

Category Chemical Result Type: Measured

Method - Acute Toxicity

Route of Administration: Dermal

Type of Exposure: Occlusive

Species: Rabbit

Mammalian Strain: New Zealand White

Gender: Both M/F

Number of Animals per Dose: 4

Dose: 2.0 and 3.0 g/kg (two separate experiments)
Test material administered undiluted

Year Study Performed: 1986

Method/Guideline Followed:

GLP: Yes

Method/Guideline and Test Condition Remarks: Prior to single application treatment, the skin of the shaved application areas of two rabbits/sex/dose was abraded whilst the other four had intact skin. A weighed quantity of undiluted test material was applied to the dorsal skin of each of 4 male (2 abraded and 2 intact skin) and 4 female (2 abraded skin and 2 intact skin) rabbits at a dose level of 2.0 g/kg. The applied dose was covered with an occlusive dressing (gauze and an impermeable covering) 24 hours after dosing, the patches were removed, the skin wiped and collars fitted to the rabbits to prevent oral intake of any residual test material. The collars were removed 24 hours later and the animals were observed for a total of 14 days post-dosing. At study termination the animals were killed with carbon dioxide and a gross necropsy was performed Any abnormalities were recorded. Since there was 25% mortality in both males and females (1 of 4 per sex, both deaths from animals with abraded skin) in the 2g/kg study, the experiment was repeated using a dose level of 3 g/kg.

Test Results - Acute Toxicity

Concentration (LC/LD) :

LC/LD	%	Value Description	Value/Lower Concentration	Upper Concentration	Units
LD	50 %	>	3000		mg/kg-bw

Number of Deaths (Male):	1 of 8
Number of Deaths (Female):	1 of 8
Number of Deaths (Total):	2 of 16
Results Remarks:	With the exception of one male in the 3 g/kg dose group, a pain response was elicited from all animals during application of the test material to the skin Dermal irritation ranging from slight to severe was observed for erythema and slight to marked for atonia, desquamation, fissuring and coriaceousness At necropsy skin lesions were observed more frequently in the 2 g/kg group than the 3 g/kg group. At the 2 g/kg dose level, clinical observations included: diarrhea (day 7, 8, &9), anorexia (day 8 & 9), and hypoactivity (day 8 & 9) in one female. One female with abraded skin at dosing site died on day 9, it is presumed to be the same female that exhibited the clinical signs. There were no clinical signs of toxicity in the males. One male (abraded test site) died on day 12 following dosing In the subsequent 3 g/kg dose study, there were no clinical signs of toxicity and no animals died.
Conclusion:	LD50 was greater than 3 g/kg for both male and female rabbits.

Reliability/Data Quality - Acute Toxicity

Reliability:	1 - Valid Without Restrictions
Reliability Remarks:	
Key Study Sponsor Indicator:	

Reference - Acute Toxicity

Reference:	American Petroleum Institute (1986) Acute oral toxicity study in rats, acute dermal toxicity study in rabbits, primary dermal irritation study in rabbits, primary eye irritation study in rabbits, dermal sensitization study in guinea pigs Study conducted by Hazleton Laboratories Inc. Health and Environmental Sciences Dept. Publ. No 33-32722 Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

Acute Toxicity

Test Substance - Acute Toxicity

Category Chemical: (64741-55-5) Naphtha, petroleum, light catalytic cracked

Test Substance: (64741-55-5) Naphtha, petroleum, light catalytic cracked

Test Substance Purity/Composition and Other Test Substance Comments: Test sample API #83-20 Light Catalytic Cracked Naphtha (LCCN). See compositional data file attached to category.

Category Chemical Result Type: Measured

Method - Acute Toxicity

Route of Administration: Inhalation

Type of Exposure:

Species: Rat

Mammalian Strain: Sprague-Dawley

Gender: Both M/F

Number of Animals per Dose: 5

Concentration: 5 mg/l

Year Study Performed: 1987

Method/Guideline Followed:

GLP: Yes

Method/Guideline and Test Condition Remarks: A group of 5 male and 5 female rats were exposed by whole body inhalation to API 83-20 at a nominal concentration of 5mg/l for 4 hours. After the 4 hour exposure the rats were observed twice daily for mortality. The animals were weighed prior to exposure and again on days 7 and 14 post exposure. On day 14 all surviving animals were killed and subjected to a gross post-mortem examination. For all animals, including those found dead during the study, the lungs were removed, fixed and examined histologically.

Test Results - Acute Toxicity

Concentration (LC/LD) :

LC/LD	%	Value Description	Value/Lower Concentration	Upper Concentration	Units
LC	50 %	>	5.3		mg/L

Number of Deaths (Male): 0 of 5

Number of Deaths (Female): 0 of 5

Number of Deaths (Total): 0 of 10

Results Remarks:	The mean analytical exposure concentration was measured and found to be 5.28 ±0.55 mgL. Gravimetric samples, collected on glass fiber filters suggested little or no aerosol in the chamber. Most animals exhibited languid behavior and squinted eyes during the second hour of the exposure. Polypnea was observed in all animals when removed from the chamber at the one hour post exposure observation period. Rhinorrhea was exhibited by two animals on day two of the test. All animals appeared normal subsequently and there were no mortalities during the study. With the exception of one animal (female) all animals had body weights that were considered unremarkable There were no remarkable gross or microscopic findings.
Conclusion:	Inhalation LC50 > 5.3 mg/L (5.3 g/m3) in male and female rats

Reliability/Data Quality - Acute Toxicity

Reliability:	1 - Valid Without Restrictions
Reliability Remarks:	
Key Study Sponsor Indicator:	

Reference - Acute Toxicity

Reference:	American Petroleum Institute (1987) Acute inhalation toxicity evaluation of a petroleum derived hydrocarbon in rats API 83-20 Light catalytic cracked naphtha (CAS 64741-55-5). Study conducted by Hazleton Laboratories America Inc. Health and Environmental Sciences Dept. Publ. No. 34-32777 Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

Acute Toxicity

Test Substance - Acute Toxicity

Category Chemical: (64741-66-8) Naphtha, petroleum, light alkylate

Test Substance: (64741-66-8) Naphtha, petroleum, light alkylate

Test Substance Purity/Composition and Other Test Substance Comments: Sample API 83-19 is a Light Alkylate Naphtha (LAN). See compositional data file attached to category.

Category Chemical Result Type: Measured

Method - Acute Toxicity

Route of Administration: Oral

Type of Exposure:

Species: Rat

Mammalian Strain: Sprague-Dawley

Gender: Both M/F

Number of Animals per Dose: 10

Dose: 5 and 7 g/kg

Year Study Performed: 1986

Method/Guideline Followed:

GLP: Yes

Method/Guideline and Test Condition Remarks: Groups of five male and five female fasted rats were given API 83-19 at doses of 5 and 7 g/kg as a single oral dose. The animals were then allowed food and water ad libitum and were observed hourly for clinical signs for the first 6 hours after dosing. Observation was twice daily thereafter for 14 days. Body weights were recorded at 7 and 14 days after administration of test material. At the end of the study, the animals were killed and subjected to a gross necropsy and any abnormalities were recorded.
study, the animals were killed and subjected to a gross necropsy and any abnormalities were recorded.

Test Results - Acute Toxicity

Concentration (LC/LD) :

LC/LD	%	Value Description	Value/Lower Concentration	Upper Concentration	Units
LD	50 %	>	7000		mg/kg-bw

Number of Deaths (Male): 0 of 5

Number of Deaths (Female): 1 of 5

Number of Deaths (Total):	1 of 10
Results Remarks:	Clinical signs seen during the study included: hypoactivity, diarrhea, yellow-stained anal area, red discharge from nose, blood-like discharge on or around penile area, pale appearance and one female in the 5 g/kg group died within one hour of dosing. All except two animals had returned to normal by day 3 of the study.
Conclusion:	The oral LD50 was found to be greater than 7 g/kg in male and female Sprague Dawley rats

Reliability/Data Quality - Acute Toxicity

Reliability:	1 - Valid Without Restrictions
Reliability Remarks:	
Key Study Sponsor Indicator:	

Reference - Acute Toxicity

Reference:	American Petroleum Institute (1986) Acute oral toxicity study in rats, acute dermal toxicity study in rabbits, primary dermal irritation study in rabbits, primary eye irritation study in rabbits, dermal sensitization study in guinea pigs on API 83-19, Light Alkylate Naphtha (CAS 64741-66-8) Study conducted by Hazleton Laboratories, Health and Environmental Sciences Dept. Report 33-30594 Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

Acute Toxicity

Test Substance - Acute Toxicity

Category Chemical: (68955-35-1) Naphtha, petroleum, catalytic reformed

Test Substance: (68955-35-1) Naphtha, petroleum, catalytic reformed

Test Substance Purity/Composition and Other Test Substance Comments: API 83-05

Category Chemical Result Type: Measured

Method - Acute Toxicity

Route of Administration: Dermal

Type of Exposure: Occlusive

Species: Rabbit

Mammalian Strain: New Zealand White

Gender: Both M/F

Number of Animals per Dose: 4

Dose: 2 g/kg

Year Study Performed: 1985

Method/Guideline Followed:

GLP: Yes

Method/Guideline and Test Condition Remarks: The skin of the patched area of two rabbits of each sex had been abraded whilst the other two had intact skin.
A weighed quantity of undiluted test material (equivalent to a dose of 2 g/Kg) was applied to the dorsal skin of each of
4 male and 4 female rabbits. The applied dose was covered with an occlusive dressing (gauze and an impermeable
covering). 24 hours after dosing, the patches were removed, the skin wiped and collars fitted to the rabbits to prevent
oral intake of any residual test material. Collars were used to restrain the animals during the application period
The animals were observed for a total of 14 days post-dosing.
Body weights were recorded just prior to dosing and again seven and 14 days after dosing
At study termination the animals were killed with carbon dioxide and a gross necropsy was performed Any abnormalities were recorded.

Test Results - Acute Toxicity

Concentration (LC/LD) :

LC/LD	%	Value Description	Value/Lower Concentration	Upper Concentration	Units
LD	50 %	>	2000		mg/kg-bw

Number of Deaths (Male):

Number of Deaths (Female):	
Number of Deaths (Total):	
Results Remarks:	There were no mortalities during the study and there were no clinical signs of toxicity with the exception of one rabbit. This animal had soft stools, diarrhea, hypoactivity and an inflamed urogenital area during the last three days of the study. All animals had gained weight by the end of the study. Dermal irritation occurred during the study and this ranged from slight to severe for erythema, slight to marked for edema and slight to marked for atonia, desquamation, coriaceousness and fissuring. At necropsy, the only findings in the males were on the treated area of the skin and were consistent with the gross observations of irritation. In the females similar skin lesions were observed and in addition, the vagina was reddened in 3 of the four animals and in one of these the trachea contained a red liquid on the inside walls and the lungs had multiple red pinpoint foci on all lobes.
Conclusion:	

Reliability/Data Quality - Acute Toxicity

Reliability:	1 - Valid Without Restrictions
Reliability Remarks:	
Key Study Sponsor Indicator:	

Reference - Acute Toxicity

Reference:	American Petroleum Institute (1985) Acute oral toxicity study in rats, acute dermal toxicity study in rabbits, primary dermal irritation study in rattis, primary eye irritation study in rabbits in API 83-05 full range catalytically reformed naphtha Study conducted by Hazleton Laboratories America, Inc. API Med research publication No. 32-31474, April 1985.

Acute Toxicity

Test Substance - Acute Toxicity

Category Chemical: (64741-87-3) Naphtha, petroleum, sweetened

Test Substance: (64741-87-3) Naphtha, petroleum, sweetened

Test Substance Purity/Composition and Other Test Substance Comments: API 81-08

Category Chemical Result Type: Measured

Method - Acute Toxicity

Route of Administration: Oral

Type of Exposure: Gavage

Species: Rat

Mammalian Strain: Sprague-Dawley

Gender: Both M/F

Number of Animals per Dose: 10

Dose: 5 g/kg

Year Study Performed: 1982

Method/Guideline Followed:

GLP: Yes

Method/Guideline and Test Condition Remarks: The test material was administered undiluted, as a single oral dose to groups of 5 male 5 female rats at a single dose level of 5 g/Kg. The dose volume was 7.35 ml/Kg based on an average bulk density of 0.68 g/ml. Food had been withheld from the rats overnight prior to dosing, but they had free access to water. Following dosing, food and water were available ad-lib for a period of 14 days. The animals were observed for clinical signs of toxicity and mortality every hour for the first 6 hours after dosing and twice daily thereafter for 14 days. The rats were weighed the day before dosing and then at 7 and 14 days after dosing. At study termination all animals were killed with carbon dioxide and subjected to a gross necropsy and abnormalities were recorded.

Test Results - Acute Toxicity

Concentration (LC/LD) :

LC/LD	%	Value Description	Value/Lower Concentration	Upper Concentration	Units
LD	50 %	>	5000		mg/kg-bw

Number of Deaths (Male): 0 of 5

Number of Deaths (Female):	0 of 5
Number of Deaths (Total):	0 of 10
Results Remarks:	No animals died during the study. Clinical signs of intoxication included diarrhea and mucoid diarrhea. Although there was a reduction in body weight following fasting, body weight were increasing by seven and 14 days post dosing. At necropsy no visible lesions were observed in 4 of 5 males and 2 of 5 females. In the right kidney of one male the renal pelvis was mildly dilated and a cervical lymph node was enlarged. In the females dilation of the pelvis of the kidney was observed in one animal, a cervical lymph node was enlarged in another animal and in a third animal mild hydrometra of the uterus was observed.
Conclusion:	The Oral LD50 was greater than 5 g/kg in male and female rats.

Reliability/Data Quality - Acute Toxicity

Reliability:	1 - Valid Without Restrictions
Reliability Remarks:	
Key Study Sponsor Indicator:	

Reference - Acute Toxicity

Reference:	American Petroleum Institute (1982) Acute toxicity studies, sweetened naphtha Sample 81-08 Study conducted by Hazleton Raltech. API Medicine and biological science department Publication No. 30-31990, August 1982 Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS 10/28/2003

Acute Toxicity

Test Substance - Acute Toxicity

Category Chemical: (68955-35-1) Naphtha, petroleum, catalytic reformed

Test Substance: (68955-35-1) Naphtha, petroleum, catalytic reformed

Test Substance Purity/Composition and Other Test Substance Comments: API 83-05

Category Chemical Result Type: Measured

Method - Acute Toxicity

Route of Administration: Inhalation

Type of Exposure:

Species: Rat

Mammalian Strain: Sprague-Dawley

Gender: Both M/F

Number of Animals per Dose: 10

Concentration: 5 mg/l

Year Study Performed: 1984

Method/Guideline Followed:

GLP: Yes

Method/Guideline and Test Condition Remarks: A group of 5 male and 5 female rats were exposed by whole body inhalation to API 83-05 at a nominal concentration of 5mg/l for 4 hours. After the 4 hour exposure the rats were observed twice daily for mortality. The animals were weighed prior to exposure and again on days 7 and 14 post exposure.
On day 14 all surviving animals were killed by exsanguination following *methoxyflurane* anesthesia and were subjected to a full necropsy. For all animals, including those found dead during the study the lungs were removed, fixed and examined histologically.

Test Results - Acute Toxicity

Concentration (LC/LD) :

LC/LD	%	Value Description	Value/Lower Concentration	Upper Concentration	Units
LC	50 %	>	5.2		mg/L

Number of Deaths (Male):

Number of Deaths (Female):

Number of Deaths (Total):

Results Remarks: The exposure chamber TWA concentration was determined to be 5 22 ± 0.14 mg/l. No animal died during the study and no clinical signs of systemic toxicity were observed.
There were no significant gross observations at necropsy and no histological changes were observed in the lungs.
The 4 hour LC50 was therefore greater than 5.22 mg/l.

Conclusion:

Reliability/Data Quality - Acute Toxicity

Reliability: 1 - Valid Without Restrictions

Reliability Remarks:

Key Study Sponsor Indicator:

Reference - Acute Toxicity

Reference: American Petroleum Institute (1984)
Acute inhalation toxicity evaluation of a petroleulm derived hydrocarbon in rats, full range catalytically reformed naphtha, API sample 83-053.
Study conducted by Litton Bionetics, Inc.
API Medical Research Publication No. 31-30681, February 1984

High Production Volume Information System (HPVIS)

Repeated-Dose Toxicity

Test Substance – Repeated-Dose Toxicity

Category Chemical:	No CAS number
Test Substance:	No CAS number
Test Substance Purity/Composition and Other Test Substance Comments:	Unleaded baseline gasoline API 99-01 Vapor Condensate Test material is a complex mixture of volatile hydrocarbons. The purity of mixture is 100% and stable based on analysis of chamber atmospheres.

Representative Components [98.8%] monitored in Study

Component	Area %
Isobutane	2.70
n-butane	12.78
3-methyl-1-butene	0.41
Isopentane	36.50
n-pentane	9.36
Trans-2-pentene	3.60
2,3-dimethylbutane	1.75
2-methylpentane	7.25
3-methylpentane	4.27
n-hexane	3.62
Methylcyclopentane	1.87
2,4-dimethylpentane	1.36
Benzene	2.75
2-methylhexane	1.73
2,3-dimethylpentane	1.52
3-methylhexane	1.73
Isooctane	1.92
Toluene	3.91

Category Chemical Result Type:	Measured

Method – Repeated-Dose Toxicity

Route of Administration:	Inhalation
Type of Exposure:	Whole body
Species:	Rat
Mammalian Strain:	Sprague Dawley [Crl: CD IGS BR]
Gender:	Male and female
Number of Animals per Dose:	10 males/10 females/group and 10 males/10 females in control and in high dose recovery groups
Dose:	Target: 0, 2000, 10,000, and 20,000mg/m^3

	Actual: 0, 2050, 10,153, and 20,324 mg/m^3
Year Study Performed:	2005
Method/Guideline Followed:	EPA OPPTS 870.3465
GLP:	Yes
Exposure Period:	13 weeks, [minimum 65 exposures]
Frequency of Treatment:	6 hours/day, 5 days/week
Post-Exposure Period:	4 weeks
Method/Guideline and Test Condition Remarks:	Baseline Gasoline Vapor Condensate was administered via whole-body exposures to Sprague Dawley rats for 13 weeks followed by a 4-week recovery period. The assessment included routine toxicology parameters as well as detailed evaluations of neurotoxicity parameters. The test substance was administered at target concentrations of 2000, 10000 and 20000 mg/m^3 for 6 hours/day, generally 5 days/week for 13 weeks. In addition, an Air Control group received nitrogen-enriched air only while in chamber. Exposure levels were determined using an infra-red spectrophotometer 4 times per chamber per day. The test substance's major components were assayed once per chamber per week. Particle size distribution measurements were also made once per chamber per week using a TSI Aerodynamic Particle Sizer. Viability checks were performed twice daily to check for mortality and signs of severe toxic or pharmacologic effects. Physical observations, body weight and feed consumption measurements were performed on all animals each week. Ophthalmoscopic examinations were conducted pretest and at study termination. Hematology, coagulation and clinical chemistry studies were performed for all animals at 4 weeks and termination of all exposures. Neurobehavioral testing was conducted on non-exposure days at least 16 hours post-exposure on 10 rats/sex/group pretest and at weeks 3, 7 and 12 of exposure according to OPPTS guideline 870.6200 Neurotoxicity Screening Battery. The Functional Observational Battery (FOB) was performed before evaluation of motor activity. FOB included home cage and handling evaluation, open field trials, reflex assessment, grip strength, landing food splay, hindlimb extensor strength and air righting ability. Motor activity was monitored using an automated Photobeam activity system. After 13 weeks of exposures, all animals were sacrificed except recovery animals, which were sacrificed after an additional 4-week recovery period. Selected organs were weighed [brain, heart, liver, lungs, adrenal glands, kidneys, spleen, thymus, ovaries, uterus, testes, seminal vesicles, prostate, epididymides] and organ/body weight and organ/brain weight ratios calculated. Complete macroscopic postmortem examinations were performed on all animals. Histopathological evaluations of 31 tissues were

	conducted on all Air Control and 20000 mg/m^3 exposed animals at the Terminal interval and at the Recovery interval. Lungs and gross lesions from all animals and kidney tissue from all male rats were examined at the Terminal interval. At terminal sacrifice five rats/sex/group were perfused for neuropathology. Brain size and weight were measured and sections of brain, eye with optic nerve, spinal cord, peripheral nerves and dorsal and ventral root ganglia were examined microscopically. Statistical methods: Evaluation of equality of group means was made by the appropriate statistical method, followed by a multiple comparison test if needed. Bartletts' test was performed to determine if groups had equal variances. For all parameters except organ weights, if the variances were equal, parametric procedures were used; if not, nonparametric procedures were used. The parametric method used was the standard one-way analysis of variance (ANOVA) using the F ratio to assess significance. If significant differences among the means were indicated, additional tests were used to determine which means were significantly different from the control: Dunnett's, Williams, or Cochran and Cox's modified t-test. The nonparametric method was the Kruskal-Wallis test and if differences were indicated, Shirley's tes, Dunn's test, Steel's test or Pairwise Comparison with Bonferroni Correction were used to determine where means differed from control. Bartlett's test for equality of variance was conducted at the 1% significance level; all other statistical tests were conducted at the 5% and 1% significance levels. Neurobehavioral statistics: The statistical analysis of the continuous FOB variables was by a mixed model analysis of covariance with a first order autoregressive error structure on the time points. The pretest response was used as the covariate. The residuals from the model were tested for normality by the Shapiro-Wilk test. Those variables that did not exhibit normally distributed residuals at the 0.01 level of significance were transformed by Blom's normalized rank transformation and reanalyzed. The nominal and count data of the FOB were analyzed by a cumulative logit repeated measures analysis. The statistical model partitions the variation of the response variable among the variables sex, dose group, week number and their interactions. Motor activity data were analyzed by a mixed model analysis of covariance with an unstructured error relationship among the five-minute periods, and a first order autoregressive error structure on weeks. The pretest response was used as the covariate. The residuals from the model were tested for normality by the Shapiro-Wilk test. Those variables that did not exhibit normally distributed residuals at the 0.01 level of significance were transformed by Blom's normalized rank transformation and reanalyzed.

	Satellite groups of animals for genetic toxicity, immunotoxicity and glial fibrillary acidic protein [GFAP] measurement assays were exposed with the subchronic animals. Robust summaries for these studies are provided separately.

Test Results – Repeated-Dose Toxicity

Concentration (LOAEL/LOAEC/ NOAEL/NOAEC):

LOAEL/LOAEC/ NOAEL/NOAEC	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units
LOAEL	Both sexes	=	20000		mg/m^3
NOAEL	Both sexes	=	10000		mg/m^3

Results Remarks:

The mean (± standard deviation) analytical exposure concentrations of Baseline Gasoline Vapor Condensate were determined to be 0 ± 0, 2050 ± 154, 10148 ± 739 and 20324 ± 1183mg/m^3 for the Air Control and the exposure groups, respectively. The analytically measured exposure levels of the airborne test substance were reasonably close to the targeted exposure levels and the nominal exposure levels. Chamber environmental conditions averaged 24^{0}C and 45% relative humidity. Particle sizing results indicated that the atmospheres were essentially vapor only, as expected, since there was no substantial difference between the particulate levels in the test substance chambers and the Air Control chambers. Analysis of the major components in the neat test substance and the test atmospheres showed a close comparison between the neat test substance and the vaporized test substance. This data demonstrated that the test animals were exposed, as expected, to all of the major components of the test substance in their proper proportion. The data was also consistent from week-to-week during the study indicating stability of the test substance and the atmosphere generation techniques.

All animals survived throughout the exposures and recovery phases of the study except a 20000 mg/m^3 exposed male which was humanely sacrificed on day 34 of the exposures phase because of an accidental injury, a 10000 mg/m^3 exposed male which was found dead on day 58 of the exposures phase and a 10000 mg/m^3 exposed male which was humanely sacrificed on day 69 of the exposures phase because of swollen limbs. These deaths were considered unrelated to test substance exposure.

The test animals were unremarkable in the chambers during the exposure periods. The test animals were also generally unremarkable during the non-exposure periods. However, a slight increase in red nasal discharge was seen in the 20000mg/m^3 animals during the 13 weeks of exposures but not during the 4-week recovery period. There were no toxicologically significant differences in ophthalmoscopic findings in the test animals compared to

	the Air Control animals. There were no toxicologically significant differences in body weights and feed consumption in the test animals compared to the Air Control animals. Test substance exposure was not associated with any change in counts of the 26 nominal or the 4 continuous FOB measures or with changes in motor activity. There were no toxicologically significant differences in clinical chemistry, hematology and coagulation values in the test substance animals compared to the Air Control animals at the 4th week and terminal intervals. There were no toxicologically significant differences in organ weights and brain measurements in the test animals compared to the Air Control animals at the Terminal and/or Recovery intervals. No gross abnormalities related to test substance exposure were evident on necropsy examination. Some of the male and female rats exposed to 20000 mg/m^3 of Baseline Gasoline Vapor Condensate had eosinophilic material within the nasolacrimal duct lumen at the Terminal sacrifice. This finding was considered to correlate with the increase in red nasal discharge noted previously in this group of test animals. Similar changes were not evident in control animals. Microscopic findings that were considered exposure-related were found also in the kidneys of male animals exposed to all levels of Baseline Gasoline Vapor Condensate following the Terminal sacrifice. These renal histopathologic changes were consistent with hyaline droplet nephropathy, attributable to accumulation of alpha-2 microglobulin within renal tubular epithelial cells. This species- and gender-specific change has been well documented in male rats exposed to a variety of hydrocarbon compounds and is not considered relevant to humans (US EPA 1991). The 20000 mg/m^3 exposed males sacrificed following a 4-week recovery period had near complete resolution of the relevant histologic changes. No test substance related histopathologic changes were noted in other protocol-specified tissues including lung, nasoturbinates, and larynx. No neuropathologic microscopic changes attributable to test substance effect were observed in brain, spinal cord, eyes, peripheral nerves, or ganglia among the 20000 mg/m^3 exposed satellite animals.
Conclusion:	Thirteen weeks of exposure of rats to Baseline Gasoline Vapor Condensate resulted in hydrocarbon nephropathy in male animals exposed to all exposure levels of vapor, a species and sex specific syndrome not considered to be relevant to human risk assessment. Exposure also resulted in slight but reversible increases in red nasal discharge in animals exposed to 20000 mg/m^3 of vapor. Therefore, the 10000mg/m^3 exposure level (excluding male rat nephropathy) was considered a no observable adverse effect level. The NOAEL for neurotoxicity =20000mg/m^3
Reliability/Data Quality – Repeated-Dose Toxicity	

Reliability:	**1**. Reliable without restriction
Reliability Remarks:	HPV Supporting study from Section 211(b) Testing Consortium, Fuels and Fuel Additives Health Effects Testing Regulation, administered by API, Washington DC
Key Study Sponsor Indicator:	Not a Key Study
Reference – Repeated-Dose Toxicity	
Reference:	Baseline Gasoline Vapor Condensate: A 13-Week Whole Body Inhalation Toxicity Study in Rats with Neurotoxicity Assessments and 4-Week In Vivo Genotoxicity and Immunotoxicity Assessments. 2005. HLS Study No. 00-6125. Huntingdon Life Sciences Laboratories, East Millstone, NJ US EPA 1991. Alpha 2 microglobulin: Association of chemically induced renal toxicity and neoplasia in male rats. In Risk Assessment Forum, p.85. US Govt Printing Office, Washington DC

High Production Volume Information System (HPVIS)

Repeated-Dose Toxicity

Test Substance – Repeated-Dose Toxicity	
Category Chemical:	No cas number
Test Substance:	No Cas number
Test Substance Purity/Composition and Other Test Substance Comments:	Light Naphtha N-Hexane Rich(no CAS provided) Test material designation F-186 Test material was applied neat
Category Chemical Result Type:	measured
Method – Repeated-Dose Toxicity	
Route of Administration:	dermal
Type of Exposure:	Occluded for 6 hr post treatment
Species:	rat
Mammalian Strain:	Sprague-Dawley
Gender:	Males & females
Number of Animals per Dose:	10
Dose:	0, 0.05, 0.25, or 1.0 ml/kg
Year Study Performed:	1992
Method/Guideline Followed:	unknown
GLP:	yes
Exposure Period:	28 days
Frequency of Treatment:	5 days per week for 4 weeks
Post-Exposure Period:	none
Method/Guideline and Test Condition Remarks:	Dermal irritation pilot studies were conducted in order to set the study doses to minimize confounding by site of application effects. Sponsor protocol number ATX-91-0078; Study number 66195 Groups of 10 rats/sex/dose were administered F-186 to the clipped areas on the back, 5 days/week for four

weeks at doses of 0, 0.05, 0.25 and 1.0 ml/kg-bw/day. The site of application was occluded for 6 hr after administration of test article. The sham control group was treated in the same manner as were the test article-treated, with the exception of the application of test article.

Animals were observed twice daily for viability and signs of toxicity. Dermal irritation was evaluated once each day just prior to dosing, twenty-our hours after the fifth dose each week, and just prior to necropsy. Body weights were recorded three times per week during the study. At the time of necropsy, fasted body weights and organ weights (adrenal glands, brain, kidney, liver, testes/ovaries) were determined, blood samples were collected for hematology and clinical chemistry evaluation, and selected tissues were collected for histological evaluation. The following tissues were evaluated histologically for sham control and high dose groups:

Adrenal glands
Brain
- cerebellum
- cerebrum
- medulla pons
Cervical lymph nodes
Gastrointestinal tract
- stomach
- duodenum
- jejunum
- ileum
- colon
- rectum
Gross lesions
heart
kidneys (2)
liver
lungs
pancreas
salivary glands
skin (control &treated)
spleen
sternum & bone marrow
testes/ovaries (2)
thyroid
thymus
urinary bladder

Test Results – Repeated-Dose Toxicity

Concentration (LOAEL/LOAEC/ NOAEL/NOAEC):

LOAEL/LOAEC/ NOAEL/NOAEC	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units
NOAEL	males	>	1.0		ml/kg
NOAEL	females	>	1.0		ml/kg

Results Remarks:

F-186 induced moderate dermal irritation at a dose of 1.0 ml/kg/day as evidenced by grossly visible lesions and by microscopic histopathological changes in the skin. Slight dermal irritation was noted at a dose of 0.25 ml/kg/day. Very slight dermal irritation was noted at a dose of 0.05 ml/kg/day.

No effects were observed in any other parameters evaluated that could be attributed to the dermal administration of F-186.

	No animals died prior to scheduled termination. There were no significant body or organ weight differences between treated and control rats. Clinical observations were confined to irritation at site of application. Dermal irritation was the only gross necropsy finding. There were no treatment-induced changes in hematology or clinical chemistry. Histopathology findings were confined to site of high dose test material application, as described above.
Conclusion:	Under the conditions of this study the NOELS for both sexes of Sprague Dawley rats were: Dermal irritation NOEL < 0.05 ml/kg/day (lowest dose tested) Systemic NOEL > 1.0 ml/kg/day (highest dose tested)
Reliability/Data Quality – Repeated-Dose Toxicity	
Reliability:	1 - valid without restrictions
Reliability Remarks:	Although not a guideline study, the study was well conducted and well described, as well as being conducted under GLPs.
Key Study Sponsor Indicator:	Not a key study
Reference – Repeated-Dose Toxicity	
Reference:	UTBL, Inc. 1992. 28 Day dermal toxicity study in rats ATX-91-078; Test Article F-186 (Light Naphtha N-Hexane Rich); Study No. 66195. Salt Lake City, UT. Study available from the American Petroleum Institute, Washington, DC.

High Production Volume Information System (HPVIS)

Repeated-Dose Toxicity	
Test Substance – Repeated-Dose Toxicity	
Category Chemical:	No CAS number
Test Substance:	No CAS number
Test Substance Purity/Composition and Other Test Substance Comments:	Unleaded gasoline blend: 45% alkanes (paraffins and naphthenes), 12% alkenes (olefins) and 43% aromatics [Estimated]. Boiling range 10%bp 112^{0}F to 90%bp 326^{0}F
Category Chemical Result Type:	measured
Method – Repeated-Dose Toxicity	
Route of Administration:	Inhalation
Type of Exposure:	Whole body
Species:	rat
Mammalian Strain:	Sprague Dawley
Gender:	Males and females
Number of Animals per Dose:	10/sex/group
Dose:	0 (Chamber air control), 0 (Animal Room air control), 0.11, 1.58, 12.61mg/L (29, 416, 3316ppm)
Year Study Performed:	1984
Method/Guideline Followed:	none
GLP:	Not specified
Exposure Period:	21 days
Frequency of Treatment:	6hr/day, 5/day/week
Post-Exposure Period:	no
Method/Guideline and Test Condition Remarks:	This study was one of series of studies to investigate the relationship of petroleum stream chemical composition and renal toxicity in rats. Exposure concentrations were selected following an acute inhalation toxicity assessment; highest concentration was selected based on the maximum tolerated dose at which toxicity was observed or where no toxicity was seen as 20% of the lower

	explosive limit. Male and female rats were exposed via inhalation to concentrations of 0, 0.11, 1.58, 12.61 mg/L for 21 days (6hr/day; 5 d/week for total of 15 exposures). Test material was generated by flash evaporation and monitored by IR spectrometry and/or gas chromatography. At the end of 21 days, animals were sacrificed and general toxicity and kidney effects were evaluated. Reported results focus on kidney effects.

Test Results – Repeated-Dose Toxicity

Concentration (LOAEL/LOAEC/ NOAEL/NOAEC):

LOAEL/LOAEC/ NOAEL/NOAEC	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units
LOAEL	males	=	0.11		mg/L
NOAEL	males	<	0.11		mg/L
NOAEL	female	≥	12.61		mg/L

Results Remarks:	The LOAEL and NOAEL presented here address only kidney effects in male rats induced by light hydrocarbons, effects which are not relevant to human health assessment (US EPA, 1991). Mild tubular degeneration/regeneration and increased levels of hyalin droplets were observed in treated male rats. One high dose male rat exhibited corticomedullary tubular dilatation and necrosis. Adverse renal effects were not reported for female animals in any group. Relative potency ranking for kidney effects of test materials in this study is full range alkylate naphtha >>thermal-cracked naphtha >> polymerization naphtha > light catalytic reformed naphtha > light straight-run naphtha/ **unleaded gasoline blend** > light catalytic cracked naphtha >> heavy catalytic-reformed naphtha, respectively.
Conclusion:	Unleaded gasoline induced mild renal effects in male rats compared to other materials tested in this series. The results from this study are similar to other more fully reported studies on similar gasoline blends.

Reliability/Data Quality – Repeated-Dose Toxicity

Reliability:	**2.** Reliable with restrictions
Reliability Remarks:	Duration of study is 21 days and reported results focused only on hydrocarbon induced renal effects that are not relevant to human health.
Key Study Sponsor Indicator:	NOT A KEY STUDY

Reference – Repeated-Dose Toxicity

Reference:	Halder, C.A., Warne, T.M., and Hatoum, N.S. 1984. Renal toxicity of gasoline and related petroleum naphthas in male rats. Chapter VI in Renal Effects of Petroleum

	Hydrocarbons, Mehlman et al., Eds. Princeton Scientific Publishers, Princeton, NJ pp. 73-88. U.S. Environmental Protection Agency. Alpha 2 microglobulin: association with chemically induced renal toxicity and neoplasia in the male rat. 1991. In Risk Assessment Forum. US Government Printing Office, Washington, DC: EPA: 85

High Production Volume Information System (HPVIS)

Repeated-Dose Toxicity	
Test Substance – Repeated-Dose Toxicity	
Category Chemical:	No CAS number
Test Substance:	No CAS number
Test Substance Purity/Composition and Other Test Substance Comments:	Unleaded gasoline blend: 45% alkanes(paraffins and naphthenes), 12% alkenes (olefins)and 43% aromatics [Estimated]. Boiling range 10%bp 112^{0}F to 90%bp 326^{0}F
Category Chemical Result Type:	measured
Method – Repeated-Dose Toxicity	
Route of Administration:	Inhalation
Type of Exposure:	Whole body
Species:	rat
Mammalian Strain:	Sprague Dawley
Gender:	Males and females
Number of Animals per Dose:	20/sex/group [10/sex/group for 90 treatment days and 10/sex/group maintained for untreated recovery period]
Dose:	0 (Chamber air control), 0 (Animal Room air control), 0.15, 1.44, 14.70mg/L (40, 379, 3866ppm)
Year Study Performed:	1984
Method/Guideline Followed:	none
GLP:	Not specified
Exposure Period:	90 days
Frequency of Treatment:	6hr/day, 5/day/week
Post-Exposure Period:	4 weeks
Method/Guideline and Test Condition Remarks:	This study was one of series of studies to investigate the relationship of petroleum stream chemical composition and renal toxicity in rats. Male and female rats were exposed via inhalation to concentrations of 0, 0.15, 1.44, 14.70mg/L for 90 days (6hr/day; 5 d/week for a total of 65 exposures). Test material was generated by flash evaporation and monitored by IR spectrometry and/or gas

	chromatography. At the end of 90 days, 10 animals/sex/group were sacrificed and general toxicity and kidney effects were evaluated. After a 4-week recovery period, the remaining 10 rats/sex/group were sacrificed. Reported results focus on kidney effects.

Test Results – Repeated-Dose Toxicity

Concentration (LOAEL/LOAEC/ NOAEL/NOAEC):

LOAEL/LOAEC/ NOAEL/NOAEC	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units
LOAEL	males	=	0.15		mg/L
NOAEL	males	<	0.15		mg/L
NOAEL	female	≥	14.70		mg/L

Results Remarks:	The LOAEL and NOAEL presented here address only kidney effects in male rats induced by light hydrocarbons, effects which are not relevant to human health assessment (US EPA, 1991). Treatment-related incidence and dose-related severity of tubular dilatation and necrosis at the cortico-medullary junction was observed in male rats only. Tubular necrosis was observed at both terminal sacrifice and following the 4-week recovery period. Incidence and severity were similar at both sacrifice periods, suggesting that the nephrotoxic effects may be irreversible. No adverse renal effects were reported for females in any dose group. (Hyalin droplet accumulation and cortical tubular degeneration/regeneration were not reported in text or summary table but likely occurred similar to the 21-day study.)
Conclusion:	The renal effects observed with the unleaded gasoline blend in this 90 day study occurred with increased incidence and greater severity in male rats than those sexposed for 21 days. The results from this study are similar to other more fully reported studies on similar gasoline blends.

Reliability/Data Quality – Repeated-Dose Toxicity

Reliability:	**2.** Reliable with restrictions
Reliability Remarks:	Although the duration of study was 90 days, the reported results focused only on hydrocarbon induced renal effects, detailing only tubular necrosis in male rats. Kidney effects are not relevant to human health
Key Study Sponsor Indicator:	NOT A KEY STUDY

Reference – Repeated-Dose Toxicity

Reference:	Halder, C.A., Warne, T.M., and Hatoum, N.S. 1984. Renal toxicity of gasoline and related petroleum naphthas in male rats. Chapter VI in Renal Effects of Petroleum Hydrocarbons, Mehlman et al., Eds. Princeton Scientific Publishers, Princeton, NJ pp. 73-88.

	U.S. Environmental Protection Agency. Alpha 2 microglobulin: association with chemically induced renal toxicity and neoplasia in the male rat. 1991. In Risk Assessment Forum. US Government Printing Office, Washington, DC: EPA: 85

High Production Volume Information System (HPVIS)

Repeated-Dose Toxicity

Test Substance – Repeated-Dose Toxicity

Category Chemical:	64741-41-9
Test Substance:	64741-41-9,
Test Substance Purity/Composition and Other Test Substance Comments:	Naphtha, petroleum, heavy straight-run, Colorless liquid. MW 111.25. The test substance is a mixture that contains approximately 225 volatile hydrocarbons. The purity of the mixture is 100% Stable based on analyses of chamber atmosphere. 12 Representative Components monitored in Study

Component	Volume %
2-Methyl C6 + C7-olefin	4.50
3-Methylhexane	3.52
t-1,3-Dimethylcyclopentane	1.45
t-1,2-Dimethylcyclopentane	1.61
n-Heptane	7.23
Methylcyclohexane	6.76
Toluene	3.44
2-Methylheptane	3.25
n-Octane	5.81
Ethylcyclohexane	1.95
m-Xylene	1.71
n-Nonane	4.47

Category Chemical Result Type:	Measured

Method – Repeated-Dose Toxicity

Route of Administration:	Inhalation
Type of Exposure:	Whole body
Species:	Rat
Mammalian Strain:	Sprague Dawley Crl:CD(SD)
Gender:	Male and female
Number of Animals per Dose:	12 males/12 subchronic females/12 satellite breeding females/group
Dose:	Target: 0, 100, 500, 3000ppm (0, 455, 2275, 13650mg/m^3) Actual: 0, 100, 520, 2950ppm (0, 455, 2366, 13423mg/m^3) The mean concentrations (±SE) representing the total area for the approximately 225 components contained in the test substance over the test period were 100 ± 0.8,

	500 ± 2.0, and 3000 ± 8.3ppm in chambers targeted at 100, 500, and 3000ppm, respectively. Results from the cryogenic GC analysis indicated that the components were present in the chamber atmosphere within expected concentrations.
Year Study Performed:	2008
Method/Guideline Followed:	OECD 422 [Details of Reproductive/Developmental Screen presented in separate robust summary]
GLP:	Yes
Exposure Period:	Actual 30 and 31 days for subchronic males and females, respectively;
Frequency of Treatment:	6 hours/day, 7 days/week
Post-Exposure Period:	None
Method/Guideline and Test Condition Remarks:	Concentrations of Naphtha vapor were generated by flash evaporation of the test material. An air control group was also evaluated using a similar generation apparatus; however, no test material was supplied to this vapor generator. Vapor concentrations of Naphtha were measured by gas chromatography (GC) using the area sum function and integrating all of the eluted peaks. Additional air samples were collected weekly and analyzed for 12 of the larger, most representative components of the test substance using a cryogenic GC. Temperature, humidity, and airflow were also recorded periodically during each exposure day. Exposures were conducted for 6 hours per day, 7 days per week. Groups of 12 young, adult, male or nulliparous, non-pregnant female Crl:CD(SD) rats were exposed to atmospheres containing 0, 100, 500, or 3000ppm of Naphtha for 30- 31 days. Satellite females without evidence of mating during the 2-week period continued to be exposed for 26 days after the end of the cohabitation period. Body weights, clinical signs, and food consumption were recorded throughout the study. Body weight data were collected weekly for males, subchronic females and satellite females without evidence of copulation. After approximately 30 days of exposure, blood samples were collected from all male and all subchronic female rats for measurement of haematology and clinical chemistry parameters. An abbreviated neurobehavioral evaluation was conducted on all males, subchronic females, and satellite females prior to test substance administration in order to obtain baseline measurements, and again during week 4 [test days 26-29] in the morning prior to daily exposure for males and subchronic females Neurobehavioral evaluation consisted of motor activity and a modified Functional Observational Battery [FOB] of open field (approach and touch response, auditory response and tail pinch), papillary response, and fore and hind limb grip strength. Males and subchronic females were sacrificed after approximately 30 days of

exposure, organs (liver, kidneys, lungs, adrenal glands, thymus, brain, spleen, heart, testes with epididymides, prostate, ovaries with oviducts, and uterus with cervix) were weighed, and 36 selected tissues were evaluated microscopically.

Statistical analysis: Preliminary statistical analyses included Levene's test for homogeneity and Shapiro-Wilk test for normality, followed by one-way analysis of variance [ANOVA] and Dunnett/Tamhane-Dunnett's test or Kruskall-Wallis and Dunn's test as appropriate. Repeated measure ANOVA with Linear contrasts or Jonckheere-Terpstra trend test was used for motor activity and grip strength.

Test Results – Repeated-Dose Toxicity

Concentration (LOAEL/LOAEC/ NOAEL/NOAEC):

LOAEL/LOAEC/ NOAEL/NOAEC	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units
LOAEL	Both sexes	=	13650 target 13423 actual		mg/m^3
NOAEL	Both sexes	=	2275 target 2366 actual		mg/m^3
NOAEL	Neuro-toxicity	≥	13650 target 13423 actual		mg/m^3
					mg/m^3

Results Remarks:

Mortality did not occur at any exposure concentration. Test substance-related increases in the incidence of stained and wet fur in males and subchronic females were observed in the 3000ppm group; however, this did not adversely impact the health of the animals. In 3000ppm subchronic females, adverse, test substance-related, decreases in body weight, and weight gain (35% lower than controls) occurred. Slightly decreased body weight and/or weight gain occurred in 3000ppm males however, the magnitude of the effects was not statistically significant. No adverse effect on body weight or weight gain were seen in any animals in the 500 or 100ppm groups

Summary of Body Weight, Weight Gain in Subchronic Rats exposed to Naphtha

Dose (ppm)	Male		Female	
	Day 29 BW (g)	BW gain (g) Days 1-29	Day 29 BW (g)	BW gain(g) Days 1-29
0	433.7	132.7	269.5	51.1
100	422.5	127.0	263.7	46.9
500	413.6	120.0	266.7	48.7
3000	413.7	112.6	248.1	33.3*

Note: BW = body weight; BWG = body weight gain,
*Statistically significant at $p<0.05$ by Dunnett/Tamhane-Dunnett

Decreases in food consumption correlated with decreased body weight and weight gains for animals in the 3000ppm

	group. Food efficiency was significantly reduced in subchronic 3000ppm females (0.057 vs 0.085 control). No test-substance related effects were seen on food consumption or efficiency in 100 or 500ppm groups or on food efficiency in 3000ppm males. There were no adverse or test substance related effects on haematology or clinical chemistry parameters. Liver weight parameters were increased in 3000ppm males and females, which correlated with hepatocellular hypertrophy and were consistent with pharmacological induction of hepatic enzymes. Kidney weight parameters were increased in 500ppm and above males and in 3000ppm females. In males, the increased absolute/relative kidney weights correlated with hyaline droplet accumulation, which was observed in 100ppm and above males, indicative of light hydrocarbon nephropathy, a species and sex specific syndrome not relevant to humans (EPA, 1991). In 3000ppm subchronic females, the increased kidney weight parameters were not associated with any functional or microscopic change, and therefore were considered secondary to non-adverse enzyme induction. Minimal hypertrophy of thyroid follicular epithelium occurred in 3000ppm males and females, possibly secondary to the liver enzyme induction. The systemic toxicity LOAEL exclusive of kidney effects = 3000ppm (13650mg/m^3) based on decreased body weight, weight gain and decreased food efficiency in females and on hypertrophy of thyroid follicular epithelium in 3000ppm males and females. Systemic NOAEL = 500ppm (2275mg/m^3) Neurobehavioral Toxicology: There were no test substance-attributed or statistically significant differences in forelimb or hindlimb grip strength in subchronic males and females at any concentration of the test substance. Pupillary constriction response and open field parameters consisting of approach and touch response, auditory response and tail pinch response were comparable for all treated groups and controls. Motor activity [duration of movement and number of movements] did not demonstrate any test substance related adverse effects. Males assigned to the 3000ppm group had statistically significantly lower motor activity compared to the control group mean at both the baseline pre-exposure evaluation and the week 4 evaluation, indicating that this effect was a function of the group composition and was not induced by high naphthenic naphtha vapor exposure. The NOAEL for neurobehavioral toxicity was 3000ppm (13650mg/m^3), the highest concentration tested.
Conclusion:	Exposure to this heavy straight run naphtha at 3000ppm induced some systemic toxicity in male and female rats expressed as reduced body weight and weight gain, decreased food efficiency in females and hypertrophy of thyroid follicular epithelium in both sexes. Hydrocarbon nephropathy was seen in male rats at all

	doses but is a species and sex-specific syndrome not relevant to human risk assessment [US EPA, 1991] and thus was not included in determining the systemic NOAEL of 500ppm. This naphtha did not induce neurotoxic adverse effects and is not considered a neurobehavioral toxicant.
Reliability/Data Quality – Repeated-Dose Toxicity	
Reliability:	1. Reliable without restriction
Reliability Remarks:	
Key Study Sponsor Indicator:	Key study The reproductive/developmental toxicity segment of this study is described in a separate Robust Summary.
Reference – Repeated-Dose Toxicity	
Reference:	Naphtha, Petroleum, Heavy Straight-run: Combined Repeated Dose Toxicity Study With the Reproduction/Developmental Toxicity Screening Test in Rats (OECD 422). 2008. DuPont Haskell Global Centers for Health and Environmental Sciences Project ID DuPont-18331. Newark, DE. Sponsored by Petroleum HPV Testing Group, API, Washington, DC. US EPA 1991. Alpha 2 microglobulin: Association of chemically induced renal toxicity and neoplasia in male rats. In Risk Assessment Forum, p.85. US Govt Printing Office, Washington DC

High Production Volume Information System (HPVIS)

Repeated-Dose Toxicity

Test Substance – Repeated-Dose Toxicity	
Category Chemical:	64741-46-4
Test Substance:	64741-46-4
Test Substance Purity/Composition and Other Test Substance Comments:	Light Straight run naphtha: 96% alkanes(paraffins and naphthenes), 0% alkenes (olefins)and 4% aromatics. Boiling range 10%bp 71^{0}F to 90%bp 222^{0}F
Category Chemical Result Type:	measured
Method – Repeated-Dose Toxicity	
Route of Administration:	Inhalation
Type of Exposure:	Whole body
Species:	rat
Mammalian Strain:	Sprague Dawley
Gender:	Males and females
Number of Animals per Dose:	10/sex/group
Dose:	0 (chamber air control), 0 (animal room control), 1.50, 5.13, 14.56mg/L (395, 1349, 3829ppm)
Year Study Performed:	1984
Method/Guideline Followed:	none
GLP:	Not specified
Exposure Period:	21 days
Frequency of Treatment:	6hr/day, 5/day/week
Post-Exposure Period:	no
Method/Guideline and Test Condition Remarks:	This study was one of series of studies to investigate the relationship of petroleum stream chemical composition and renal toxicity in rats. Exposure concentrations were selected following an acute inhalation toxicity assessment; highest concentration was selected based on the maximum tolerated dose at which toxicity was observed or where no toxicity was seen as 20% of the lower explosive limit.

	Male and female rats were exposed via inhalation to concentrations of 0, 1.50, 5.13, 14.56mg/L for 21 days (6hr/day; 5 d/week for total of 15 exposures). Test material was generated by flash evaporation and monitored by IR spectrometry and/or gas chromatography. At the end of 21 days, animals were sacrificed and general toxicity and kidney effects were evaluated. Reported results focus on kidney effects.

Test Results – Repeated-Dose Toxicity

Concentration (LOAEL/LOAEC/ NOAEL/NOAEC):

LOAEL/LOAEC/ NOAEL/NOAEC	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units
LOAEL	males	=	1.50		mg/L
NOAEL	males	<	1.50		mg/L
NOAEL	female	≥	14.56		

Results Remarks:	The LOAEL and NOAEL presented here address only kidney effects in male rats induced by light hydrocarbons, effects which are not relevant to human health assessment (US EPA, 1991) Males developed marked increase in hyalin droplet accumulation and treatment and dose-related cortical tubular degeneration and regeneration as well as tubular dilatation and necrosis at the cortico-medullary junction in 3 high dose males. Low non-significant incidence of cortical tubular regenerative hyperplasia seen in all groups of females and control males. Relative potency ranking for kidney effects of test materials in this study is full range alkylate naphtha >>thermal-cracked naphtha >> polymerization naphtha > light catalytic reformed naphtha > **light straight-run naphtha**/ unleaded gasoline blend > light catalytic cracked naphtha >> heavy catalytic-reformed naphtha, respectively.
Conclusion:	The LOAEL for this material is the lowest dose tested based on the occurrence of increased incidence of hyalin droplets and dose-related cortical tubular degeneration and regeneration. Potency ranking indicates that light straight run naphtha is a moderate inducer of hydrocarbon -induced nephropathy in male rats. The results from this study are similar to other more fully reported studies on the same or similar test material.

Reliability/Data Quality – Repeated-Dose Toxicity

Reliability:	**2.** Reliable with restrictions
Reliability Remarks:	Duration of study is 21 days and reported results focused only on hydrocarbon induced renal effects that are not relevant to human health.

Key Study Sponsor Indicator:	NOT A KEY STUDY
Reference – Repeated-Dose Toxicity	
Reference:	Halder, C.A., Warne, T.M., and Hatoum, N.S. 1984. Renal toxicity of gasoline and related petroleum naphthas in male rats. Chapter VI in Renal Effects of Petroleum Hydrocarbons, Mehlman et al., Eds. Princeton Scientific Publishers, Princeton, NJ pp. 73-88. U.S. Environmental Protection Agency. Alpha 2 microglobulin: association with chemically induced renal toxicity and neoplasia in the male rat. 1991. In Risk Assessment Forum. US Government Printing Office, Washington, DC: EPA:85

High Production Volume Information System (HPVIS)

Repeated-Dose Toxicity

Test Substance – Repeated-Dose Toxicity	
Category Chemical:	64741-55-5
Test Substance:	64741-55-5
Test Substance Purity/Composition and Other Test Substance Comments:	Test material is Light Catalytically Cracked Naphtha (LCCN); CAS # 64741-55-5 Sponsor (Mobil) test material designation "MEHSL CRU # 84152" Test material was applied neat. LCCN is a hydrocarbon refinery stream used mainly in gasoline. It is comprised primarily of low boiling compounds in the C4 to C8 range, it has a boiling range of 82°F to 363°F and contains approximately 33% paraffins, 25% olefins, 15% naphthenes, and 27% aromatics.
Category Chemical Result Type:	measured
Method – Repeated-Dose Toxicity	
Route of Administration:	dermal
Type of Exposure:	Not occluded
Species:	rat
Mammalian Strain:	Sprague Dawley
Gender:	Males & females
Number of Animals per Dose:	15
Dose:	0, 30, 125, or 300 mg/kg/day
Year Study Performed:	1988
Method/Guideline Followed:	No data
GLP:	unknown
Exposure Period:	90 days
Frequency of Treatment:	5 days per week
Post-Exposure Period:	none

Method/Guideline and Test Condition Remarks:	Light catalytically cracked naphtha (LCCN) (MEHSL CRU # 84152) was applied to the back of groups of 15 male and 15 female Sprague Dawley rats 5 days/week for 13 weeks at dose levels of 30, 125, or 300 mg/kg bw/day. LCCN was dispensed by volume from a syringe and left uncovered on the skin. The rats were fitted with cardboard Elizabethan collars to minimize ingestion of the test material. A similar group of 15 males and 15 females served as controls; they were treated in the same manner as the test animals except that not material was applied to their skin. Assessment for toxic responses included body and organ weights (adrenals, brain, gonads, heart, liver, prostate, and thymus), clinical observations, sperm morphology, hematology, serum chemistry, urinalyses, gross necropsy, and histopathology. For percutaneous absorption assessment, LCCN containing radioactive n-octane was applied inside a 1.25 sq. inch non-occlusive Bronaugh cell to untreated animals and animals pre-treated for 13 weeks with cold LCCN. Percent applied dose recovered in urine, feces, and tissues was determined over 96 hrs.

Test Results – Repeated-Dose Toxicity

Concentration (LOAEL/LOAEC/ NOAEL/NOAEC):

LOAEL/LOAEC/ NOAEL/NOAEC	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units
NOAEL	males	>	300		Mg/kg bw/day
NOAEL	females	>	300		Mg/kg bw/day

Results Remarks:	There were no indications of systemic toxicity from 13 weeks dermal application of LCCN at dose levels up to 300 mg/kg bw/day. There were no treatment-related effects on mortality or body weight; no animals died prior to scheduled termination. There were no adverse effects on hematologic parameters measured. At weeks 9 and 13, WBC counts for the high-dose (300 mg/kg/day) males were greater than for control males; the differences occurred because the values for the control animals decreased during the study, not because the values for the treated animals increased. The WBC counts for the high-dose males were within the normal range. No differences were seen in females. Therefore, these differences were not regarded as indicating toxicity. No organs were directly affected by the test material as judged by serum chemistry, clinical observations,

	organ weights, gross necropsy, or microscopic evaluation of organ structures. There were no differences seen in sperm morphology. Moderate erythema, slight edema (in males only), and flaking of the skin were observed in all treated groups of box sexes during the dosing phase of the study. These were difficult to score because the skin was covered with scabs, apparently from the animals scratching themselves. Microscopic examination of the skin indicated mild to moderate epidermal hyperplasia, mild inflammation of the superficial dermis, and ulceration. The degree of skin reaction was surprising since the material was not covered and appeared to evaporate from the skin within minutes. Radioactive n-octane was used as a marker for LCCN penetration through the skin. The dermal bioavailability was approximately 1%. The penetration was not affected by prior treatment of the rats with LCCN for 13 weeks.
Conclusion:	The LCCN test material did cross the skin barrier & was systemically available; the dermal bioavailability was approximately 1%. Dermal irritation at site of application was observed in both males and females. No treatment related systemic toxicity was observed at any dose. The subchronic portal-of-entry and systemic NOAELs for both male and female Sprague Dawley rats was < 30 mg/kg bw/day (lowest dose tested) and > 300 mg/kg bw/day (highest dose tested), respectively.
Reliability/Data Quality – Repeated-Dose Toxicity	
Reliability:	2 - valid with restrictions
Reliability Remarks:	This was a well conducted and well reported study. It is unknown if the study was conducted under GLP or if there was internal laboratory QA/QC.
Key Study Sponsor Indicator:	Not a key study
Reference – Repeated-Dose Toxicity	
Reference:	Mobil Environmental and Health Science Laboratory. 1988. Thirteen week dermal administration of light catalytically cracked naphtha (LCCN) to rats; Study No. 50381. Princeton, NJ.

High Production Volume Information System (HPVIS)

Repeated-Dose Toxicity	
Test Substance – Repeated-Dose Toxicity	
Category Chemical:	64741-55-5
Test Substance:	64741-55-5
Test Substance Purity/Composition and Other Test Substance Comments:	Light catalytic cracked naphtha: 39% alkanes(paraffins and naphthenes), 32% alkenes (olefins)and 29% aromatics. Boiling range 10%bp 174^{0}F to 90%bp 346^{0}F
Category Chemical Result Type:	measured
Method – Repeated-Dose Toxicity	
Route of Administration:	Inhalation
Type of Exposure:	Whole body
Species:	rat
Mammalian Strain:	Sprague Dawley
Gender:	Males and females
Number of Animals per Dose:	10/sex/group
Dose:	0 (Chamber air control), 0.20, 2.04, 13.06mg/L (43, 434, 2777ppm)
Year Study Performed:	1984
Method/Guideline Followed:	none
GLP:	Not specified
Exposure Period:	21 days
Frequency of Treatment:	6hr/day, 5/day/week
Post-Exposure Period:	no
Method/Guideline and Test Condition Remarks:	This study was one of series of studies to investigate the relationship of petroleum stream chemical composition and renal toxicity in rats. Exposure concentrations were selected following an acute inhalation toxicity assessment; highest concentration was selected based on the maximum tolerated dose at which toxicity was observed or where no toxicity was seen as 20% of the lower

	explosive limit. Male and female rats were exposed via inhalation to concentrations of 0, 0.20, 2.04, 13.06mg/L for 21 days (6hr/day; 5 d/week for total of 15 exposures). Test material was generated by flash evaporation and monitored by IR spectrometry and/or gas chromatography. At the end of 21 days, animals were sacrificed and general toxicity and kidney effects were evaluated. Reported results focus on kidney effects.

Test Results – Repeated-Dose Toxicity

Concentration (LOAEL/LOAEC/ NOAEL/NOAEC):

LOAEL/LOAEC/ NOAEL/NOAEC	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units
LOAEL	males	=	0.20		mg/L
NOAEL	males	<	0.20		mg/L
NOAEL	female	≥	13.06		

Results Remarks:	The LOAEL and NOAEL presented here address only kidney effects in male rats induced by light hydrocarbons, effects which are not relevant to human health assessment (US EPA, 1991) Male rats showed mild nephrotoxicity only. Treatment related accumulation of hyalin droplets and a dose related increase in incidence of degeneration of proximal tubules in the renal cortex were observed. These effects were not seen in females in any groups or in control males. Relative potency ranking for kidney effects of test materials in this study is full range alkylate naphtha >>thermal-cracked naphtha >> polymerization naphtha > light catalytic reformed naphtha > light straight-run naphtha/ unleaded gasoline blend > **light catalytic cracked naphtha** >> heavy catalytic-reformed naphtha, respectively.
Conclusion:	The LOAEL for this material is the lowest dose tested based on the occurrence of increased incidence of hyalin droplets and dose-related cortical tubular degeneration. Potency ranking indicates that light catalytic cracked naphtha is a weak inducer of hydrocarbon -induced nephropathy in male rats. The results from this study are similar to other more fully reported studies on the same or similar test material.

Reliability/Data Quality – Repeated-Dose Toxicity

Reliability:	**2.** Reliable with restrictions
Reliability Remarks:	Duration of study is 21 days and reported results focused only on hydrocarbon induced renal effects that are not relevant to human health.
Key Study Sponsor Indicator:	NOT A KEY STUDY

Reference – Repeated-Dose Toxicity	
Reference:	Halder, C.A., Warne, T.M., and Hatoum, N.S. 1984. Renal toxicity of gasoline and related petroleum naphthas in male rats. Chapter VI in Renal Effects of Petroleum Hydrocarbons, Mehlman et al., Eds. Princeton Scientific Publishers, Princeton, NJ pp. 73-88. U.S. Environmental Protection Agency. Alpha 2 microglobulin: association with chemically induced renal toxicity and neoplasia in the male rat. 1991. In Risk Assessment Forum. US Government Printing Office, Washington, DC: EPA:85

High Production Volume Information System (HPVIS)

Repeated-Dose Toxicity	
Test Substance – Repeated-Dose Toxicity	
Category Chemical:	64741-63-5
Test Substance:	64741-63-5
Test Substance Purity/Composition and Other Test Substance Comments:	Light catalytic reformed naphtha: 67% alkanes(paraffins and naphthenes), 2% alkenes (olefins)and 31% aromatics. Boiling range 10%bp 137^{0}F to 90%bp 230^{0}F
Category Chemical Result Type:	measured
Method – Repeated-Dose Toxicity	
Route of Administration:	Inhalation
Type of Exposure:	Whole body
Species:	rat
Mammalian Strain:	Sprague Dawley
Gender:	Males and females
Number of Animals per Dose:	10/sex/group
Dose:	0 (chamber air control), 0 (animal room control), 2.00, 5.85, 20.30mg/L (544, 1591, 5522ppm)
Year Study Performed:	1984
Method/Guideline Followed:	none
GLP:	Not specified
Exposure Period:	21 days
Frequency of Treatment:	6hr/day, 5/day/week
Post-Exposure Period:	no
Method/Guideline and Test Condition Remarks:	This study was one of series of studies to investigate the relationship of petroleum stream chemical composition and renal toxicity in rats. Exposure concentrations were selected following an acute inhalation toxicity assessment; highest concentration was selected based on the maximum tolerated dose at which toxicity was observed or where no toxicity was seen as 20% of the lower

	explosive limit. Male and female rats were exposed via inhalation to concentrations of 0, 2.00, 5.85 or 20.30mg/L for 21 days (6hr/day; 5 d/week for total of 15 exposures). Test material was generated by flash evaporation and monitored by IR spectrometry and/or gas chromatography. At the end of 21 days, animals were sacrificed and general toxicity and kidney effects were evaluated. Reported results focus on kidney effects.

Test Results – Repeated-Dose Toxicity

Concentration (LOAEL/LOAEC/ NOAEL/NOAEC):

LOAEL/LOAEC/ NOAEL/NOAEC	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units
LOAEL	males	=	2.00		mg/L
NOAEL	males	<	2.00		mg/L
NOAEL	female	≥	20.30		

Results Remarks:	The LOAEL and NOAEL presented here address only kidney effects in male rats induced by light hydrocarbons, effects which are not relevant to human health assessment (US EPA, 1991). A small but dose-related incidence of renal tubular necrosis at the corticomedullary junction was seen in treated male rats only at the mid and high dose. Proximal convoluted tubular degeneration/regeneration was observed in all male treated groups and the animal room controls but incidence and severity were not dose related. Hyalin droplet formation was observed in kidneys of male rats from all groups including controls but incidence and severity were significantly higher in treated animals. No kidney lesions were seen in female rats. Relative potency ranking for kidney effects of test materials in this study is full range alkylate naphtha >>thermal-cracked naphtha >> polymerization naphtha > **light catalytic reformed naphtha** > light straight-run naphtha/ unleaded gasoline blend > light catalytic cracked naphtha >> heavy catalytic-reformed naphtha, respectively.
Conclusion:	The LOAEL for this material is the lowest dose tested based on the occurrence of increased incidence of hyalin droplets. Small but dose-related incidence of renal tubular necrosis at the corticomedullary junction was seen in treated male rats beginning at the mid-dose. Potency ranking indicates that light catalytic reformed naphtha is a moderate inducer of hydrocarbon -induced nephropathy in male rats. The results from this study are similar to other more fully reported studies on the same or similar test material.

Reliability/Data Quality – Repeated-Dose Toxicity

Reliability:	**2.** Reliable with restrictions
Reliability Remarks:	Duration of study is 21 days and reported results focused only on hydrocarbon induced renal effects that are not relevant to human health.
Key Study Sponsor Indicator:	NOT A KEY STUDY
Reference – Repeated-Dose Toxicity	
Reference:	Halder, C.A., Warne, T.M., and Hatoum, N.S. 1984. Renal toxicity of gasoline and related petroleum naphthas in male rats. Chapter VI in Renal Effects of Petroleum Hydrocarbons, Mehlman et al., Eds. Princeton Scientific Publishers, Princeton, NJ pp. 73-88. U.S. Environmental Protection Agency. Alpha 2 microglobulin: association with chemically induced renal toxicity and neoplasia in the male rat. 1991. In Risk Assessment Forum. US Government Printing Office, Washington, DC: EPA: 85

High Production Volume Information System (HPVIS)

Repeated-Dose Toxicity	
Test Substance – Repeated-Dose Toxicity	
Category Chemical:	64741-64-6
Test Substance:	64741-64-6
Test Substance Purity/Composition and Other Test Substance Comments:	Full range alkylate naphtha: 98% alkanes (paraffins and naphthenes), 2% alkenes (olefins) and 0% aromatics. Boiling range 10%bp 124^{0}F to 90%bp 315^{0}F
Category Chemical Result Type:	measured
Method – Repeated-Dose Toxicity	
Route of Administration:	Inhalation
Type of Exposure:	Whole body
Species:	rat
Mammalian Strain:	Sprague Dawley
Gender:	Males and females
Number of Animals per Dose:	1st trial:10/sex/group 2nd trial:20 males/treated group; 40 males/chamber control
Dose:	1st trial: 0 (Chamber air control), 0 (Animal Room air control), 1.54, 4.92, 15.30mg/L (345, 1104, 3434ppm) 2nd trial, males only: 0 (Chamber air control), 0.010, 0.152, 1.538mg/L (3, 34, 345ppm)
Year Study Performed:	1984
Method/Guideline Followed:	none
GLP:	Not specified
Exposure Period:	21 days
Frequency of Treatment:	6hr/day, 5/day/week
Post-Exposure Period:	no

Method/Guideline and Test Condition Remarks:	This study was one of series of studies to investigate the relationship of petroleum stream chemical composition and renal toxicity in rats. Exposure concentrations were selected following an acute inhalation toxicity assessment; highest concentration was selected based on the maximum tolerated dose at which toxicity was observed or where no toxicity was seen as 20% of the lower explosive limit. In the first trial male and female rats were exposed via inhalation to concentrations of 0, 1.54, 4.92, 15.30mg/L for 21 days (6hr/day; 5 d/week for total of 15 exposures). Test material was generated by flash evaporation and monitored by IR spectrometry and/or gas chromatography. At the end of 21 days, animals were sacrificed and general toxicity and kidney effects were evaluated. A second trial was performed with males only at lower doses of 0 (Chamber air control), 0.010, 0.152, 1.538mg/L to establish a NOAEL. Reported results focus on kidney effects.

Test Results – Repeated-Dose Toxicity

Concentration (LOAEL/LOAEC/ NOAEL/NOAEC):

LOAEL/LOAEC/ NOAEL/NOAEC	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units
LOAEL	males	=	0.152		mg/L
NOAEL	males	=	0.015		mg/L
NOAEL	female	≥	15.30		mg/L

Results Remarks:	The LOAEL and NOAEL presented here address only kidney effects in male rats induced by light hydrocarbons, effects which are not relevant to human health assessment (US EPA, 1991). In the first trial incidence of tubular dilatation and necrosis at the corticomedullary junction was observed in 100% of the male rats of all 3 exposure levels with dose-dependent severity. Females at all doses and control animals were unaffected. In the second trial, a significant increase in incidence of a variety of renal lesions were observed at 0.152mg/L and increased at the highest dose. Relative potency ranking for kidney effects of test materials in this study is **full range alkylate naphtha** >>thermal-cracked naphtha >> polymerization naphtha > light catalytic reformed naphtha > light straight-run naphtha/ unleaded gasoline blend > light catalytic cracked naphtha >> heavy catalytic-reformed naphtha, respectively.
Conclusion:	Full range alkylate naphtha was ranked as the most potent naphtha in this series in producing renal lesions on male rats. The results from this study are similar to other more fully reported studies on the same or similar test material.

Reliability/Data Quality – Repeated-Dose Toxicity	
Reliability:	**2.** Reliable with restrictions
Reliability Remarks:	Duration of study is 21 days and reported results focused only on hydrocarbon induced renal effects that are not relevant to human health.
Key Study Sponsor Indicator:	NOT A KEY STUDY
Reference – Repeated-Dose Toxicity	
Reference:	Halder, C.A., Warne, T.M., and Hatoum, N.S. 1984. Renal toxicity of gasoline and related petroleum naphthas in male rats. Chapter VI in Renal Effects of Petroleum Hydrocarbons, Mehlman et al., Eds. Princeton Scientific Publishers, Princeton, NJ pp. 73-88. U.S. Environmental Protection Agency. Alpha 2 microglobulin: association with chemically induced renal toxicity and neoplasia in the male rat. 1991. In Risk Assessment Forum. US Government Printing Office, Washington, DC: EPA: 85

High Production Volume Information System (HPVIS)

Repeated-Dose Toxicity	
Test Substance – Repeated-Dose Toxicity	
Category Chemical:	64741-72-6
Test Substance:	64741-72-6
Test Substance Purity/Composition and Other Test Substance Comments:	Polymerization naphtha Intermediate C6-C12: 8% alkanes(paraffins and naphthenes), 92% alkenes (olefins)and <1% aromatics. Boiling range 10%bp 205^{0}F to 90%bp 353^{0}F
Category Chemical Result Type:	measured
Method – Repeated-Dose Toxicity	
Route of Administration:	Inhalation
Type of Exposure:	Whole body
Species:	rat
Mammalian Strain:	Sprague Dawley
Gender:	Males and females
Number of Animals per Dose:	10/sex/group
Dose:	0 (Chamber air control), 0 (Animal Room air control), 1.04, 3.05, 9.89mg/L (215, 632, 2049ppm)
Year Study Performed:	1984
Method/Guideline Followed:	none
GLP:	Not specified
Exposure Period:	21 days
Frequency of Treatment:	6hr/day, 5/day/week
Post-Exposure Period:	no
Method/Guideline and Test Condition Remarks:	This study was one of series of studies to investigate the relationship of petroleum stream chemical composition and renal toxicity in rats. Exposure concentrations were selected following an acute inhalation toxicity assessment; highest concentration was selected based on the maximum tolerated dose at which toxicity was observed or where no toxicity was seen as 20% of the lower

	explosive limit. Male and female rats were exposed via inhalation to concentrations of 0, 1.04, 3.05, 9.89 mg/L for 21 days (6hr/day; 5 d/week for total of 15 exposures). Test material was generated by flash evaporation and monitored by IR spectrometry and/or gas chromatography. At the end of 21 days, animals were sacrificed and general toxicity and kidney effects were evaluated. Reported results focus on kidney effects.

Test Results – Repeated-Dose Toxicity

Concentration (LOAEL/LOAEC/ NOAEL/NOAEC):

LOAEL/LOAEC/ NOAEL/NOAEC	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units
LOAEL	males	=	1.04		mg/L
NOAEL	males	<	1.04		mg/L
NOAEL	female	≥	9.89		mg/L

Results Remarks:	The LOAEL and NOAEL presented here address only kidney effects in male rats induced by light hydrocarbons, effects which are not relevant to human health assessment (US EPA, 1991). Small, dose-related incidence of corticomedullary tubular dilatation and necrosis in males at mid and high doses and non-dose dependent degeneration and regeneration of proximal convoluted tubules and excessive hyalin droplet formation were seen in all treated males. A low incidence of these lesions occurred in control males but not in females of any dose group. Relative potency ranking for kidney effects of test materials in this study is full range alkylate naphtha >>thermal-cracked naphtha >> **polymerization naphtha** > light catalytic reformed naphtha > light straight-run naphtha/ unleaded gasoline blend > light catalytic cracked naphtha >> heavy catalytic-reformed naphtha, respectively.
Conclusion:	The incidence of corticomedullary tubular dilatation and necrosis seen here was similar to that produced by light catalytic reformed naphtha at the mid-dose and above. However, the LOAEL for this material is the lowest dose tested based on the occurrence of increased incidence of hyalin droplets and dose-related cortical tubular degeneration and regeneration. The results from this study are similar to other more fully reported studies on the same or similar test material.

Reliability/Data Quality – Repeated-Dose Toxicity

Reliability:	**2.** Reliable with restrictions
Reliability Remarks:	Duration of study is 21 days and reported results focused only on hydrocarbon induced renal effects that are not relevant to human health.

Key Study Sponsor Indicator:	NOT A KEY STUDY
Reference – Repeated-Dose Toxicity	
Reference:	Halder, C.A., Warne, T.M., and Hatoum, N.S. 1984. Renal toxicity of gasoline and related petroleum naphthas in male rats. Chapter VI in Renal Effects of Petroleum Hydrocarbons, Mehlman et al., Eds. Princeton Scientific Publishers, Princeton, NJ pp. 73-88. U.S. Environmental Protection Agency. Alpha 2 microglobulin: association with chemically induced renal toxicity and neoplasia in the male rat. 1991. In Risk Assessment Forum. US Government Printing Office, Washington, DC: EPA: 85

High Production Volume Information System (HPVIS)

Repeated-Dose Toxicity

Test Substance – Repeated-Dose Toxicity	
Category Chemical:	64741-68-0
Test Substance:	64741-68-0
Test Substance Purity/Composition and Other Test Substance Comments:	Heavy Reformate Naphtha CAS # 64741-80-0 Test material designation F-184 Test material was applied neat
Category Chemical Result Type:	measured
Method – Repeated-Dose Toxicity	
Route of Administration:	dermal
Type of Exposure:	Occluded for 6 hr post treatment
Species:	rat
Mammalian Strain:	Sprague-Dawley
Gender:	Males & females
Number of Animals per Dose:	10
Dose:	0, 0.05, 0.25, or 1.0 ml/kg
Year Study Performed:	1992
Method/Guideline Followed:	unknown
GLP:	yes
Exposure Period:	28 days
Frequency of Treatment:	5 days per week for 4 weeks
Post-Exposure Period:	none
Method/Guideline and Test Condition Remarks:	Dermal irritation pilot studies were conducted in order to set the study doses to minimize confounding by site of application effects. Protocol number ATX-91-0062; Study number 66193. Groups of 10 rats/sex/dose were administered F-184 to the clipped areas on the back, 5 days/week for four weeks at doses of 0, 0.05, 0.25 and 1.0 ml/kg-bw/day.

The site of application was occluded for 6 hr after administration of test article. The sham control group was treated in the same manner as were the test article-treated, with the exception of the application of test article.

Animals were observed twice daily for viability and signs of toxicity. Dermal irritation was evaluated once each day just prior to dosing, twenty-our hours after the fifth dose each week, and just prior to necropsy. Body weights were recorded three times per week during the study. At the time of necropsy, fasted body weights and organ weights (adrenal glands, brain, kidney, liver, testes/ovaries) were determined, blood samples were collected for hematology and clinical chemistry evaluation, and selected tissues were collected for histological evaluation. The following tissues were evaluated histologically for sham control and high dose groups:

Adrenal glands	heart
Brain	kidneys (2)
- cerebellum	liver
- cerebrum	lungs
- medulla pons	pancreas
Cervical lymph nodes	salivary glands
Gastrointestinal tract	skin (control &treated)
- stomach	spleen
- duodenum	sternum & bone marrow
- jejunum	testes/ovaries (2)
- ileum	thyroid
- colon	thymus
- rectum	urinary bladder
Gross lesions	

Test Results – Repeated-Dose Toxicity

Concentration (LOAEL/LOAEC/ NOAEL/NOAEC):

LOAEL/LOAEC/ NOAEL/NOAEC	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units
NOAEL	males	>	1.0		ml/kg
NOAEL	females	>	1.0		ml/kg

Results Remarks:

F-184 induced slight to moderate dermal irritation at a dose of 1.0 ml/kg/day as evidenced by grossly visible lesions and by microscopic histopathological changes in the skin. Slight dermal irritation was noted at a dose of 0.25 ml/kg/day. Very slight dermal irritation was noted at a dose of 0.05 ml/kg/day.

No effects were observed in any other parameters evaluated that could be attributed to the dermal administration of F-184.

	No animals died prior to scheduled termination. There were no significant body or organ weight differences between treated and control rats. Clinical observations were confined to irritation at site of application. Dermal irritation was the only gross necropsy finding. There were no treatment-induced changes in hematology or clinical chemistry. Histopathology findings were confined to site of high dose test material application, as described above.
Conclusion:	Under the conditions of this test the NOELS for both sexes of Sprague Dawley rats were: Dermal irritation NOEL < 0.05 ml/kg/day (lowest dose tested) Systemic NOEL > 1.0 ml/kg/day (highest dose tested)
Reliability/Data Quality – Repeated-Dose Toxicity	
Reliability:	1 - valid without restrictions
Reliability Remarks:	Although not a guideline study, the study was well conducted and well described, as well as being conducted under GLPs.
Key Study Sponsor Indicator:	Not a key study
Reference – Repeated-Dose Toxicity	
Reference:	UTBL, Inc. 1992. 28 Day dermal toxicity study in rats ATX-91-062; Test Article F-184 (Heavy Reformate Naphtha); Study No. 66193. Salt Lake City, UT. Study available from the American Petroleum Institute, Washington, DC.

High Production Volume Information System (HPVIS)

Repeated-Dose Toxicity	
Test Substance – Repeated-Dose Toxicity	
Category Chemical:	64741-68-0
Test Substance:	64741-68-0
Test Substance Purity/Composition and Other Test Substance Comments:	Heavy catalytic reformed naphtha: 7% alkanes (paraffins and naphthenes), 0% alkenes (olefins)and 93% aromatics. Boiling range 10%bp 290^{0}F to 90%bp 364^{0}F
Category Chemical Result Type:	measured
Method – Repeated-Dose Toxicity	
Route of Administration:	Inhalation
Type of Exposure:	Whole body
Species:	rat
Mammalian Strain:	Sprague Dawley
Gender:	Males and females
Number of Animals per Dose:	10/sex/group
Dose:	0 (Chamber air control), 0 (Animal Room air control), 1.03, 2.81, 10.20mg/L (215, 587, 2132ppm)
Year Study Performed:	1984
Method/Guideline Followed:	none
GLP:	Not specified
Exposure Period:	21 days
Frequency of Treatment:	6hr/day, 5/day/week
Post-Exposure Period:	no
Method/Guideline and Test Condition Remarks:	This study was one of series of studies to investigate the relationship of petroleum stream chemical composition and renal toxicity in rats. Exposure concentrations were selected following an acute inhalation toxicity assessment; highest concentration was selected based on the maximum tolerated dose at which toxicity was observed or where no toxicity was seen as 20% of the lower

	explosive limit. Male and female rats were exposed via inhalation to concentrations of 0, 1.03, 2.81, 10.20 mg/L for 21 days (6hr/day; 5 d/week for total of 15 exposures). Test material was generated by flash evaporation and monitored by IR spectrometry and/or gas chromatography. At the end of 21 days, animals were sacrificed and general toxicity and kidney effects were evaluated. Reported results focus on kidney effects.

Test Results – Repeated-Dose Toxicity

Concentration (LOAEL/LOAEC/ NOAEL/NOAEC):

LOAEL/LOAEC/ NOAEL/NOAEC	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units
LOAEL	Both sexes	=	10.20		mg/L
NOAEL	Both sexes	=	2.81		mg/L

Results Remarks:	No adverse renal effects were observed in rats exposed to heavy catalytic reformed naphtha. The test material did cause irritation to the lungs resulting in treatment related interstitial pneumonitis and pulmonary edema which may have contributed to deaths in the high exposure group. Relative potency ranking for kidney effects of test materials in this study is full range alkylate naphtha >>thermal-cracked naphtha >> polymerization naphtha > light catalytic reformed naphtha > light straight-run naphtha/ unleaded gasoline blend > light catalytic cracked naphtha >> **heavy catalytic-reformed naphtha**, respectively.
Conclusion:	The LOAEL and NOAEL were determined based on deaths at the highest dose, related to pulmonary toxicity. No renal effects were observed, thus the NOAEL for renal effects with this material is the highest dose tested. Results indicate that naphthas high in aromatics do not induce hydrocarbon nephropathy in male rats. The results from this study are similar to other more fully reported studies on the same or similar test material.

Reliability/Data Quality – Repeated-Dose Toxicity

Reliability:	**2.** Reliable with restrictions
Reliability Remarks:	Duration of study is 21 days and reported results focused only on hydrocarbon induced renal effects.
Key Study Sponsor Indicator:	NOT A KEY STUDY

Reference – Repeated-Dose Toxicity

Reference:	Halder, C.A., Warne, T.M., and Hatoum, N.S. 1984. Renal toxicity of gasoline and related petroleum naphthas in male

	rats. Chapter VI in Renal Effects of Petroleum Hydrocarbons, Mehlman et al., Eds. Princeton Scientific Publishers, Princeton, NJ pp. 73-88.

High Production Volume Information System (HPVIS)

Repeated-Dose Toxicity

Test Substance – Repeated-Dose Toxicity	
Category Chemical:	64742-82-1
Test Substance:	64742-82-1
Test Substance Purity/Composition and Other Test Substance Comments:	Heavy Naphtha CAS # 64742-82-1 Test material designation F-185 Test material was applied neat
Category Chemical Result Type:	measured
Method – Repeated-Dose Toxicity	
Route of Administration:	dermal
Type of Exposure:	Occluded for 6 hr post treatment
Species:	rat
Mammalian Strain:	Sprague-Dawley
Gender:	Males & females
Number of Animals per Dose:	10
Dose:	0, 0.05, 0.25, or 1.0 ml/kg
Year Study Performed:	1992
Method/Guideline Followed:	unknown
GLP:	yes
Exposure Period:	28 days
Frequency of Treatment:	5 days per week for 4 weeks
Post-Exposure Period:	none
Method/Guideline and Test Condition Remarks:	Dermal irritation pilot studies were conducted in order to set the study doses to minimize confounding by site of application effects. Sponsor protocol number ATX-91-0070; Study number 66194 Groups of 10 rats/sex/dose were administered F-185 to the clipped areas on the back, 5 days/week for four

weeks at doses of 0, 0.05, 0.25 and 1.0 ml/kg-bw/day. The site of application was occluded for 6 hr after administration of test article. The sham control group was treated in the same manner as were the test article-treated, with the exception of the application of test article.

Animals were observed twice daily for viability and signs of toxicity. Dermal irritation was evaluated once each day just prior to dosing, twenty-our hours after the fifth dose each week, and just prior to necropsy. Body weights were recorded three times per week during the study. At the time of necropsy, fasted body weights and organ weights (adrenal glands, brain, kidney, liver, testes/ovaries) were determined, blood samples were collected for hematology and clinical chemistry evaluation, and selected tissues were collected for histological evaluation. The following tissues were evaluated histologically for sham control and high dose groups:

Adrenal glands
Brain
- cerebellum
- cerebrum
- medulla pons
Cervical lymph nodes
Gastrointestinal tract
- stomach
- duodenum
- jejunum
- ileum
- colon
- rectum
Gross lesions
heart
kidneys (2)
liver
lungs
pancreas
salivary glands
skin (control &treated)
spleen
sternum & bone marrow
testes/ovaries (2)
thyroid
thymus
urinary bladder

Test Results – Repeated-Dose Toxicity

Concentration (LOAEL/LOAEC/ NOAEL/NOAEC):

LOAEL/LOAEC/ NOAEL/NOAEC	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units
NOAEL	males	>	1.0		ml/kg
NOAEL	females	>	1.0		ml/kg

Results Remarks:

F-185 induced moderate dermal irritation at a dose of 1.0 ml/kg/day as evidenced by grossly visible lesions and by microscopic histopathological changes in the skin. Slight dermal irritation was noted at a dose of 0.25 ml/kg/day. Very slight dermal irritation was noted at a dose of 0.05 ml/kg/day.

No effects were observed in any other parameters evaluated that could be attributed to the dermal administration of F-185.

	No animals died prior to scheduled termination. There were no significant body or organ weight differences between treated and control rats. Clinical observations were confined to irritation at site of application. Dermal irritation was the only gross necropsy finding. There were no treatment-induced changes in hematology or clinical chemistry. Histopathology findings were confined to site of high dose test material application, as described above.
Conclusion:	Under the conditions of this study the NOELS for both sexes of Sprague Dawley rats were: Dermal irritation NOEL < 0.05 ml/kg/day (lowest dose tested) Systemic NOEL > 1.0 ml/kg/day (highest dose tested)
Reliability/Data Quality – Repeated-Dose Toxicity	
Reliability:	1 - valid without restrictions
Reliability Remarks:	Although not a guideline study, the study was well conducted and well described, as well as being conducted under GLPs.
Key Study Sponsor Indicator:	Not a key study
Reference – Repeated-Dose Toxicity	
Reference:	UTBL, Inc. 1992. 28 Day dermal toxicity study in rats ATX-91-070; Test Article F-185 (Heavy Naphtha); Study No. 66194. Salt Lake City, UT. Study available from the American Petroleum Institute, Washington, DC.

High Production Volume Information System (HPVIS)

Repeated-Dose Toxicity	
Test Substance – Repeated-Dose Toxicity	
Category Chemical:	64741-83-9
Test Substance:	64741-83-9
Test Substance Purity/Composition and Other Test Substance Comments:	Thermal cracked naphtha, heavy: 58% alkanes(paraffins and naphthenes), 30% alkenes (olefins)and 12% aromatics. Boiling range 10%bp 112^{0}F to 90%bp 354^{0}F
Category Chemical Result Type:	measured
Method – Repeated-Dose Toxicity	
Route of Administration:	Inhalation
Type of Exposure:	Whole body
Species:	rat
Mammalian Strain:	Sprague Dawley
Gender:	Males and females
Number of Animals per Dose:	10/sex/group
Dose:	0 (Chamber air control), 0 (Animal Room air control), 1.13, 3.48, 9.88mg/L (230, 709, 2014ppm)
Year Study Performed:	1984
Method/Guideline Followed:	none
GLP:	Not specified
Exposure Period:	21 days
Frequency of Treatment:	6hr/day, 5/day/week
Post-Exposure Period:	no
Method/Guideline and Test Condition Remarks:	This study was one of series of studies to investigate the relationship of petroleum stream chemical composition and renal toxicity in rats. Exposure concentrations were selected following an acute inhalation toxicity assessment; highest concentration was selected based on the maximum tolerated dose at which toxicity was observed or where no toxicity was seen as 20% of the lower

	explosive limit. Male and female rats were exposed via inhalation to concentrations of 0, 1.13, 3.48, 9.88mg/L for 21 days (6hr/day; 5 d/week for total of 15 exposures). Test material was generated by flash evaporation and monitored by IR spectrometry and/or gas chromatography. At the end of 21 days, animals were sacrificed and general toxicity and kidney effects were evaluated. Reported results focus on kidney effects.

Test Results – Repeated-Dose Toxicity

Concentration (LOAEL/LOAEC/ NOAEL/NOAEC):

LOAEL/LOAEC/ NOAEL/NOAEC	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units
LOAEL	males	=	1.13		mg/L
NOAEL	males	<	1.13		mg/L
NOAEL	female	≥	9.88		mg/L

Results Remarks:	The LOAEL and NOAEL presented here address only kidney effects in male rats induced by light hydrocarbons, effects which are not relevant to human health assessment (US EPA, 1991). Significant treatment-related increases in hyalin droplet formation, and tubular degeneration and regeneration in proximal convoluted tubules of the renal cortex as well as severe treatment and dose-related incidence of tubular dilatation and necrosis at the corticomedullary junction were observed at all doses in kidneys of male rats. No adverse renal effects were reported in females. Relative potency ranking for kidney effects of test materials in this study is full range alkylate naphtha >>**thermal-cracked naphtha** >> polymerization naphtha > light catalytic reformed naphtha > light straight-run naphtha/ unleaded gasoline blend > light catalytic cracked naphtha >> heavy catalytic-reformed naphtha, respectively.
Conclusion:	The severity of tubular dilatation and necrosis at the corticomedullary junction induced by thermal-cracked naphtha was second only to that of full range alkylate naphtha. The results from this study are similar to other more fully reported studies on the same or similar test material.

Reliability/Data Quality – Repeated-Dose Toxicity

Reliability:	**2.** Reliable with restrictions
Reliability Remarks:	Duration of study is 21 days and reported results focused only on hydrocarbon induced renal effects that are not relevant to human health.
Key Study Sponsor Indicator:	NOT A KEY STUDY

Reference – Repeated-Dose Toxicity	
Reference:	Halder, C.A., Warne, T.M., and Hatoum, N.S. 1984. Renal toxicity of gasoline and related petroleum naphthas in male rats. Chapter VI in Renal Effects of Petroleum Hydrocarbons, Mehlman et al., Eds. Princeton Scientific Publishers, Princeton, NJ pp. 73-88. U.S. Environmental Protection Agency. Alpha 2 microglobulin: association with chemically induced renal toxicity and neoplasia in the male rat. 1991. In Risk Assessment Forum. US Government Printing Office, Washington, DC: EPA: 85

High Production Volume Information System (HPVIS)

Repeated-Dose Toxicity	
Test Substance – Repeated-Dose Toxicity	
Category Chemical:	64741-87-3
Test Substance:	64741-87-3
Test Substance Purity/Composition and Other Test Substance Comments:	Sweet Naphthas - Merox Gasoline Stream CAS # 64741-87-3 Test material designation F-251 Test material was applied neat
Category Chemical Result Type:	measured
Method – Repeated-Dose Toxicity	
Route of Administration:	dermal
Type of Exposure:	Occluded for 6 hr post treatment
Species:	rat
Mammalian Strain:	Sprague-Dawley
Gender:	Males & females
Number of Animals per Dose:	10
Dose:	0, 0.05, 0.25, or 1.0 ml/kg
Year Study Performed:	1994
Method/Guideline Followed:	unknown
GLP:	yes
Exposure Period:	28 days
Frequency of Treatment:	5 days per week for 4 weeks
Post-Exposure Period:	none
Method/Guideline and Test Condition Remarks:	Dermal irritation pilot studies were conducted in order to set the study doses to minimize confounding by site of application effects. Protocol number ATX-92-0064; Study number 66743. Groups of 10 rats/sex/dose were administered F-251 to the clipped areas on the back, 5 days/week for four weeks at doses of 0, 0.05, 0.25 and 1.0 ml/kg-bw/day.

The site of application was occluded for 6 hr after administration of test article. The sham control group was treated in the same manner as were the test article-treated, with the exception of the application of test article.

Animals were observed twice daily for viability and signs of toxicity. Dermal irritation was evaluated once each day just prior to dosing, twenty-our hours after the fifth dose each week, and just prior to necropsy. Body weights were recorded three times per week during the study. At the time of necropsy, fasted body weights and organ weights (adrenal glands, brain, kidney, liver, testes/ovaries) were determined, blood samples were collected for hematology and clinical chemistry evaluation, and selected tissues were collected for histological evaluation. The following tissues were evaluated histologically for sham control and high dose groups:

Adrenal glands
Brain
- cerebellum
- cerebrum
- medulla pons

Cervical lymph nodes
Gastrointestinal tract
- stomach
- duodenum
- jejunum
- ileum
- colon
- rectum

Gross lesions
heart
kidneys (2)
liver
lungs
pancreas
salivary glands
skin (control &treated)
spleen
sternum & bone marrow
testes/ovaries (2)
thyroid
thymus
urinary bladder

Test Results – Repeated-Dose Toxicity

Concentration (LOAEL/LOAEC/ NOAEL/NOAEC):

LOAEL/LOAEC/ NOAEL/NOAEC	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units
NOAEL	males	>	1.0		ml/kg
NOAEL	females	>	1.0		ml/kg

Results Remarks:

F-251 induced mild dermal irritation at a dose of 1.0 ml/kg/day as evidenced by grossly visible lesions and by microscopic histopathological changes in the skin. Slight dermal irritation was noted at a dose of 0.25 ml/kg/day. No dermal irritation was noted at a dose of 0.05 ml/kg/day.

No effects were observed in any other parameters evaluated that could be attributed to the dermal administration of F-251.

	No animals died prior to scheduled termination. There were no significant body or organ weight differences between treated and control rats. Clinical observations were confined to irritation at site of application. Dermal irritation was the only gross necropsy finding. There were no treatment-induced changes in hematology or clinical chemistry. Histopathology findings were confined to site of high dose test material application, as described above.
Conclusion:	Under the conditions of this test the NOELS for both sexes of Sprague Dawley rats were: Dermal irritation NOEL = 0.05 ml/kg/day (lowest dose tested) Systemic NOEL > 1.0 ml/kg/day (highest dose tested)
Reliability/Data Quality – Repeated-Dose Toxicity	
Reliability:	1 - valid without restrictions
Reliability Remarks:	Although not a guideline study, the study was well conducted and well described, as well as being conducted under GLPs.
Key Study Sponsor *Indicator*:	Not a key study
Reference – Repeated-Dose Toxicity	
Reference:	UTBL, Inc. 1994. 28 Day dermal toxicity study in rats ATX-92-064; Test Article F-251(Sweet Naphtha- Merox Gasoline Stream); Study No. 66743. Salt Lake City, UT. Study available from the American Petroleum Institute, Washington, DC.

High Production Volume Information System (HPVIS)

Repeated-Dose Toxicity	
Test Substance – Repeated-Dose Toxicity	
Category Chemical:	68513-02-0
Test Substance:	68513-02-0
Test Substance Purity/Composition and Other Test Substance Comments:	Merox Feed (CAS# 68513-02-0) Test material designation F-250 Test material was applied neat
Category Chemical Result Type:	measured
Method – Repeated-Dose Toxicity	
Route of Administration:	dermal
Type of Exposure:	Occluded for 6 hr post treatment
Species:	rat
Mammalian Strain:	Sprague-Dawley
Gender:	Males & females
Number of Animals per Dose:	10
Dose:	0, 0.05, 0.25, or 1.0 ml/kg
Year Study Performed:	1994
Method/Guideline Followed:	unknown
GLP:	yes
Exposure Period:	28 days
Frequency of Treatment:	5 days per week for 4 weeks
Post-Exposure Period:	none
Method/Guideline and Test Condition Remarks:	Dermal irritation pilot studies were conducted in order to set the study doses to minimize confounding by site of application effects. Sponsor protocol number ATX-92-0056; Study number 66693 Groups of 10 rats/sex/dose were administered F-250 to the clipped areas on the back, 5 days/week for four

weeks at doses of 0, 0.05, 0.25 and 1.0 ml/kg-bw/day. The site of application was occluded for 6 hr after administration of test article. The sham control group was treated in the same manner as were the test article-treated, with the exception of the application of test article.

Animals were observed twice daily for viability and signs of toxicity. Dermal irritation was evaluated once each day just prior to dosing, twenty-our hours after the fifth dose each week, and just prior to necropsy. Body weights were recorded three times per week during the study. At the time of necropsy, fasted body weights and organ weights (adrenal glands, brain, kidney, liver, testes/ovaries) were determined, blood samples were collected for hematology and clinical chemistry evaluation, and selected tissues were collected for histological evaluation. The following tissues were evaluated histologically for sham control and high dose groups:

Adrenal glands
Brain
- cerebellum
- cerebrum
- medulla pons
Cervical lymph nodes
Gastrointestinal tract
- stomach
- duodenum
- jejunum
- ileum
- colon
- rectum
Gross lesions
heart
kidneys (2)
liver
lungs
pancreas
salivary glands
skin (control &treated)
spleen
sternum & bone marrow
testes/ovaries (2)
thyroid
thymus
urinary bladder

Test Results – Repeated-Dose Toxicity

Concentration (LOAEL/LOAEC/ NOAEL/NOAEC):

LOAEL/LOAEC/ NOAEL/NOAEC	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units
NOAEL	males	>	1.0		ml/kg
NOAEL	females	>	1.0		ml/kg

Results Remarks:

F-250 induced slight to moderate (primarily moderate) dermal irritation at a dose of 1.0 ml/kg/day as evidenced by grossly visible lesions and by microscopic histopathological changes in the skin. Slight dermal irritation was noted at a dose of 0.25 ml/kg/day. Very slight dermal irritation was noted at a dose of 0.05 ml/kg/day.

No animals died prior to scheduled termination. There were no significant body or organ weight differences

	between treated and control rats. Clinical observations were confined to irritation at site of application. Dermal irritation was the only gross necropsy finding. Histopathology findings were confined to site of high dose test material application, as described above. Alterations in percent neutrophils, percent lymphocytes, globulin, and albumin/globulin ratio values were observed for animals of both sexes in the 1.00 ml/kg/day high dose group, and an increase in total protein for the females only of the high dose group. A significant increase in globulin values and a decrease in albumin/globulin ratios were observed for females of the 0.25 ml/kg dose group. The study authors concluded that these findings were considered secondary to the dermal irritation noted in these dose groups and were not considered to be test article-attributable. A system effect consisting of trace myeloid hyperplasia of the bone marrow was noted in the males and females of the high dose (1.00 ml/kg/day) group. In addition, trace to mild axillary lymph node hyperplasia was noted in the males and females of the mid (0.25 ml/kg/day) and high (1.00 ml/kg/day) dose groups. The study authors concluded that these effects were considered secondary to the dermal irritation caused by the repeated application of F-250. No effects were observed in any of the other parameters evaluated that could be attributed to the dermal administration of F-250.
Conclusion:	Under the conditions of this study the NOELS for both sexes of Sprague Dawley rats were: Dermal irritation NOEL < 0.05 ml/kg/day (lowest dose tested) Systemic NOEL > 1.0 ml/kg/day (highest dose tested)
Reliability/Data Quality – Repeated-Dose Toxicity	
Reliability:	1 - valid without restrictions
Reliability Remarks:	Although not a guideline study, the study was well conducted and well describes, as well as being conducted under GLPs.
Key Study Sponsor Indicator:	Not a key study
Reference – Repeated-Dose Toxicity	
Reference:	UTBL, Inc. 1994. 28 Day dermal toxicity study in rats ATX-92-056; Test Article F-250 (Merox Feed); Study No. 66196. Salt Lake City, UT.

	Study available from the American Petroleum Institute, Washington, DC.

Repeated-Dose Toxicity

Test Substance - Repeated-Dose Toxicity

Category Chemical: *No CAS Number Provided*

Test Substance: *No CAS Number Provided*

Test Substance Purity/Composition and Other Test Substance Comments: Leaded and unleaded gasoline

An unleaded EPA reference fuel and a commercially available leaded gasoline were tested. The compositional properties of the two fuels were as follows:

	Unleaded fuel	Leaded fuel
Calculated data		
Research octane No	93	87
Motor octane No	88	86
Reid vapor pressure (PSIA	6.9	6.3
Distillation °F (ASTM D-86)		
Initial boiling point	80	80
10%	135	160
50%	210	217
90%	275	295
100%	345	340
FIA analysis		
% aromatics	30.1	27.4 %
olefins	8.2	7.8 %
saturates	61.7	64.8
Experimental data		
API gravity at 60°F	57.0	58.4
Sulfur, ppm	240	75
Lead, g/gallon	<0.005	1.94
Benzene, LV%	0.2	0.4
Toluene, LV%	16.7	11.4
n-Butane, LV%	1.0	0.4
Isopentane, LV%	5.4	5.5
n-Pentane, LV%	4.8	4.0

Category Chemical Result Type: Measured

Method - Repeated-Dose Toxicity

Route of Administration: Inhalation

Type of Exposure: Vapor

Species: Monkey

Mammalian Strain: Other

Other Strain:

Gender: Both M/F

Number of Animals per Dose: 4

Concentration: Leaded gasoline: 0, 100 & 400 ppm (0, 420, and 1,530 mg/m³). Unleaded gasoline: 0, 400 & 1500 ppm (0, 1570, and 6,350 mg/m³)

Year Study Performed: 1984

Method/Guideline Followed:

GLP: No Data

Exposure Period: 13 Weeks

Frequency of Treatment: 6 hr/day, 5 days/week

Post-Exposure Period:

Method/Guideline and Test Condition Remarks:

This study was conducted as a preliminary range finding study prior to conducting a two year study on the same test materials. 20 rats and 4 monkeys of each sex were housed in 1m³ glass and stainless steel exposure chambers 24 hours a day and were only removed for cleaning purposes Target exposure vapor concentrations of the test materials were· Unleaded gasoline· 400 and 1500 ppm Leaded gasoline. 100 and 400 ppm A control group of 20 rats and 4 monkeys of each sex were exposed to air only. Exposures were for 6 hours each day, 5 days each week for 13 weeks. Blood was taken from 10 rats of each sex at the end of the study from the highest dose groups only for hematological evaluation. Blood was taken from all monkeys in the highest dose group at 1.5, and 3 months. Urine samples were analyzed for all animals at 1.5 and 3 months for levels of protein, glucose, ketones, bilirubin, blood and lead.

CNS evaluations were conducted on the monkeys in the control and high level dose groups at before exposure and at 3 months. The CNS evaluations consisted of recording simultaneous and evoked responses and this was accomplished using electrodes that had been implanted permanently in the visual cortex. Pulmonary function tests similar to those reported by Alarie were conducted on all monkeys prior to exposure and at 1.5 and 3 months on the control and high level unleaded groups. All animals that died or were sacrificed at termination of the study were subjected to a gross necropsy. Organ weights were recorded and lungs, kidneys, spleen, heart, brain and bone marrow from the control and high dose groups were evaluated for histopathology. All male and female animal from the control and high exposure groups were also evaluated for the presence of IgG in the renal glomerulus and lungs. A lead analysis was also made on rat brain, kidney, liver, urine and blood from both the leaded dose groups and controls.

The gasoline samples were piped to an atomizer to which nitrogen heated to 105 °C was also fed at a pressure of 10 psig. The atomized gasoline was then carried to the exposure chamber with air Exposure chamber atmospheres were analyzed for gasoline vapor concentration twice daily. The mean exposure concentrations for the two gasoline samples were as follows.
Target concentration Gasoline vapor
 exposure
 concentration
 mg/liter
 ppm Alkyl lead
 ±SD µg Pb/l ±SD
0 ppm (control)
Unleaded gasoline
1500 ppm 6 35 ± 0 44 1552 -
400 ppm 1 57 ± 0.15 384 -
Leaded gasoline
400 ppm 1.53 ± 0 23 374 0.72 ± 0.10
100 ppm 0.42 ± 0.04 103 0.19 ± 0 04

Test Results - Repeated-Dose Toxicity

Concentration (LOAEL/ LOAEC/ NOAEL/ NOAEC) :

LOAEL/ LOAEC/ NOAEL/ NOAEC	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units
LOAEC	Male	<	1570		mg/m3
LOAEC	Female	=	6350		mg/m3
NOAEC	Female	=	1570		mg/m3

Results Remarks:

Gasoline vapor
 exposure concentration Alkyl lead
Group Mg/l ppm µg Pb/l
 ±SD
Control - - -
Unleaded 1500 ppm 6 35±0.44 1552 -
Unleaded 400 ppm 1.57±0.15 384 -
Leaded 400 ppm 1.53±0.23 374 0.72±0.1
Leaded 100 ppm 0.42±0.04 103 0.19±0.04

Three rats at different dose levels and three monkeys also at different dose levels died during the study. These deaths were not considered to be treatment-related. Two female monkeys in each of the high dose groups exhibited emesis, 13 and 17 days after commencing exposure for the 1500 ppm unleaded and 400 ppm leaded groups respectively. Although there was a reduction in body weights in males in the lowest dose group of each of the test materials but by the end of the study they were demonstrating increased weights. No differences were observed in any of the other treated groups The hematological values for the monkeys exposed to either test material at either dose level were similar to those fo the control animals. In the rats the only changes observed were:
unleaded (1500 ppm males) 64% increase in thrombocytes
unleaded (1500 ppm females) 150% increase in reticulocytes
leaded (400 ppm males) 4% decrease in MCHC

leaded (400 ppm females) 10% increase in hematocrit
leaded (400 ppm females) 11% increase in MCV
leaded (400 ppm females) 25% decrease in WBC

Mean flash-evoked response time for the monkeys was measured prior to exposure and was unaffected by exposure.

The results of the mean pulmonary function data are summarised in the following table. Only increases (+%) or decreases (-%) compared to controls are shown in the table. All other parameters were similar for treated and control animals

 Pre-exposure 42 days 90 days
Respiratory rate
Unleaded 1500 ppm F - - -
Unleaded 1500 ppm M -30% -21% -
Leaded 400 ppm F - - -
Leaded 400 ppm M - - -
Tidal volume
Unleaded 1500 ppm F - - -22%
Unleaded 1500 ppm M - - -
Leaded 400 ppm F - - -
Leaded 400 ppm M - - -
Minute volume
Unleaded 1500 ppm F - - -
Unleaded 1500 ppm M - - +36%
Leaded 400 ppm F - - -
Leaded 400 ppm M - - +53%

There were no effects on airway resistance, dynamic compliance or breaths to 1% nitrogen.

Urinalysis showed no differences between treated and control animals in either species There was no evidence of IgG deposition in the kidneys of rats or monkeys of either sex following exposure to the test materials for 90 days. Group mean lead levels in the rat tissues were as follows:
 Leaded Unleaded
 Control 400 ppm 100 ppm
Brain M 1.26 9 49 7 23
 F 1.44 5.39 2 32
Kidney M 1.71 12.4 7.06
 F 2.97 9.57 13
Liver M 0.71 17 9 6.51
 F 1.21 19.7 8.41
Blood M 0.61 6.1 0.77
 F 0.24 1.32 0.46
Urine M 0.17 0.21 0.19
 F 0.31 0.18 0.25

No actual values are given on organ weights or organ/body weight ratios but the following effects are reported:

Rats
 Liver wt Kidney wt
Unleaded 400 ppm M increased
Unleaded 400 ppm F
Unleaded 1500 ppm M
Unleaded 1500 ppm F
Leaded 400 ppm M
Leaded 400 ppm F decreased
Leaded 100 ppm M increased
Leaded 100 ppm F increased

Monkeys

 Thyroid Kidney
Unleaded 400 ppm M increased
Unleaded 400 ppm F
Unleaded 1500 ppm M increased
Unleaded 1500 ppm F
Leaded 400 ppm M decreased
Leaded 400 ppm F
Leaded 100 ppm M
Leaded 100 ppm F

Organ weights were also expressed as % of body weight and
the following effects were recorded:

Rats
Decreased heart weight in both male leaded groups
Decreased brain weight in both male unleaded groups
Decreased liver weight in 400 ppm female leaded group
Decreased adrenal weight in 1500 ppm female unleaded group.
Monkeys.
Decreased kidney weight in 400 ppm male unleaded group.

No evidence of treatment-related histopathology was observed in either rats or monkeys, with the exception of lesions noted in the kidneys of all male rats The lesions were characterized by subtle but discernible increases in the incidence and severity of regenerative epithelium and dilated tubules. The latter were seen to contain protein in their lumens

Conclusion:

UNLEADED GASOLINE: [NOTE unleaded gasoline results ONLY in results table]

Male LOAEC < 384 ppm (1 57 g/m³), based on increased thyroid wts at both exposure concentrations
Female LOAEC = 1552 ppm (6.35 g/m³), based on decreased tidal volume at 90d
Female NOAEC = 384 ppm (1 57 g/m³)

LEADED GASOLINE. [results NOT presented in table above]
Male LOAEC = 374 ppm (1.53 g/m³), based on decreased kidney wt
Male NOAEC = 103 ppm (0 42 g/m³)
Female NOAEC > 374 ppm (1.53 g/m³)

Reliability/Data Quality - Repeated-Dose Toxicity

Reliability:

2 - Valid With Restrictions

Reliability Remarks:

Although the GLP status of the study is unknown, the study is generally well described in the peer reviewed publication.

Key Study Sponsor Indicator:

Reference - Repeated-Dose Toxicity

Reference:

Kuna,R A. and Ulrich, C E (1984) Subchronic inhalation toxicity of two motor fuels J American College of Toxicology. Vol 3. No. 4 217-229.

Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS. 10/28/2003

Repeated-Dose Toxicity

Test Substance - Repeated-Dose Toxicity

Category Chemical:	(64741-55-5) Naphtha, petroleum, light catalytic cracked
Test Substance:	(64741-55-5) Naphtha, petroleum, light catalytic cracked
Test Substance Purity/Composition and Other Test Substance Comments:	LCCN-D (Distillate of LCCN)
Category Chemical Result Type:	Measured

Method - Repeated-Dose Toxicity

Route of Administration:	Inhalation
Type of Exposure:	Vapor
Species:	Rat
Mammalian Strain:	Sprague-Dawley
Gender:	Both M/F
Number of Animals per Dose:	16
Concentration:	Target: 750, 2500 & 7500 ppm. (0, 2300, 7700, 23400 mg/m3) Actual: 756, 2507 & 7533 ppm
Year Study Performed:	2001
Method/Guideline Followed:	EPA OTS 798.2450
GLP:	Yes
Exposure Period:	15 Weeks
Frequency of Treatment:	6 hours/day, 5 days/week
Post-Exposure Period:	4 Weeks
Method/Guideline and Test Condition Remarks:	Groups of 16 male and 16 female rats underwent whole body exposures to 750, 2500 and 7500 ppm LCCN-D. Exposures were for 6 hours each day, 5 days per week, for at least 65 exposures, over a period of 15 weeks. Extra groups of 16 rats of each sex were exposed to the high dose level and also for a recovery control group. These animals were maintained untreated for 28 days following cessation of the 15 weeks exposure. Neurobehavioral evaluations of motor activity and functional activity were performed pretest and during weeks 5, 9, 14/15 and after the 4 week recovery period for the recovery animals. Animals were not exposed to LCCN-D during these tests. Following 15 weeks of exposure, 16 animals/sex/group were necropsied and microscopic examination was performed on selected tissues. Nervous tissue from 6 rats/sex/group was also examined microscopically. At the end of the 4 week recovery period, 16 animals of each sex from the high and control groups were necropsied and selected tissues were examined microscopically. During the study clinical observations were made twice daily Ophthalmoscopic evaluations were performed pretest and just prior to the scheduled sacrifices at 15 weeks and 20 weeks (recovery groups). Body weights and food consumption were measured throughout the study Blood samples were taken from 10 fasted rats/sex/group at 14 and 18 weeks for hematological and clinical chemical measurements. At termination (after 15 weeks exposure for the main study and after 19 weeks for the recovery animals) all animals were killed and subjected to a complete macroscopic examination 10 animals of each sex were designated for non-neuropathological examination and 6 of each

sex for neuropathological examination.
For the non neuropathology animals, the following organs were weighed: adrenals, brain, heart, kidneys, liver, lung, ovaries, prostate, spleen, testes (with epididymes), thymus and uterus. Brain lengths and widths were measured for each rat.

A wide range of tissues (39) were removed from the control and high dose animals and were fixed and examined histopathologically. Additionally, kidneys from selected animals were stained with Mallory-Heidenhain and examined Tissues were also removed from the nervous system (central and peripheral) of all animals for subsequent special staining and histopathological examination.
Animals designated for neuropathological examination were subjected to a detailed examination of central and peripheral nervous tissues

Neurobehavioral studies were undertaken as follows:
Motor activity Locomotor activity was monitored as the number of beam breaks in an activity box. Monitoring sessions were for 60 minutes, divided into twelve 5-minute intervals. Evaluation was made pretest and during weeks 5, 9, 15 and at the end of the 4 week recovery period [A detailed description of the evaluation and analysis is provided in the publication but is not included here.]

Functional Operational Battery An assessment of the following was made:
Home cage evaluations for Posture, vocalization, palpebral closure.
Handling evaluations for reactivity to general stimuli, signs of autonomic function
Open field behavior: arousal level, gait, urination and defecation frequency, convulsions, tremor, abnormal behavior, piloerection and exophthalmos.
Reflex assessments for: response to visual and auditory stimuli, tail pinch, pupillary function

Animals were also evaluated for fore limb and hind limb grip strength, landing foot splay and air righting ability

The test atmospheres were generated by wholly vaporizing the test material (LCCN-D) and diluting with air to achieve the required concentrations. The highest concentration was approximately 75% of the lower explosive limit.

Actual exposure concentrations were determined six times per exposure session for treated groups and once for controls.

Particle size determinations were carried out once during each exposure using an aerodynamic particle sizer Mean mass aerodynamic diameter (MMAD), geometric standard deviation (GSD) and total mass concentration (TMC) were calculated The actual concentrations for each of the target dose levels were:
Dose group Actual TMC*

 (ppm) (ppm) (mg/m3)
0 (Control) 0 0.005820

750 756 0.005506
2500 2507 0 005085

7500 7533 0 004348
* TMC = Total Mass Aerosol Concentration

Test Results - Repeated-Dose Toxicity

Concentration (LOAEL/ LOAEC/ NOAEL/ NOAEC) :

LOAEL/ LOAEC/ NOAEL/ NOAEC	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units
LOAEC	Male	=	23400		mg/m3
NOAEC	Male	=	7700		mg/m3
LOAEC	Female	=	23400		mg/m3
NOAEL	Female	=	7700		mg/m3

Results Remarks:

No exposure-related clinical observations were noted either during exposure or during non-exposure periods and no ocular abnormalities were observed. Although the males in the high dose group were slightly lighter than the controls (total weight gain 344g compared to 323g), the difference was not significant. In the females however, the difference (total weight gain 165g compared to 154g) was statistically significant At the end of the 4 week recovery period body weights of the high dose males and females were comparable to the corresponding controls During the 4 week recovery period, the high dose males and females had food consumption that were greater (statistically significant) than controls. [Note actual data not included in the draft publication] At 15 weeks the following hematological changes were recorded
7500 ppm males: Decreased hemoglobin concentration (8%) Decreased hematocrit (7%)
2500 ppm males: Decreased MCHC (3%)
7500 ppm females: Decreased MCHC (4%)

After the 4 week recovery period, all hematological values were considered to be normal.
At 15 weeks there were no abnormal clinical chemistry values. After the 4 week recovery period however, glucose and albumin was raised in the 7500 ppm females by 21 and 15% respectively Since the values were within the normal range they were not considered to be toxicologically significant.

Neurobehavioral studies: There was no evidence of any effect on motor activity either after 15 weeks exposure or after the 4 week recovery period There was no evidence of a treatment-related effect in the functional

operational battery that was carried out.
Pathology. With the exception of those listed below, absolute and relative organ weights were not affected by treatment.

 Group
Parameter 2500 ppm 7500 ppm Recovery
MALES
Abs Kidney 21% up
Rel Kidney 15% up 32% up
Rel Liver 23% up
FEMALES
Rel Kidney 18% up
Abs Liver 24% up
Rel Liver 12% up
Rel Brain 9% down

There were no microscopic findings in either the liver or brain of the groups in which organ weight changes had been recorded. The only treatment-related microscopic changes were found in the nasal turbinates and kidneys as follows.

Nasal turbinates: The following table summarizes the incidence of selected microscopic findings in the nasoturbinal tissues. Numbers in table are male incidence/female incidence

 Dose group (ppm)

 0 750 2500 7500
Incidence at 15 weeks

No. evaluated 10/10 10/10 10/10 10/10
Goblet cell hypertrophy/hyperplasia
Score 1 3/2 1/4 1/4 1/1

 2 7/6 5/5 7/3 5/5

 3 0/1 2/1 2/3 3/3
Nasal mucosa hyperplasia

Score 1 0/1 0/4 1/2 1/0

 2 2/3 3/3 6/5 5/5

 3 0/0 0/0 1/1 1/2
Incidence in post-exposure animals
No evaluated 10/10 0/0 0/0 10/10

Goblet cell hypertrophy/hyperplasia
Score
1 2/4 2/2

 2 5/2 5/3

 3 3/1 3/0
Nasal mucosa hyperplasia
Score 1 2/4 2/3

 2 6/4 5/5

 3 0/0 1/0
These findings are considered indicative of exposure to a mild irritant.

Kidney: At the end of 15 weeks exposure several changes were observed and at the end of the 4 week recovery period there was an indication of some reversibility of the kidney effects. The findings are summarized in the following table.

Finding
Terminal Post-exposure
 0 750 2500 7500 0 7500

No of animals evaluated
 10 10 10 10 10
10
Bilateral cortex: eosinophilic hyaline droplets in proximal convoluted tubular epithelium with severity greater than or equal to 2

 0 3 8 10 0 2
Postive Mallory/Heidenhain staining hyaline droplets in proximal convoluted tubular epithelium with severity greater than or equal to 2

 1 4 9 10 1 2
Bilateral interstitium subacute/chronic inflammation
 0 0 3
5 1 3
Bilateral cortex/cortico-medullary junction tubules dilated with granular casts
 0 0 1
4 0 0
Bilateral cortex convoluted tubular basophilic epithelium
 0 0 0 3 0 0

Similar effects were not observed in the females. In the post exposure animals, brain length and width measurements showed no test-material-related effects.

Conclusion: In both males and females, the subchronic LOAEC = 7,500 ppm (23,400 mg/m3) and the NOAEC = 2500 ppm (7,700 mg/m3). These finding were based on nasal mucosa cell hyperplasia and goblet cell hypertrophy/hyperplasia.

Light hydrocarbon nephropathy was observed in males at all exposure levels Since this finding is specific to male rats and not relevant for human risk assessment it was excluded when deriving the subchronic LOAEL/NOAEL.

In both males and females the neurotoxicity NOAEL > 7500 ppm (23,400 mg/m3), the highest dose tested.

Reliability/Data Quality - Repeated-Dose Toxicity

Reliability: 1 - Valid Without Restrictions

Reliability Remarks:

Key Study Sponsor Indicator:

Reference - Repeated-Dose Toxicity

Reference: Lapin, C., Bui, Q., Breglia, R., Burnett, D., Koschier, F., Roth, R., Schreiner, C., White,R., Mandella, R and Hoffman, G. (2001) Toxicity evaluation of petroleum blending streams: Inhalation subchronic toxicity/neurotoxicity study of a light catalytic cracked naphtha distillate in rats. Int. J. Toxicol. Vol 20, pp 307-319

Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS.

10/28/2003

Repeated-Dose Toxicity

Test Substance - Repeated-Dose Toxicity

Category Chemical:	(64741-55-5) Naphtha, petroleum, light catalytic cracked
Test Substance:	(64741-55-5) Naphtha, petroleum, light catalytic cracked
Test Substance Purity/Composition and Other Test Substance Comments:	Vapors of LCCN were generated in a glass countercurrent generator (one for each concentration). As liquid LCCN flowed down the coil, nitrogen passed upwards and carried off vapors of the more volatile components. Main stream air was used to dilute the vapor to the required concentration. Vapor concentration was monitored at approximately hourly intervals during each exposure period. In addition the composition of neat LCCN (liquid), its static headspace and the inhalation chambers was assessed. The results shown below confirm that the animals had been exposed to the lighter components of LCCN % in Component LCCN Headspace Chamber Total C4/C5 nonaromatics 18.6 76.5 38.2 n-Butane 0.2 5.5 Isobutane – 1.0 0.2 Butenes 1.7 11.4 n-Pentane 1.4 3.3 7.0 Pentenes 3.8 13.1 Methyl butene 5.2 11.9 Total C6 nonaromatics 16.2 14 n-Hexane 1.0 0.9 2,3-Dimethylbutane 1 3 1 0 2-Methylpentane 4.1 6.0 12.2 3-Methylpentane 2.5 2.7 7.5 Methylpentene 1.7 0.9 Hexenes 2.1 1.1 Methylcyclopentane 2 3 1 8 4-Methylcyclopentane 0.6 0 5 Total C7 nonaromatics 10.2 1.9 Total C8 nonaromatics 8.0 n-Octane 0.3 2,2,4-Trimethylpentane 0.8 0.4 2.7 Total Aromatics 24.0 Benzene 0.1 0 6 2.3 Toluene 4.6 0.8 4.7 Ethylbenzene 1 5 0.1 Xylenes 7 6 0.5 2 3
Category Chemical Result Type:	Measured

Method - Repeated-Dose Toxicity

Route of Administration:	Inhalation
Type of Exposure:	Vapor
Species:	Mouse
Mammalian Strain:	CD-1
Gender:	Both M/F
Number of Animals per Dose:	10
Concentration:	Target: 500, 2000 & 8000. Actual: 530, 2060 & 7690 mg/m3
Year Study Performed:	1996
Method/Guideline Followed:	
GLP:	No Data
Exposure Period:	13 Weeks
Frequency of Treatment:	6 hours/ day, 5 days/week

Post-Exposure Period:

Method/Guideline and Test Condition Remarks:

Groups of 10 rats of each sex and 10 mice of each sex were individually housed in inhalation chambers. The rats and mice underwent whole body exposures to LCCN vapors. Exposures were for 6 hours/day, 5 days/week for approximately 13 weeks at nominal concentrations of 500, 2000 or 8000 mg/m3 . Extra groups of 10 rats and mice of each sex served as sham and untreated controls. Food and water was available ad lib, except during the exposure periods. Clinical observations were made regularly and body weights were recorded weekly.

At the end of the 13 weeks exposure, the rats were fasted for 16 hours before blood samples were taken for hematological and clinical chemical measurements All animals were then sacrificed and necropsied. Organs were weighed and a wide range of tissues fixed for subsequent histology and microscopic examination The wet and dry weights of the right apical and right middle lung lobes were also recorded. The cauda epididymis of the control and high dose male rats was used to determine the morphology and number of sperm and the left testis was used to determine the number of testicular spermatids.

The following tissues from the high dose and sham treated animals were examined histologically: adrenals, kidney, bone and marrow (sternum), pancreas, brain, submaxillary salivary gland, eye, optic nerve, spleen, heart, stomach, colon, testes or ovaries, duodenum, kidneys, thymus, thyroid, liver, tracheobronchial lymph nodes, lung (left lobe), nasal turbinates, muscle, urinary bladder, sciatic nerve, and any gross lesions Additional sections included lung from untreated controls and kidney from 0, 2060 and the 7690 mg/m3 exposure groups.

Test Results - Repeated-Dose Toxicity

Concentration (LOAEL/ LOAEC/ NOAEL/ NOAEC) :

LOAEL/ LOAEC/ NOAEL/ NOAEC	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units
NOAEC	Male	>	7690		mg/m3
NOAEC	Female	>	7690		mg/m3

Results Remarks:

No treatment-related changes were observed in either species in clinical signs, body weight, clinical chemistry or hematology except four male rats in the high dose group that had lesions on the skin in the scrotal area. This was attributed possibly to an interaction between abrasions of the skin against the floors of the cages and the exposure to the high concentrations of LCCN. Organ weights were unaffected in either species, except for uterus weights. Uterine weights in the rats were less than untreated controls for all exposed groups, but not less than the sham controls. The actual weights (g) shown below, were not considered to be related to LCCN because they were not dose-related, and there was no difference between the sham and untreated controls. Additionally, no similar effect was observed in the mice
Untreated controls 0.69 ± 0.17
Sham controls 0.62 ± 0.07
530 mg/m3 0 55 ± 0.12
2060 mg/m3 0.52 ± 0.05
7690 mg/m3 0.54 ± 0.09

No treatment-related abnormalities were observed in any of the organs examined microscopically. The incidence of the occurrence of hyaline droplets in dilated tubules was similar in the controls and the high dose males and was not considered to be relevant. The number of sperm per gram of cauda epididymis was significantly lower in the 7690 mg/m3 group than in the sham controls but not the untreated controls. The number of epididymal sperm was not significantly affected by exposure. Also, the number of testicular spermatids and the percentage of abnormal sperm in the cauda epidiymis were not affected by exposure to 7690 mg/m3 compared to either control group.

Conclusion:

There were no treatment related effects in male or female mice, the NOAEC was greater than the highest exposure level (7690 mg/m3) for both sexes.

Reliability/Data Quality - Repeated-Dose Toxicity

Reliability:

2 - Valid With Restrictions

Reliability Remarks:	The data presented in the publication are more or less limited to those showing effects. Where no effects are reported , actual data are not shown. Nevertheless, the study is sound and helpful in assessing the effects of LCCN light ends on this biological endpoint.
Key Study Sponsor Indicator:	

Reference - Repeated-Dose Toxicity

Reference:	Dalbey, W. E., Feuston, M H., Yang, J. J., Kommineni, C. V and Roy, T. A. (1996) Light Catalytically cracked naphtha: subchronic toxicity of vapors in rats and mice and developmental toxicity screen in rats. J. Toxicol. and Env. Health Vol 47, pp 77-91 Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

Repeated-Dose Toxicity

Test Substance - Repeated-Dose Toxicity

Category Chemical: (64741-63-5) Naphtha, petroleum, light catalytic reformed

Test Substance: (64741-63-5) Naphtha, petroleum, light catalytic reformed

Test Substance Purity/Composition and Other Test Substance Comments: Light catalytically reformed naphtha (31% aromatics)

Category Chemical Result Type: Measured

Method - Repeated-Dose Toxicity

Route of Administration: Inhalation

Type of Exposure:

Species: Rat

Mammalian Strain:

Gender: Male

Number of Animals per Dose:

Concentration: 544, 1591 and 5522 ppm

Year Study Performed:

Method/Guideline Followed:

GLP:

Exposure Period:

Frequency of Treatment:

Post-Exposure Period:

Method/Guideline and Test Condition Remarks: Two other inhalation studies have been reported (Halder et al, 1984), but
since they were of shorter duration (21 days) than those summarized
above and also were only with male rats, they are not summarized in full
here.

Test Results - Repeated-Dose Toxicity

Concentration (LOAEL/ LOAEC/ NOAEL/ NOAEC) :

LOAEL/ LOAEC/ NOAEL/ NOAEC	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units

Results Remarks: In the study with the LCRN renal changes typical of light hydrocarbon nephropathy were observed.

Conclusion:

Reliability/Data Quality - Repeated-Dose Toxicity

Reliability:

Reliability Remarks:

Key Study Sponsor Indicator:

Reference - Repeated-Dose Toxicity

Reference:

Halder, C. A., Warne, T. M. and Hatoum, N. S. (1984) Renal toxicity of gasoline and related petroleum naphthas in male rats. Chapter VI in Renal effects of Petroleum Hydrocarbons. Mehlman et al Eds. Princeton Scientific Publishers, Princeton, NJ. pp. 73-88

Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

Repeated-Dose Toxicity

Test Substance - Repeated-Dose Toxicity

Category Chemical: (68955-35-1) Naphtha, petroleum, catalytic reformed

Test Substance: *No CAS Number Provided*

Test Substance Purity/Composition and Other Test Substance Comments: Heavy catalytically reformed naphtha (93% aromatics)

Category Chemical Result Type: Measured

Method - Repeated-Dose Toxicity

Route of Administration: Inhalation

Type of Exposure:

Species: Rat

Mammalian Strain:

Gender: Male

Number of Animals per Dose:

Concentration: 0, 215, 587 and 2132 ppm (0, 1030, 2810, & 10,200 mg/m3)

Year Study Performed:

Method/Guideline Followed:

GLP:

Exposure Period:

Frequency of Treatment:

Post-Exposure Period:

Method/Guideline and Test Condition Remarks: Two other inhalation studies have been reported (Halder et al, 1984), but
since they were of shorter duration (21 days) than those summarized
above and also were only with male rats, they are not summarized in full
here.

Test Results - Repeated-Dose Toxicity

Concentration (LOAEL/ LOAEC/ NOAEL/ NOAEC) :

LOAEL/ LOAEC/ NOAEL/ NOAEC	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units

Results Remarks: In the study with HCRN there were no kidney changes but lung irritation
was apparent

Conclusion:

Reliability/Data Quality - Repeated-Dose Toxicity

Reliability:

Reliability Remarks:

Key Study Sponsor Indicator:

Reference - Repeated-Dose Toxicity

Reference:

Halder, C. A., Warne, T. M. and Hatoum, N. S. (1984) Renal toxicity of gasoline and related petroleum naphthas in male rats. Chapter VI in Renal effects of Petroleum Hydrocarbons Mehlman et al Eds. Princeton Scientific Publishers, Princeton, NJ. pp. 73-88

Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

Repeated-Dose Toxicity

Test Substance - Repeated-Dose Toxicity

Category Chemical: (64741-66-8) Naphtha, petroleum, light alkylate

Test Substance: (64741-66-8) Naphtha, petroleum, light alkylate

Test Substance Purity/Composition and Other Test Substance Comments: The test material (LAN-D) was a distillate of a Light Alkylate Naphtha (LAN).
The composition and uniformity chamber gas chromatic results (% weight) were.
Component Liquid Vapor
 At Start Termination
n-butane 2.442 3.217 3.210
iso-pentane
 29.854 33.517 34.343
2,3-dimethylbutane
 12.437 11.963 12 977
2-methylpentane
 4.064 4.775 4.096
2,4-dimethylpentane
 5.923 5.663 5.663
2,3-dimethylpentane
 2.904 2.794 2.680
2,2,4-trimethylpentane
 18 35 16.897 16.885
2,3,4-trimethylpentane
 4.343 3 772 3.578
2,3,3-trimethylpentane
 5.258 4.614 4.505
2,2,5-trimethylhexane
 3.096 2.641 2.499

Chamber concentrations were monitored throughout the study. Actual chamber concentrations were close to target concentrations.
Particle mass distribution measurements confirmed that no measurable test material was present as aerosol.

Category Chemical Result Type: Measured

Method - Repeated-Dose Toxicity

Route of Administration: Inhalation

Type of Exposure:

Species: Rat

Mammalian Strain: Sprague-Dawley

Gender: Both M/F

Number of Animals per Dose: 12

Concentration: 0, 668, 2220, 6646 ppm (0, 2500, 8200, 24300 mg/m3)

The nominal and actual concentrations for each of the target dose levels were:
Dose group Nominal Actual TMC*
 (ppm) (ppm) (ppm) (mg/m3)
 0 (Control) 0 0 3.8
 675 719 668 3.7
 2250 2073 2220 3.9
 6750 7127 6669 4.2
 6750 (recovery) 6768 6623 3.2
* TMC = Total Mass Aerosol Concentration

Year Study Performed: 1998

Method/Guideline Followed: OECD 413

GLP: Yes

Exposure Period: 13 Weeks

Frequency of Treatment: 6 hours/day, 5 days/week

Post-Exposure Period:

Method/Guideline and Test Condition Remarks: Groups of 12 male and 12 female rats underwent whole body exposures to 668, 2220 and 6646 ppm LAN-D. Exposures were for 6 hours each day, 5 days per week for 13 weeks. Extra groups of 12 rats of each sex were exposed to the high dose level and also for a recovery control group. These animals were maintained untreated for 28 days following cessation of the 13 weeks exposure. Neurobehavioural evaluations of motor activity and functional activity were performed pretest and during weeks 5, 9, 14 and 18 recovery groups Animals were not exposed to LAN-D during these tests. Following 13 weeks of exposure, 12 animals/sex/group were necropsied and microscopic examination was performed on selected tissues. Nervous tissue from 6 rats/sex/group was also examined microscopically. At the end of the 4 week recovery period, 12 animals of each sex from the high and control groups were necropsied and selected tissues were examined microscopically. During the study clinical observations were made twice daily. Ophthalmoscopic evaluations were performed pretest and just prior to the scheduled sacrifices at 14 weeks and 18 weeks (recovery groups). Body weights and food consumption was measured throughout the study. Blood samples were taken from 12 fasted rats/sex /group at 14 and 18 weeks for hematological and clinical chemical measurements. At termination (after 13 weeks exposure for the main study and after 18 weeks for the recovery animals) all animals were killed and subjected to a

complete macroscopic examination. The following organs were weighed: adrenals, brain, heart, kidneys, liver, lung, ovaries, prostate, spleen, testes (with epididymes), thymus and uterus. Brain lengths and widths were measured for each rat A wide range of tissues (39) were removed from the control and high dose animals, were fixed and examined histopathologically. Additionally, kidneys from selected animals were stained with Mallory-Heidenhain and examined. Tissues were also removed from the nervous system (central and peripheral) of all animals for subsequent special staining and histopathological examination. Nervous system tissues were selected randomly from 6 rats/sex/group in the high dose and controls at the end of 13 weeks for microscopic examination. Specific brain regions examined were forebrain, cerebral cortex, hipocampus, basal ganglia, midbrain cerebellum and pons and medulla.

Neurobehavioural studies were undertaken as follows: Motor activity: Locomotor activity was monitored as the number of beam breaks in an activity box. Monitoring sessions were for 60 minutes, divided into twelve 5-minute intervals. Evaluation was made pretest and during weeks 5, 9, 14 and at the end of the 4 week recovery period. [A detailed description of the evaluation and analysis is provided in the publication but is not included here.]

Functional Operational Battery: An assessment of the following was made: Home cage evaluations for Posture, vocalization, palpebral closure Handling evaluations for reactivity to general stimuli, signs of autonomic function open field behavior, arousal level, gait, urination and defecation frequency, convulsions, tremor, abnormal behavior, piloerection and exophthalmos. Reflex assessments for: response to visual and auditory stimuli, tail pinch, pupillary function.

Animals were also evaluated for fore limb and hind limb grip strength, landing foot splay and air righting ability.

The test atmospheres were generated by wholly vaporizing the test material (LAN-D) and diluting with air to achieve the required concentrations. The highest concentration was approximately 75% of the lowest explosive limit. Nominal concentrations were calculated from the loss of weight from the generation apparatus divided by the total airflow through the chamber during exposure.
Actual exposure concentrations were determined three times daily by gas chromatography. Particle size determinations were also carried out once during each exposure using an aerodynamic particle sizer. Mean mass aerodynamic diameter (MMAD), geometric standard deviation (GSD) and total mass concentration (TMC) were calculated. The nominal and actual concentrations for each of the target dose levels were:

Test Results - Repeated-Dose Toxicity

Concentration (LOAEL/ LOAEC/ NOAEL/ NOAEC) :

LOAEL/ LOAEC/ NOAEL/ NOAEC	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units
LOAEC	Male	=	24300		mg/m3
NOAEC	Male	=	8200		mg/m3
LOAEC	Female	=	24300		mg/m3
NOAEC	Female	=	8200		mg/m3

Results Remarks:

There were no mortalities during the study and there were no treatment related signs of toxicity. A possible treatment related sign was an increased incidence of red facial staining in rats of both sexes in the high dose group. Mean body weights, body weight gains and food consumption was unaffected by treatment.

Hematological and clinical chemical measurements were unaffected except for a 5% decrease in hemoglobin, a 5% decrease in hematocrit and a 7% decrease in erythrocytes. The hemoglobin was still decreased (4%) after the 4 week
recovery period. However, it was considered that these differences were toxicologically unimportant because they were small and within the historical range for the test laboratory.

Although there were some changes in AST and ALT in high dose females they were not considered to be toxicologically significant because several control animals also had elevated levels for these enzymes in the control groups and
also relative to historical controls. The organ weight changes were few. Absolute and relative kidney weights were increased in the males at all dose
levels and they were also elevated in the high dose recovery animals. These increases correlated with the finding of hyaline droplets in the proximal convoluted tubules at microscopy.

Absolute and relative liver weights were observed in the high dose males and females at 13 weeks but the differences had disappeared after the recovery period. There were no pathological findings associated with this increase. The magnitude of the organ weight increases is shown below.

Dose level (ppm) 	668	2220	6646	Recovery Males Abs. Kidney wt.	13.2	19.8	27	23 Rel. Kidney wt.	18	30	11 Abs. Liver wt.	21 Rel. Liver wt.	25 Females Abs. Liver wt.	17	12 Rel. Liver wt.	12

In the neurobehavioral studies no treatment-related effects were observed in the functional operational battery In the study of motor activity there were some statistically significant differences, but overall they did not occur in a
dose related manner and furthermore were smaller than some of the differences seen during the pre dosing period.

Conclusion:

LAN-D was not a neurotoxicant in the neurobehavioral studies that were conducted. LAN-D did induce a light hydrocarbon nephropathy in the male rats at all exposure levels, but this is regarded as species and sex specific and not relevant for human health risk assessment. Excluding the nephropathy, the NOEL for subchronic toxicity was 2220 ppm (based on reversible increased liver weights) and for neurotoxicity was 6646 ppm.

Reliability/Data Quality - Repeated-Dose Toxicity

Reliability: 1 - Valid Without Restrictions

Reliability Remarks:

Key Study Sponsor Indicator:

Reference - Repeated-Dose Toxicity

Reference:

Schreiner, C., Lapadula, E., Breglia, R., Bui, Q., Burnett, D., Koschier, F., Podhasky, P and White,R. (1998) Toxicity evaluation of petroleum blending streams inhalation subchronic toxicity/neurotoxicity study of a light alkylate naphtha distillate in rats. J. Toxicol. and Env. Health, Part A, Vol 55, pp 277-296

Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

Repeated-Dose Toxicity

Test Substance - Repeated-Dose Toxicity

Category Chemical:	(68955-35-1) Naphtha, petroleum, catalytic reformed
Test Substance:	(68955-35-1) Naphtha, petroleum, catalytic reformed
Test Substance Purity/Composition and Other Test Substance Comments:	Distillate of a Light catalytically reformed naphtha (LCRN-D). See compositional data file attached to category. The LCRN-D was pumped onto the central glass helix of a volatilization chamber. Nitrogen was passed upwards through the chamber over the heated coil and the volatilized material was suitably diluted with air to achieve the desired concentration A separate volatilization chamber was used for each dose concentration. During the study the exposure chamber concentrations were monitored hourly. The composition of the vapor (vol. %) is shown in the following table: Parameter LCRN-D vapor Olefins 1.37 Paraffins 88.3 Naphthenes) 1.24 Aromatics 9.09 Benzene 4.65 Carbon No. 4 3.6 5 59.11 6 25.18 7 11.65 8 0.46 9 0 There was a gas chromatographic analysis of the LCRN-D at the beginning and at the end of the study. The results (expressed in wt %) were as follows: Component LCRN-D vapor (wt %) Study Study Beginning Termination n-Butane 3.34 3.16 n-Pentane 20.38 20.43 Isopentane 35.31 34.70 1-Pentene 0.05 0.05 2-Methyl-2-butene 0.35 0.36 2-Methyl-1-butene 0.20 0.20 2,2-Dimethylbutane 2.22 2.22 n-Hexane 4.27 4.34 Methylcyclopentane 0.48 0.49 2,3-Dimethylbutane 1.54 1.59 2-Methylpentane 6.62 6 73 3-Methylpentane 4 54 4.62 Benzene 6.42 6.61 2-Methylhexane 1.65 1.67 3-Methylhexane 1.83 1.86 n-Heptane 0.90 0.91 Toluene 5.65 5.76
Category Chemical Result Type:	Measured

Method - Repeated-Dose Toxicity

Route of Administration:	Inhalation
Type of Exposure:	
Species:	Rat
Mammalian Strain:	Sprague-Dawley
Gender:	Both M/F
Number of Animals per Dose:	16
Concentration:	0, 750, 2500 and 7500 ppm (0, 2780, 9250, and 27800 mg/m3)
Year Study Performed:	2000
Method/Guideline Followed:	OECD 413
GLP:	Yes
Exposure Period:	13 Weeks
Frequency of Treatment:	6 hours/day, 5 days/week
Post-Exposure Period:	4 Weeks
Method/Guideline and Test Condition Remarks:	The method used was described in OECD guideline 413. Groups of 16 male and 16 female rats underwent whole body exposures to 750, 2500 and 7500 ppm LCRN-D. Exposures were for 6 hours each day, 5 days per week for 13 weeks. Extra groups of 16 rats of each sex were exposed to the high dose level and also for a recovery control group. These animals were maintained untreated for 28 days following cessation of the 13 weeks exposure. Neurobehavioural evaluations of motor activity and functional activity were performed pretest and during weeks 5, 9, 14 and 1 9 (recovery groups). Animals were not exposed to LCRN-D during these tests. Following 13 weeks of exposure, 16 animals/sex/group were necropsied and microscopic examination was performed on selected tissues. Nervous tissue from 6 rats/sex/group was also examined microscopically. At the end of the 4 week recovery period, 16 animals of each sex from the high and control groups were necropsied and selected tissues were examined microscopically. During the study, clinical observations were made twice daily. Ophthalmoscopic evaluations were

performed pretest and just prior to the scheduled sacrifices at 14 weeks and 19 weeks (recovery groups). Body weights and food consumption was measured throughout the study. Blood samples were taken from 10 fasted rats/sex/group at 14 and 18 weeks for hematological and clinical chemical measurements.

At termination (after 13 weeks exposure for the main study and after 19 weeks for the recovery animals) all animals were killed and subjected to a complete macroscopic examination. 10 animals of each sex were designated for non-neuropathological examination and 6 of each sex for neuropathological examination.

For the non-neuropathology animals, the following organs were weighed: adrenals, brain, heart, kidneys, liver, lung, ovaries, prostate, spleen, testes (with epididymes), thymus and uterus. Brain lengths and widths were measured for each rat.

A wide range of tissues (39) was removed from the control and high dose animals, were fixed and examined histopathologically. Additionally, kidneys from selected animals were stained with Mallory-Heidenhain and examined. Tissues were also removed from the nervous system (central and peripheral) of all animals for subsequent special staining and histopathological examination. Animals designated for neuropathological examination were subjected to a detailed examination of central and peripheral nervous tissues

Neurobehavioural studies were undertaken as follows:

Motor activity
Locomotor activity was monitored as the number of beam breaks in an activity box. Monitoring sessions were for 60 minutes, divided into twelve 5-minute intervals. Evaluation was made pretest and during weeks 5, 9, 14 and at the end of the 4 week recovery period. [A detailed description of the evaluation and analysis is provided in the publication but is not included here.]

Functional Operational Battery
An assessment of the following was made:
Home cage evaluations for Posture, vocalization, palpebral closure.

Handling evaluations for reactivity to general stimuli, signs of autonomic function

open field behavior: arousal level, gait, urination and defecation frequency, convulsions, tremor, abnormal behavior, piloerection and exophthalmos

Reflex assessments for: response to visual and auditory stimuli, tail pinch, pupillary function.

Animals were also evaluated for fore limb and hind limb grip strength, landing foot splay and air righting ability.

The LCRN-D was pumped onto the central glass helix of a volatilization chamber. Nitrogen was passed upwards through the chamber over the heated coil and the volatilized material was suitably diluted with air to achieve the desired concentration.
A separate volatilization chamber was used for each dose concentration.
During the study the exposure chamber concentrations were monitored hourly. The composition of the vapor (vol. %) is shown in the following table:
Parameter LCRN-D vapor
Olefins 1.37
Paraffins 88.3
Naphthenes) 1.24
Aromatics 9.09
Benzene 4.65
Carbon No.
 4 3.6
 5 59.11
 6 25.18
 7 11.65
 8 0 46
 9 0

There was a gas chromatographic analysis of the LCRN-D at the beginning and at the end of the study. The results (expressed in wt %) were as follows.

Component LCRN-D vapor (wt %)
 Study Study
 Beginning Termination
n-Butane 3.34 3.16
n-Pentane 20.38 20.43
Isopentane 35.31 34.70
1-Pentene 0.05 0.05
2-Methyl-2-butene 0.35 0.36
2-Methyl-1-butene 0.20 0.20
2,2-Dimethylbutane 2.22 2.22
n-Hexane 4.27 4.34
Methylcyclopentane 0.48 0.49
2,3-Dimethylbutane 1 54 1.59
2-Methylpentane 6.62 6.73
3-Methylpentane 4.54 4.62
Benzene 6.42 6.61
2-Methylhexane 1.65 1.67
3-Methylhexane 1.83 1.86
n-Heptane 0.90 0.91
Toluene 5.65 5.76

Test Results - Repeated-Dose Toxicity

Concentration (LOAEL/ LOAEC/ NOAEL/ NOAEC) :

LOAEL/ LOAEC/ NOAEL/ NOAEC	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units
LOAEC	Male	=	27800		mg/m3
NOAEC	Male	=	9250		mg/m3
NOAEC	Female	>	27800		mg/m3

Results Remarks:

There were no mortalities during the study and there were no treatment-related signs of toxicity. The ophthalmic examinations did not reveal any treatment-related effects Mean body weights, body weight gains and food consumption were unaffected by treatment.

No treatment-related effects were recorded in the Functional Operational Battery. In the examinations of motor activity, there were no treatment-related effects recorded during the 13 week exposure period but a slight increased activity was found in the highest treatment group after the 4 week recovery period.

After 13 weeks exposure there was a significant decrease in total WBC count (36%) and lymphocyte counts in the high dose males and a slight decrease in neutrophil counts for the mid dose males. A trend towards decreased WBC (2.1%) and lymphocyte counts was also seen in the mid dose males and high dose females. After the 4 week recovery period, leukocyte values were comparable to control values. However, MCV was slightly decreased (2.8%) in the high dose males.

	It was concluded that these changes were suggestive of a reversible slight effect of the LCRN-D. Clinical chemistry parameters were unaffected by treatment After 13 weeks exposure relative kidney weights in the high dose males were increased (15.9%) and this correlated with the occurrence of hyaline droplets in the proximal convoluted tubules. This finding has been described as a "light hydrocarbon nephropathy" and is sex and species specific and is not relevant for human health risk assessment. In the high dose males decreased absolute (25.7%) and relative (22%) spleen weights were also recorded. It was concluded that this was associated with the minor hematological changes that had been observed. These differences were not apparent after the recovery period and no abnormal microscopic findings were found in either the spleen or bone marrow. Brain length and width measurements were unaffected by treatment and there were no abnormal microscopic findings in the brain, spinal cord or peripheral nerves.
Conclusion:	The male systemic LOAEC exclusive of kidney effects was 27,800 mg/m3 based upon the decreased WBC and lymphocyte counts. The male neurotoxicity LOAEL was also 27,800 mg/m3, based on the increased motor activity in the hight dose rcovery group The system and neurotoxicity NOAEC for male rats was 9250 mg/m3. There were no systemic or neurotoxic effects observed in female rats; the NOAEC for both endpoints was greater than 27,800 mg/m3.

Reliability/Data Quality - Repeated-Dose Toxicity

Reliability:	1 - Valid Without Restrictions
Reliability Remarks:	
Key Study Sponsor Indicator:	

Reference - Repeated-Dose Toxicity

Reference:	Schreiner, C., Bui, Q., Breglia, R., Burnett, D., Koschier, F., Lapadula, E., Podhasky, P., White, R., Hoffman, G. and Mandella, R. (2000) Toxicity evaluation of petroleum blending streams: Inhalation subchronic toxicity/neurotoxicity study of a light catalytic reformed naphtha distillate in rats. J. Tox. and Env. Health, Part A. Vol. 60, pp 489-512 Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

Repeated-Dose Toxicity

Test Substance - Repeated-Dose Toxicity

Category Chemical:	(68955-35-1) Naphtha, petroleum, catalytic reformed
Test Substance:	(68955-35-1) Naphtha, petroleum, catalytic reformed
Test Substance Purity/Composition and Other Test Substance Comments:	Test material API #83-05, Catalytic reformed naphtha See compositional data file attached to category.
Category Chemical Result Type:	Measured

Method - Repeated-Dose Toxicity

Route of Administration:	Dermal
Type of Exposure:	Occlusive
Species:	Rabbit
Mammalian Strain:	New Zealand White
Gender:	Both M/F
Number of Animals per Dose:	5
Dose:	0, 200, 1000 & 2000 mg/kg
Year Study Performed:	1986
Method/Guideline Followed:	
GLP:	Yes
Exposure Period:	28 Days
Frequency of Treatment:	6 hr/day, 3 times/week
Post-Exposure Period:	
Method/Guideline and Test Condition Remarks:	Prior to the study 5-day range finding study was conducted. The method and results of he range-finding study are not included in this summary. Undiluted API 83-05 was applied at doses of 200, 1000 and 2000 mg/kg/day to the shorn dorsal skin of groups of five male and five female rabbits. The test material was applied to the skin 3 times each week for 4 weeks (12 applications total). The applied material was covered with an occlusive dressing for 6 hours, which was then removed and the skin was wiped with a dry gauze to remove any residual material. A group of five rabbits of each sex served as sham controls. The test skin site of each animal was examined and scored for irritation prior to each application of test material. Mortality and moribundity checks were performed twice daily and body weights were recorded weekly. At termination, blood samples were taken for a range of hematological and clinical chemical measurements. Urine samples were also collected and frozen for possible future examination. A complete gross necropsy was performed on all animals. Major organs were weighed and tissues were processed for subsequent histopathological examination. Microscopic examination was undertaken for the control and high dose groups only.

Test Results - Repeated-Dose Toxicity

Concentration (LOAEL/ LOAEC/ NOAEL/ NOAEC) :

LOAEL/ LOAEC/ NOAEL/	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units

NOAEC					
LOAEL	Male	=	2000		mg/kg bw
NOAEL	Male	=	1000		mg/kg bw
LOAEL	Female	=	2000		mg/kg bw
NOAEL	Female	=	1000		mg/kg bw

Results Remarks: Two males in the 2000 mg/kg group and one male in the 1000 mg/kg died during the study. The deaths occurred on days 12 and 17 for the highest dose group and day 19 at the mid dose group. There were no clinical signs of intoxication in any other animal on the study.

At 200 and 1000 mg/kg there were no treatment related effects on body weight gains over the study period although there were isolated differences between treated and control animals during the study. At the highest dose level, the females showed no weight gain and the males had an overall weight loss.

A mean irritation score was calculated for each day and overall means were also calculated. (The mean irritation score, MIS, was the sum of irritation scores for both erythema and edema for all animals of a given dose group and sex.)

The overall MIS for each dose group was:
Group/sex MIS Classification
2000 mg/kg M 5.1 Severe irritant
2000 mg/kg F 4.9 Severe irritant*
1000 mg/kg M 4.3 Moderate irritant
1000 mg/kg F 4.1 Moderate irritant
200 mg/kg M 2.9 Moderate irritant
200 mg/kg F 2.5 Moderate irritant
Control M 0 Non irritant
Control F 0 Non irritant

*Severe irritation was observed in the high dose females during the study and the authors concluded that even though the overall MIS for this group led to a moderate classification, a severe classification would be more appropriate.

Some differences were observed between the control and treated groups for a few hematological and clinical chemical parameters. The differences from control values are shown below. However, the authors concluded that since the values fell within the normal range for the laboratory, they should not be regarded as treatment related

Dose group Parameter Difference
1000 mg (M) WBC 25% higher
 Alkaline phosphatase 37% lower
2000 mg (M) Hemoglobin 5% lower
 Blood urea nitrogen 24% lower
 Alkaline phosphatase 35% lower
 (F) SGPT 26% lower

There were also a few differences between control and treated animals for absolute and relative organ weight for a small number of organs Since there was no associated histopathological findings and since the differences were not dose-related, they were not considered to be significant.

At necropsy, few gross findings were recorded other than effects on the treated skin. The findings in the liver of males and females of treated and control groups consisted of areas of discoloration and were considered to incidental to treatment.

Histological changes were mainly confined to the skin except for two males that died in the highest dose group. The kidneys of these two animals contained slight to moderate tubular degeneration.

The changes in the skin consisted of slight to moderate proliferative and inflammatory changes at the highest dose group Concurrent with these changes in the skin there was an increased granulopoiesis of the bone marrow Increased granulopoeisis was recorded for all the high dose group males and females examined and for one control male. The authors considered that this was probably related to the stress or other factors associated with the skin irritation

Conclusion: Catalytic refomed naphtha was a moderate to severe dermal irritant in a dose dependent manner.

In male & female rabbits, the subchronic LOAEL = 2000 mg/kg (based on decreased body wt.) and the NOAEL = 1000 mg/kg The one male death at 1000 mg/kg was excluded in deriving the male NOAEL.

Reliability/Data Quality - Repeated-Dose Toxicity

Reliability: 1 - Valid Without Restrictions

Reliability Remarks:

Key Study Sponsor Indicator:

Reference - Repeated-Dose Toxicity

Reference:	American Petroleum Institute (1986) 28-day dermal toxicity study in the rabbit, API 83-05, full range catalytically reformed naphtha (CAS 68955-35-1) Study conducted by Tegeris Laboratories Inc. API HESD Research Publication 33-30598, February 1986 Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

Repeated-Dose Toxicity

Test Substance - Repeated-Dose Toxicity

Category Chemical: (64741-55-5) Naphtha, petroleum, light catalytic cracked

Test Substance: (64741-55-5) Naphtha, petroleum, light catalytic cracked

Test Substance Purity/Composition and Other Test Substance Comments: API test material API # 81-03; light catalytic cracked naphtha

Category Chemical Result Type: Measured

Method - Repeated-Dose Toxicity

Route of Administration: Inhalation

Type of Exposure:

Species: Rat

Mammalian Strain: Sprague-Dawley

Gender: Both M/F

Number of Animals per Dose: 20

Concentration: 0, 1510, 2610, 4520 ppm (approximately 0, 5475, 9500, and 16,425 mg/m3)

Year Study Performed: 1987

Method/Guideline Followed:

GLP: Yes

Exposure Period: 13 Weeks

Frequency of Treatment: 6h/day, 5 days/week

Post-Exposure Period:

Method/Guideline and Test Condition Remarks: Groups of 20 male and 20 female rats underwent whole body exposures to 0, 1510, 2610, or 4520 ppm naphtha test material. Exposures were for 6 hours each day, 5 days per week for 13 weeks
During the study mortality checks and signs of overt toxicity were made twice daily. Detailed physical examinations were made weekly. Body weights were recorded weekly. At 13 weeks, hematological, clinical biochemical and urinalysis parameters were evaluated in 10 animals per sex per group.
Following 13 weeks of exposure, rats were sacrificed, necropsied and a standard battery of 31 tissues was collected from all animals. The following organs were weighted: adrenals, brain, heart kidney, liver, lung with trachea, ovary, pituitary, spleen, testes and thyroid/parathyroid. All organs and gross lesions were examined microscopically in control and high exposure groups.
The test atmospheres were generated by vaporizing the test material and diluting with air to achieve the required concentrations. Exposure levels were selected based upon a 4-week pilot study at the same concentrations as the main study

Test Results - Repeated-Dose Toxicity

Concentration (LOAEL/ LOAEC/ NOAEL/ NOAEC):

LOAEL/ LOAEC/ NOAEL/ NOAEC	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units
LOAEL	Male	=	16425		mg/m3

LOAEL	Male	=	9500		mg/m3
NOAEL	Female	>=	16425		mg/m3

Results Remarks: All animals survived to terminal sacrifice. Exposure-related redness with 'red material' around the nose was observed in high dose males and females. Body weights in the high dose males were statistically significantly lower than controls on study weeks 2 through 13 (approximately 90% of controls. Female body weights were comparable to controls in all groups.
There were no treatment-related effects in hematology, clinical chemistry or urinalysis. There were sporatic instances of statistically significant changes in some clinical chemistry parameters in males (e.g. blood glucose), however there was no dose relationship and they were within normal limits.
There were no treatment related macroscopic changes.
Kidney weights were increased at all exposure levels in males, accompanied by characteristic histopathological changes in the renal tubules consistent with light hydrocarbon induced nephropathy. This was considered to be a male specific effect with no relevance to human health.
Liver weights were increased in the mid and high exposure groups in males and high exposure group in female rats This was accompanied by centrilobular hepatocellular hypertrophy that was judged to be compatible with non-specific hepatic enzyme induction. This interpretation was supported by the normal levels of hepatic related serum enzymes. The hepatic histological changes were observed in 50% of the males and 25% of the females in the highest exposure groups (4520 ppm).

Conclusion: Based upon decreased body weights, the LOAEL = 4520 ppm and the NOAEL was 2610 ppm for male rats. Male rat specific kidney effects were excluded from determination of these values.
In female rats, a LOAEL was not determined, and the NOAEL > 4520 ppm, the highest concentration tested.

Reliability/Data Quality - Repeated-Dose Toxicity

Reliability: 1 - Valid Without Restrictions

Reliability Remarks:

Key Study Sponsor Indicator: Not Key

Reference - Repeated-Dose Toxicity

Reference: American Petroleum Institute (1987)
Thirteen week subchronic inhalation toxicity study in rats
with API 81-03: Light catalytic cracked naphtha
(CAS 64741-55-5)
HESD Report No 34-33173

Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

Repeated-Dose Toxicity

Test Substance - Repeated-Dose Toxicity

Category Chemical: *No CAS Number Provided*

Test Substance: *No CAS Number Provided*

Test Substance Purity/Composition and Other Test Substance Comments: Leaded and unleaded gasoline

An unleaded EPA reference fuel and a commercially available leaded gasoline were tested. The compositional properties of the two fuels were as follows:

	Unleaded fuel	Leaded fuel
Calculated data		
Research octane No.	93	87
Motor octane No	88	86
Reid vapor pressure (PSIA	6.9	6 3
Distillation °F (ASTM D-86)		
Initial boiling point	80	80
10%	135	160
50%	210	217
90%	275	295
100%	345	340
FIA analysis		
% aromatics	30.1	27.4
% olefins	8.2	7.8
% saturates	61 7	64.8
Experimental data		
API gravity at 60°F	57.0	58.4
Sulfur, ppm	240	75
Lead, g/gallon	<0.005	1 94
Benzene, LV%	0 2	0.4
Toluene, LV%	16.7	11.4
n-Butane, LV%	1.0	0 4
Isopentane, LV%	5.4	5.5
n-Pentane, LV%	4 8	4.0

Category Chemical Result Type: Measured

Method - Repeated-Dose Toxicity

Route of Administration: Inhalation

Type of Exposure: Vapor

Species: Rat

Mammalian Strain: Sprague-Dawley

Gender: Both M/F

Number of Animals per Dose: 20

Concentration: Leaded gasoline: 0, 100 & 400 ppm (0, 420, and 1,530 mg/m³) Unleaded gasoline: 0, 400 & 1500 ppm (0, 1570, and 6,350 mg/m³)

Year Study Performed: 1984

Method/Guideline Followed:

GLP: No Data

Exposure Period: 13 Weeks

Frequency of Treatment: 6 hr/day, 5 days/week

Post-Exposure Period:

Method/Guideline and Test Condition Remarks: This study was conducted as a preliminary range finding study prior to conducting a two year study on the same test materials

20 rats and 4 monkeys of each sex were housed in 1m³ glass and stainless steel exposure chambers 24 hours a day and were only removed for cleaning purposes. Target

exposure vapor concentrations of the test materials were: Unleaded gasoline 400 and 1500 ppm
Leaded gasoline. 100 and 400 ppm

A control group of 20 rats and 4 monkeys of each sex were exposed to air only. Exposures were for 6 hours each day, 5 days each week for 13 weeks.

Blood was taken from 10 rats of each sex at the end of the study from the highest dose groups only for hematological evaluation Blood was taken from all monkeys in the highest dose group at 1.5, and 3 months. Urine samples were analyzed for all animals at 1.5 and 3 months for levels of protein, glucose, ketones, bilirubin, blood and lead.

CNS evaluations were conducted on the monkeys in the control and high level dose groups at before exposure and at 3 months The CNS evaluations consisted of recording simultaneous and evoked responses and this was accomplished using electrodes that had been implanted permanently in the visual cortex. Pulmonary function tests similar to those reported by Alarie were conducted on all monkeys prior to exposure and at 1.5 and 3 months on the control and high level unleaded groups All animals that died or were sacrificed at termination of the study were subjected to a gross necropsy. Organ weights were recorded and lungs, kidneys, spleen, heart, brain and bone marrow from the control and high dose groups were evaluated for histopathology. All male and female animal from the control and high exposure groups were also evaluated for the presence of IgG in the renal glomerulus and lungs. A lead analysis was also made on rat brain, kidney, liver, urine and blood from both the leaded dose groups and controls.

The gasoline samples were piped to an atomizer to which nitrogen heated to 105 °C was also fed at a pressure of 10 psig. The atomized gasoline was then carried to the exposure chamber with air. Exposure chamber atmospheres were analyzed for gasoline vapor concentration twice daily. The mean exposure concentrations for the two gasoline samples were as follows:
Target concentration Gasoline vapor
 exposure
 concentration
 mg/liter ppm Alkyl lead
 ±SD µg Pb/l ±SD
0 ppm (control)
Unleaded gasoline
1500 ppm 6 35 ± 0.44 1552 -
400 ppm 1 57 ± 0.15 384 -
Leaded gasoline
400 ppm 1 53 ± 0 23 374 0 72 ± 0.10
100 ppm 0 42 ± 0.04 103 0.19 ± 0.04

Test Results - Repeated-Dose Toxicity

Concentration (LOAEL/ LOAEC/ NOAEL/ NOAEC) :

LOAEL/ LOAEC/ NOAEL/ NOAEC	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units
LOAEC	Male	=	6350		mg/m3
NOAEC	Male	=	1570		mg/m3
LOAEC	Female	=	6350		mg/m3
NOAEC	Female	=	1570		mg/m3

Results Remarks:

Gasoline vapor
 exposure concentration Alkyl lead
Group Mg/l ppm µg Pb/l,
 ±SD ±SD
Control - - -
Unleaded 1500 ppm 6.35±0.44 1552 -
Unleaded 400 ppm 1.57±0.15 384 -
Leaded 400 ppm 1.53±0 23 374 0.72±0.1
Leaded 100 ppm 0.42±0.04 103 0.19±0.04

Three rats at different dose levels and three monkeys also at different dose levels died during the study These deaths were not considered to be treatment-related.

Two female monkeys in each of the high dose groups exhibited emesis, 13 and 17 days after commencing exposure for the 1500 ppm unleaded and 400 ppm leaded groups respectively. Although there was a reduction in body weights in males in the lowest dose group of each of the test materials but by the end of the study they were demonstrating increased weights. No differences were observed in any of the other treated groups.

The hematological values for the monkeys exposed to either test material at either dose level were similar to those fo the control animals In the rats the only changes observed were:
unleaded (1500 ppm males) 64% increase in thrombocytes
unleaded (1500 ppm females) 150% increase in reticulocytes
leaded (400 ppm males) 4% decrease in MCHC
leaded (400 ppm females) 10% increase in hematocrit
leaded (400 ppm females) 11% increase in MCV
leaded (400 ppm females) 25% decrease in WBC

Mean flash-evoked response time for the monkeys was measured prior to exposure and was unaffected by exposure.

The results of the mean

pulmonary function data are summarised in the following table. Only increases (+%) or decreases (-%) compared to controls are shown in the table. All other parameters were similar for treated and control animals.

Pre-exposure 42 days 90 days
Respiratory rate
Unleaded 1500 ppm F - - -
Unleaded 1500 ppm M -30% -21% -
Leaded 400 ppm F - - -
Leaded 400 ppm M - - -
Tidal volume
Unleaded 1500 ppm F - - -22%
Unleaded 1500 ppm M - - -
Leaded 400 ppm F - - -
Leaded 400 ppm M - - -
Minute volume
Unleaded 1500 ppm F - - -
Unleaded 1500 ppm M - - +36%
Leaded 400 ppm F - - -
Leaded 400 ppm M - - +53%

There were no effects on airway resistance, dynamic compliance or breaths to 1% nitrogen.

Urinalysis showed no differences between treated and control animals in either species There was no evidence of IgG deposition in the kidneys of rats or monkeys of either sex following exposure to the test materials for 90 days. Group mean lead levels in the rat tissues were as follows:
Leaded Unleaded
Control 400 ppm 100 ppm
Brain M 1.26 9.49 7.23
F 1.44 5.39 2.32
Kidney M 1 71 12.4 7.06
F 2.97 9.57 13
Liver M 0 71 17.9 6 51
F 1.21 19.7 8.41
Blood M 0.61 6.1 0.77
F 0 24 1.32 0.46
Urine M 0.17 0.21 0.19
F 0.31 0.18 0.25

No actual values are given on organ weights or organ/body weight ratios but the following effects are reported:
Rats
Liver wt Kidney wt
Unleaded 400 ppm M increased
Unleaded 400 ppm F
Unleaded 1500 ppm M
Unleaded 1500 ppm F
Leaded 400 ppm M
Leaded 400 ppm F decreased
Leaded 100 ppm M increased
Leaded 100 ppm F increased

Monkeys
Thyroid Kidney
Unleaded 400 ppm M increased
Unleaded 400 ppm F
Unleaded 1500 ppm M increased
Unleaded 1500 ppm F
Leaded 400 ppm M decreased
Leaded 400 ppm F
Leaded 100 ppm M
Leaded 100 ppm F

Organ weights were also expressed as % of body weight and the following effects were recorded:
Rats:
Decreased heart weight in both male leaded groups
Decreased brain weight in both male unleaded groups
Decreased liver weight in 400 ppm female leaded group
Decreased adrenal weight in 1500 ppm female unleaded group
Monkeys.
Decreased kidney weight in 400 ppm male unleaded group.

No evidence of treatment-related histopathology was observed in either rats or monkeys, with the exception of lesions noted in the kidneys of all male rats. The lesions were characterized by subtle but discernible increases in the incidence and severity of regenerative epithelium and dilated tubules. The latter were seen to contain protein in their lumens

The kidney lesions in males are now attributed to light hydrocarbon nephropathy (LHN) that is specific to male rats Since male rat LHN is not relevant for human risk, it was not taken into account to determine the study LOAEL and NOAEL

Conclusion: UNLEADED GASOLINE: [NOTE unleaded gasoline results ONLY in results table]
Male LOAEC = 1552 ppm (6.35 g/m³), based upon increased thrombocyte count
Male NOAEC = 384 ppm (1.57 g/m³)
Female LOAEC = 1552 ppm (6.35 g/m³), based upon increased reticulocyte count
Female NOAEC = 384 ppm (1 57 g/m³)

LEADED GASOLINE. [results NOT presented in table above]
Male LOAEC = 374 ppm (1.53 g/m³), based upon increased thrombocyte count
Male NOAEC = 103 ppm (0 42 g/m³)
Female LOAEC = 374 ppm (1.53 g/m³), based upon decreased WBC count
Female NOAEC = 103 ppm (0.42 g/m³)

Male LOAEL/NOAEL values excluded male rat specific nephropathy findings

Reliability/Data Quality - Repeated-Dose Toxicity

Reliability: 2 - Valid With Restrictions

Reliability Remarks: Although the GLP status of this study is unknown, the study is generally well described in the peer reviewed publication.

Key Study Sponsor Indicator:

Reference - Repeated-Dose Toxicity

Reference: Kuna,R. A. and Ulrich, C E. (1984) Subchronic inhalation toxicity of two motor fuels. J. American College of Toxicology. Vol 3. No 4. 217-229.

Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS. 10/28/2003

Repeated-Dose Toxicity

Test Substance - Repeated-Dose Toxicity

Category Chemical: (68955-35-1) Naphtha, petroleum, catalytic *reformed*

Test Substance: (68955-35-1) Naphtha, petroleum, catalytic reformed

Test Substance Purity/Composition and Other Test Substance Comments: Partially vaporized (30-40%) full range catalytic reformed naphtha (FR-CRN) See compositional data file attached to category.

Test atmospheres were generated by partially vaporizing FRCRN. The concentrations in the chamber were adjusted by dilution with air. Concentrations were monitored throughout the study. The actual concentrations for each of the dose levels are shown below.

Parameter Exposure group
Low Medium High
Target conc. (mg/m3) 500 2000 8000

Actual conc. (mg/m3) 410 1970 8050
Butane
4 33 3.91 4.05
Methylbutane 20 56
17 26 17 55
Pentane 13 24
11.44 11.86
Hexane 6.53 5.71
6 36
Heptane 2.32 2.35
2.33
Benzene 2.19 4 93
5.79
Toluene 10.02 12 23 10 93
m-and
p-Xylenes 3.57 4.05 3.4
2-Ethyltoluene
0.43 0.35 0.17
Trimethylbenzene 0.01 0.01 0 04

Category Chemical Result Type: Measured

Method - Repeated-Dose Toxicity

Route of Administration: Inhalation

Type of Exposure: Vapor

Species: Rat

Mammalian Strain: Sprague-Dawley

Gender: Both M/F

Number of Animals per Dose: 15

Concentration: 410, 1970 and 8050 mg/m3

Year Study Performed: 1996

Method/Guideline Followed:

GLP: No Data

Exposure Period: 13 Weeks

Frequency of Treatment: 6 hours/day, 5 days/week

Post-Exposure Period:

Method/Guideline and Test Condition Remarks: Groups of 15 rats of each sex were individually housed in 1m3 inhalation chambers. The rats underwent whole body exposures to partially vaporized full range catalytic reformed naphtha (FRCRN). Exposures were [6 hours/day, 5 days/week] for 13 weeks at nominal concentrations of 500, 2000 and 8000 mg/m3.

Two extra groups of 15 rats of each sex served as sham and untreated controls (NB This is not stated in the publication but from other comments in the paper, it is clear that exposure was not continual during the study).

Water was available ad lib, but food was withheld during the exposure periods.

Clinical observations were made regularly and body weights were recorded weekly.

At the *end* of the 13 weeks exposure, blood samples were taken for hematological and clinical chemical measurements The rats were then sacrificed and necropsied. Organs were weighed and a wide range of tissues fixed for subsequent histology and microscopic examination. The wet

weight of the right middle lung lobe was also weighed. The lobes were then dried and their dry weights determined. The cauda epididymis of the control and high dose male rats was used to determine the morphology and number of sperm and the left testis was used to determine the number of testicular spermatids.

The following tissues from the high dose animals were examined histologically: adrenals, bone and marrow (sternum), pancreas (head), brain (three sections), submaxillary salivary gland, eye, optic nerve, spleen, heart, stomach (squamous and glandular), colon, testes or ovaries, duodenum, kidneys, thymus, thyroid, liver, tracheobronchial lymph nodes, lung (left lobe), nasal turbinates (four sections), thigh muscle, urinary bladder, sciatic nerve, and any gross lesions. In addition, tracheobronchial lymph nodes and any gross lesions from untreated control animals were also evaluated

Test Results - Repeated-Dose Toxicity

Concentration (LOAEL/ LOAEC/ NOAEL/ NOAEC) :

LOAEL/ LOAEC/ NOAEL/ NOAEC	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units
LOAEC	Male	=	8050		mg/m3
NOAEC	Male	=	1970		mg/m3
LOAEC	Male	=	8050		mg/m3
NOAEC	Male	=	1970		mg/m3

Results Remarks:

There were no treatment-related clinical signs during the study, no effects on serum chemistry values or parameters of the male reproductive system a terminal sacrifice. Body weights of males were exposed to the mid and high dose groups were higher than the controls throughout the study and the differences were statistically significant in the high dose group from week 10 onwards.

WBC count was significantly lower in sham treated controls and all three treated groups in both sexes compared to untreated controls. Additionally the WBC count was decreased by approximately 24% in the high dose females when compared to the sham controls. No other parameters were affected.

The only organ weights affected were the liver and kidney In the male high dose group, mean kidney weight was approximately 13% greater than the sham treated animals (but not the untreated controls), and the liver weight was approximately 14% greater

No treatment-related gross lesions were observed at necropsy and no treatment-related abnormalities were noted during microscopic examination. No hydrocarbon-induced nephropathy was observed in male rats in this study Because of the lack of effects in the histology, no tissues were examined from the lower dose groups.

Conclusion:

The LOAEC = 8050mg/m3 based on increased liver and kidney weights in males, decreased WBC in females. NOAEC = 1970mg/m3 in both male and female rats

Reliability/Data Quality - Repeated-Dose Toxicity

Reliability:

2 - Valid With Restrictions

Reliability Remarks:

The publication is not clear in its description of the frequency and duration of exposures. However, it is assumed that the exposures are 6 hours/day, 5 days/week since this would be consistent with other studies reported from the
same laboratory.

Key Study Sponsor Indicator:

Reference - Repeated-Dose Toxicity

Reference:

Dalbey, W. and Feuston, M. (1996) Partially vaporized full range catalytic reformed naphtha. Subchronic and developmental toxicity studies in rats Inhalation Toxicology. Vol 8., pp 271-284

Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS. 10/28/2003

Repeated-Dose Toxicity

Test Substance - Repeated-Dose Toxicity

Category Chemical: (64741-66-8) Naphtha, petroleum, light alkylate

Test Substance: (64741-66-8) Naphtha, petroleum, light alkylate

Test Substance Purity/Composition and Other Test Substance Comments: Sample API 83-19 is a Light Alkylate Naphtha (LAN). See compositional data file attached to category

Category Chemical Result Type: Measured

Method - Repeated-Dose Toxicity

Route of Administration: Dermal

Type of Exposure: Occlusive

Species: Rabbit

Mammalian Strain: New Zealand White

Gender: Both M/F

Number of Animals per Dose: 5

Dose: 0, 200, 1000 & 2000 mg/kg

Year Study Performed: 1986

Method/Guideline Followed:

GLP: Yes

Exposure Period: 28 Days

Frequency of Treatment: Once per day, three times per week for 4 weeks

Post-Exposure Period:

Method/Guideline and Test Condition Remarks: Prior to the study 5-day range finding study was conducted The method and results of the range-finding study are not included in this summary. Undiluted API 83-19 was applied at doses of 200, 1000 and 2000 mg/kg/day to the shorn dorsal skin of groups of five male and five female rabbits. The test material was applied to the skin 3 times each week for 4 weeks (12 applications total). The applied material was covered with an occlusive dressing for 6 hours which was then removed and the skin was wiped with a dry gauze to remove any residual material. A group of five rabbits of each sex served as sham controls. The test skin site of each animal was examined and scored for irritation prior to each application of test material. Mortality and moribundity checks were performed twice daily and body weights were recorded weekly. At termination blood samples were taken for a range of hematological and clinical chemical measurements. Urine samples were also collected and frozen for possible future examination. A complete gross necropsy was performed on all animals. Major organs were weighed and tissues were processed for subsequent histopathological examination.

Test Results - Repeated-Dose Toxicity

Concentration (LOAEL/ LOAEC/ NOAEL/ NOAEC) :

LOAEL/ LOAEC/ NOAEL/ NOAEC	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units

LOAEL	Male	=	2000		mg/kg bw
NOAEL	Male	=	1000		mg/kg bw
LOAEL	Female	=	2000		mg/kg bw
NOAEL	Female	=	1000		mg/kg bw

Results Remarks: No deaths occurred during the study. During the latter half of the study all but one high dose female looked thin. This was considered to be a treatment-related effect. Apart from skin irritation there were no other treatment-related clinical signs. Weight gains of treated animals over the duration of the study was similar to controls except for the females at 2000 mg/kg. which were significantly reduced. The mean weight for these rabbits was the same at the end of the study as it was on day 1. A mean irritation score was calculated for each day and overall means were also calculated. (The mean irritation score, MIS, was the sum of irritation scores for both erythema and edema for all animals of a given dose group and sex.)

The overall MIS for each dose group was:
 Group/sex MIS Classification
2000 mg/kg M 3.5 Moderate irritant
2000 mg/kg F 3.6 Moderate irritant
1000 mg/kg M 2.8 Moderate irritant
1000 mg/kg F 2.7 Moderate irritant
 200 mg/kg M 0.5 Minimal irritant
 200 mg/kg F 0.5 Minimal irritant
 Control M 0 Non irritant
 Control F 0 Non irritant

There were no remarkable findings in the hematological data from any of the male or female groups compared to controls. The only significant clinical chemical finding was an approximately 40% reduction in ALP of the 2000 mg/kg females. All other clinical chemical measurements were unremarkable. There were few differences in organ weight between the control and treated animals, these were:
18% increase in R adrenal weight in 1000 mg/kg males
28% increase in L adrenal weight in 1000 mg/kg males
37% decrease in R ovary weight of 2000 mg/kg females.

In none of the above was there an associated change in the relative organ weights and the differences were not considered to be treatment-related. At gross necropsy, treatment -related skin findings consisted of: dry, scaly, rough, fissured, reddened, crusted, and/or thickened skin. There were no other treatment-related findings at necropsy. Although there were some findings at histopathology, they were not treatment-related except those in the skin. The skin changes consisted of a slight to moderate proliferative and minimal to moderately severe inflammatory changes in the skin of all animals in the 2000 mg/kg groups. These skin changes were accompanied by an increased granulopoeisis of the bone marrow. This was considered to be possibly related to stress or other factors resulting from skin irritation

Conclusion: Based on reduced body weights, LOAEL = 2000 mg/kg and NOAEL = 1000 mg/kg for male and female rabbits.

Light Alkylate Naphtha was a mild to moderate skin irritant in a dose dependent manner.

Reliability/Data Quality - Repeated-Dose Toxicity

Reliability: 1 - Valid Without Restrictions

Reliability Remarks:

Key Study Sponsor Indicator:

Reference - Repeated-Dose Toxicity

Reference: American Petroleum Institute (1986) 28-Day dermal toxicity study in the rabbit. API 83-19, Light alkylate naphtha (CAS 64741-66-8). Study conducted by
Tegeris laboratories. API Health and Environmental Sciences Dept. Publ. 33-30498

Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

Repeated-Dose Toxicity

Test Substance - Repeated-Dose Toxicity

Category Chemical: (64741-55-5) Naphtha, petroleum, light catalytic cracked

Test Substance:

Test Substance Purity/Composition and Other Test Substance Comments:

Category Chemical Result Type: Measured

Method - Repeated-Dose Toxicity

Route of Administration: Inhalation

Type of Exposure:

Species: Rat

Mammalian Strain:

Gender:

Number of Animals per Dose:

Concentration: 55, 567 and 3628 ppm

Year Study Performed:

Method/Guideline Followed:

GLP:

Exposure Period: 21 Days

Frequency of Treatment:

Post-Exposure Period:

Method/Guideline and Test Condition Remarks: A 21-day inhalation study in rats has been reported (Halder et al 1984). Rats were exposed to Light Catalytically Cracked Naphtha at concentrations of 55, 567 and 3628 ppm.

Test Results - Repeated-Dose Toxicity

Concentration (LOAEL/ LOAEC/ NOAEL/ NOAEC) :

LOAEL/ LOAEC/ NOAEL/ NOAEC	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units

Results Remarks: The results confirmed the findings in male rat kidneys that have been observed in other studies with rats.

Conclusion: check references - API ref is prob wrong

Reliability/Data Quality - Repeated-Dose Toxicity

Reliability:

Reliability Remarks:

Key Study Sponsor Indicator:

Reference - Repeated-Dose Toxicity

Reference: American Petroleum Institute (1987) Thirteen week subchronic inhalation toxicity study in rats with API 81-03: Light catalytic cracked naphtha (CAS 64741-55-5) HESD Report No. 34-33173 [this API reference is probably wrong]

Halder, C. A., Warne, T. M., and Hatoum, N. S. (1984) Renal toxicity of gasoline and related petroleum naphthas in male rats. Chapter VI in Renal Effects of Petroleum Hydrocarbons Mehlman et al., Eds. Princeton Scientific Publishers, Princeton, NJ. pp 73-88

Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

Repeated-Dose Toxicity

Test Substance - Repeated-Dose Toxicity

Category Chemical:	(64741-55-5) Naphtha, petroleum, light catalytic cracked
Test Substance:	(64741-55-5) Naphtha, petroleum, light catalytic cracked
Test Substance Purity/Composition and Other Test Substance Comments:	Vapors of LCCN were generated in a glass countercurrent generator (one for each concentration). As liquid LCCN flowed down the coil, nitrogen passed upwards and carried off vapors of the more volatile components. Main stream air was used to dilute the vapor to the required concentration Vapor concentration was monitored at approximately hourly intervals during each exposure period. In addition the composition of neat LCCN (liquid), its static headspace and the inhalation chambers was assessed. The results shown below confirm that the animals had been exposed to the lighter components of LCCN % in Component LCCN Liquid Headspace Static Chamber Exposure Total C4/C5 nonaromatics 18.6 76.5 38.2 n-Butane 0.2 5.5 Isobutane - 1.0 0.2 Butenes 1.7 11.4 n-Pentane 1.4 3.3 7.0 Pentenes 3.8 13.1 Methyl butene 5.2 11.9 Total C6 nonaromatics 16 2 14 n-Hexane 1.0 0.9 2,3-Dimethylbutane 1.3 1.0 2-Methylpentane 4.1 6.0 12.2 3-Methylpentane 2.5 2.7 7.5 Methylpentene 1 7 0.9 Hexenes 2.1 1 1 Methylcyclopentane 2.3 1 8 4-Methylcyclopentane 0.6 0.5 Total C7 nonaromatics 10.2 1.9 Total C8 nonaromatics 8.0 n-Octane 0.3 2,2,4-Trimethylpentane 0.8 0.4 2.7 Total Aromatics 24 0 Benzene 0 1 0.6 2.3 Toluene 4.6 0.8 4.7 Ethylbenzene 1.5 0 1 Xylenes 7.6 0.5 2.3
Category Chemical Result Type:	Measured

Method - Repeated-Dose Toxicity

Route of Administration:	Inhalation
Type of Exposure:	Vapor
Species:	Rat
Mammalian Strain:	Sprague-Dawley
Gender:	Both M/F
Number of Animals per Dose:	20
Concentration:	Target: 500, 2000 & 8000. Actual: 530, 2060 & 7690 mg/m3
Year Study Performed:	1996
Method/Guideline Followed:	
GLP:	No Data
Exposure Period:	13 Weeks
Frequency of Treatment:	6 hours/ day, 5 days/week

Post-Exposure Period:

Method/Guideline and Test Condition Remarks:

Groups of 10 rats of each sex and 10 mice of each sex were individually housed in inhalation chambers. The rats and mice underwent whole body exposures to LCCN vapors. Exposures were for 6 hours/day, 5 days/week for approximately 13 weeks at nominal concentrations of 500, 2000 or 8000 mg/m3 Extra groups of 10 rats and mice of each sex served as sham and untreated controls. Food and water was available ad lib, except during the exposure periods. Clinical observations were made regularly and body weights were recorded weekly.

At the end of the 13 weeks exposure, the rats were fasted for 16 hours before blood samples were taken for hematological and clinical chemical measurements. All animals were then sacrificed and necropsied. Organs were weighed and a wide range of tissues fixed for subsequent histology and microscopic examination. The wet and dry weights of the right apical and right middle lung lobes were also recorded. The cauda epididymis of the control and high dose male rats was used to determine the morphology and number of sperm and the left testis was used to determine the number of testicular spermatids.

The following tissues from the high dose and sham treated animals were examined histologically: adrenals, kidney, bone and marrow (sternum), pancreas, brain, submaxillary salivary gland, eye, optic nerve, spleen, heart, stomach, colon, testes or ovaries, duodenum, kidneys, thymus, thyroid, liver, tracheobronchial lymph nodes, lung (left lobe), nasal turbinates, muscle, urinary bladder, sciatic nerve, and any gross lesions. Additional sections included lung from untreated controls and kidney from 0, 2060 and the 7690 mg/m3 exposure groups.

Test Results - Repeated-Dose Toxicity

Concentration (LOAEL/ LOAEC/ NOAEL/ NOAEC) :

LOAEL/ LOAEC/ NOAEL/ NOAEC	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units
LOAEC	Male	=	7690		mg/m3
NOAEC	Male	=	2060		mg/m3
NOAEC	Female	>	7690		mg/m3

Results Remarks:

No treatment-related changes were observed in either species in clinical signs, body weight, clinical chemistry or hematology except four male rats in the high dose group that had lesions on the skin in the scrotal area. This was attributed possibly to an interaction between abrasions of the skin against the floors of the cages and the exposure to the high concentrations of LCCN. Organ weights were unaffected in either species, except for uterus weights. Uterine weights in the rats were less than untreated controls for all exposed groups, but not less than the sham controls The actual weights (g) shown below, were not considered to be related to LCCN because they were not dose-related, and there was no difference between the sham and untreated controls. Additionally, no similar effect was observed in the mice.
Untreated controls 0.69 ± 0.17
Sham controls 0.62 ± 0.07
530 mg/m3 0.55 ± 0.12
2060 mg/m3 0.52 ± 0.05
7690 mg/m3 0.54 ± 0.09

No treatment-related abnormalities were observed in any of the organs examined microscopically. The incidence of the occurrence of hyaline droplets in dilated tubules was similar in the controls and the high dose males and was not considered to be relevant. The number of sperm per gram of cauda epididymis was significantly lower in the 7690 mg/m3 group than in the sham controls but not the untreated controls. The number of epididymal sperm was not significantly affected by exposure. Also, the number of testicular spermatids and the percentage of abnormal sperm in the cauda epidiymis were not affected by exposure to 7690 mg/m3 compared to either control group.

Conclusion:

Based on the lower number of sperm per gram of cauda epididymis, the male rat LOAEC = 7690 mg/m3 and the NOAEC = 2060 mg/m3. This conclusion is quite conservative, considering there was no treatment effect on number of epididymal sperm, the number of testicular spermatids and the percentage of abnormal sperm in the cauda epidiymis.

There were no treatment effects observed in feamle rats; the NOAEC>7690 mg/m3.

Reliability/Data Quality - Repeated-Dose Toxicity

Reliability:	2 - Valid With Restrictions
Reliability Remarks:	The data presented in the publication are more or less limited to those showing effects. Where no effects are reported , actual data are not shown Nevertheless, the study is sound and helpful in assessing the effects of LCCN light ends on this biological endpoint.
Key Study Sponsor Indicator:	

Reference - Repeated-Dose Toxicity

Reference:	Dalbey, W. E., Feuston, M. H , Yang, J. J , Kommineni, C. V and Roy, T. A (1996) Light Catalytically cracked naphtha subchronic toxicity of vapors in rats and mice and developmental toxicity screen in rats J Toxicol. and Env. Health Vol 47, pp 77-91 Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS 10/28/2003

High Production Volume Information System (HPVIS)

In Vivo Genetic Toxicity: Sister Chromatid Exchange

Test Substance – In Vivo Genetic Toxicity [SCE]

Category Chemical:	No CAS number
Test Substance:	No CAS number
Test Substance Purity/Composition and Other Test Substance Comments:	Unleaded baseline gasoline API 99-01 Vapor Condensate Test material is a complex mixture of volatile hydrocarbons. The purity of mixture is 100% and stable based on analysis of chamber atmospheres.

Representative Components [98.8%] monitored in Study

Component	Area %
Isobutane	2.70
n-butane	12.78
3-methyl-1-butene	0.41
Isopentane	36.50
n-pentane	9.36
Trans-2-pentene	3.60
2,3-dimethylbutane	1.75
2-methylpentane	7.25
3-methylpentane	4.27
n-hexane	3.62
Methylcyclopentane	1.87
2,4-dimethylpentane	1.36
Benzene	2.75
2-methylhexane	1.73
2,3-dimethylpentane	1.52
3-methylhexane	1.73
Isooctane	1.92
Toluene	3.91

Category Chemical Result Type:	Measured

Method – In Vivo Genetic Toxicity [SCE]

Route of Administration:	Inhalation
Type of Exposure:	Whole body
Species:	Rat
Mammalian Strain:	Sprague Dawley [Crl: CD IGS BR]
Gender:	Male and female
Number of Animals per Dose:	5 males, 5 females/group
Dose:	Target: 0, 2000, 10,000, and 20,000mg/m^3 Actual: 0, 2050, 10,153, and 20,324 mg/m^3

Year Study Performed:	2005
Method/Guideline Followed:	EPA SCE Assay 79.65, CFR 59, No. 122 [27 June 1994]
GLP:	Yes
Exposure Period:	4 weeks, [20 exposures]
Frequency of Treatment:	6 hours/day, 5 days/week
Post-Exposure Period:	None

Method/Guideline and Test Condition Remarks:	This study was conducted as a satellite study of the 13 week inhalation toxicity study reported in the Repeated Dose section. Baseline Gasoline Vapor Condensate was administered via whole-body exposures to Sprague Dawley rats at target concentrations of 2000, 10000 and 20000 mg/m^3 for 6 hours/day, 5 days/week for 4 weeks. An Air Control group received nitrogen-enriched air only while in chamber. A separate positive control group was treated by intraperitoneal injection with 5mg/kg cyclophosphamide within 24 hours prior to sacrifice. Baseline Gasoline Vapor exposed animals were sacrificed 24 hours after the 20^{th} exposure. Blood [2-4ml] was collected from the abdominal aorta into sodium heparin tubes and shipped in ice packs on the day of collection to BioReliance, Rockville MD. Within 24 hours of collection, whole blood samples were cultured in supplemented RPMI 1640 culture medium at 37^0C. Approximately 21 hours after initiation, cells were exposed to 5µg/ml bromodeoxyuridine (BrdU). After 68 hours, 0.2µg/ml colcemid was added to each culture flask and incubation continued for 4 more hours. After 72 hours (approximately 51 hours after BrdU exposure) cells were collected, washed, fixed in 0.5ml methanol:acidic acid [3:1] fixative and stored in fixative at least overnight at $2-8^0C$. Slides were prepared by removing overnight fixative by centrifugation, resuspending cells in fresh fixative, recentrifuging and aspirating off supernatant leaving 0.1-0.3ml fixative to resuspend the pellet. One or 2 drops of the cell suspension was dropped on a glass slide. Slides were allowed to air dry overnight and were stained using the modified fluorescence-plus Giemsa technique. Slides were coded and evaluated for SCE events without prior knowledge of treatment groups. A minimum of 25 second division metaphases per animal were scored for SCEs. At least 100 consecutive metaphases per animal were scored for the number of cells in first-, second-, or third-division metaphase for each animal as an indicator of toxicity (cell cycle delay). Average generation time [AGT] was estimated as Number of hours in BrdU x 100/[(number of cells in metaphase 1 x 1)+ (number of cells in metaphase 2 x 2) + (number of cells in metaphase 3 x 3)]. At least 1000 cells were scored for mitotic index per animal. Statistical analysis: A regression analysis (trend test) and one-tailed Dunnett's t test for multiple comparisons was performed to compare the average SCE frequency of test exposure levels to the negative control frequency.

Test Results – In Vivo Genotoxicity - SCE

Concentration (LOAEL/LOAEC/ NOAEL/NOAEC):

LOAEL/LOAEC/ NOAEL/NOAEC	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units
LOAEL	Males	=	10000		mg/m^3
NOAEL	Males	=	2000		
LOAEL	Female	=	2000		
NOAEL	Female	<	2000		

Results Remarks:	Statistically significantly increased SCE frequency ($p \leq 0.05$) was observed at all three dose levels for females and at concentrations of 10000 and 20000mg/m^3 in males. Regression analysis was also positive ($p \leq 0.05$) for exposure level responses over all three groups for males and females. A dose dependent increase in AGT was observed in test substance and positive control groups. Cyclophosphamide, the positive control, induced increased SCE frequency as expected. No appreciable differences were observed in mitotic index in any test substance exposed group compared to negative controls. Sister chromatid exchanges indicate interaction between test material and DNA, however since no genetic material is unbalanced or lost, these events cannot be considered definitive for clastogenic activity [Reviewer's comment].
Conclusion:	Baseline Gasoline Vapor Condensate administered by inhalation for 4 weeks induced sister chromatid exchanges in rat peripheral lymphocytes in both male and female rats in this *in vivo* study.

Reliability/Data Quality – In Vivo Genetic Toxicity (SCE)

Reliability:	**1**. Reliable without restriction
Reliability Remarks:	HPV Supporting study from Section 211(b) Testing Consortium, Fuels and Fuel Additives Health Effects Testing Regulation, administered by API, Washington DC
Key Study Sponsor Indicator:	Not a Key Study

Reference – In Vivo Genetic Toxicity (SCE)

Reference:	Baseline Gasoline Vapor Condensate: A 13-Week Whole Body Inhalation Toxicity Study in Rats with Neurotoxicity Assessments and 4-Week In Vivo Genotoxicity and Immunotoxicity Assessments. HLS Study No. 00-6125, Vol IV, Appendix Y: *In vivo-In vitro* Rat Peripheral Lymphocyte Sister Chromatid Exchange Assay, R. Gudi, Principal Investigator, BioReliance study designation AA40NU.130.BTL. 2005. Huntingdon Life Sciences Laboratories, East Millstone, NJ and BioReliance Laboratories, Rockville, MD

High Production Volume Information System (HPVIS)

In Vivo Genetic Toxicity: Micronucleus Assay

Test Substance – In Vivo Genetic Toxicity

Category Chemical:	No CAS number
Test Substance:	No CAS number
Test Substance Purity/Composition and Other Test Substance Comments:	Unleaded baseline gasoline API 99-01 Vapor Condensate Test material is a complex mixture of volatile hydrocarbons. The purity of mixture is 100% and stable based on analysis of chamber atmospheres.

Representative Components [98.8%] monitored in Study

Component	Area %
Isobutane	2.70
n-butane	12.78
3-methyl-1-butene	0.41
Isopentane	36.50
n-pentane	9.36
Trans-2-pentene	3.60
2,3-dimethylbutane	1.75
2-methylpentane	7.25
3-methylpentane	4.27
n-hexane	3.62
Methylcyclopentane	1.87
2,4-dimethylpentane	1.36
Benzene	2.75
2-methylhexane	1.73
2,3-dimethylpentane	1.52
3-methylhexane	1.73
Isooctane	1.92
Toluene	3.91

Category Chemical Result Type:	Measured

Method – In Vivo Genetic Toxicity

Route of Administration:	Inhalation
Type of Exposure:	Whole body
Species:	Rat
Mammalian Strain:	Sprague Dawley [Crl: CD IGS BR]
Gender:	Male and female
Number of Animals per Dose:	5 males,5 females/group
Dose:	Target: 0, 2000, 10,000, and 20,000mg/m^3 Actual: 0, 2050, 10,153, and 20,324 mg/m^3

Year Study Performed:	2005
Method/Guideline Followed:	EPA OPPTS 870.5395 [1998]
GLP:	Yes
Exposure Period:	4 weeks, [20 exposures]
Frequency of Treatment:	6 hours/day, 5 days/week
Post-Exposure Period:	None
Method/Guideline and Test Condition Remarks:	This study was conducted as a satellite study of the 13 week inhalation toxicity study reported in the Repeated Dose section. Baseline Gasoline Vapor Condensate was administered via whole-body exposures to Sprague Dawley rats at target concentrations of 2000, 10000 and 20000 mg/m^3 for 6 hours/day, 5 days/week for 4 weeks. An Air Control group received nitrogen-enriched air only while in chamber. A separate positive control group was treated by intraperitoneal injection with 40mg/kg cyclophosphamide within 24 hours prior to sacrifice. Baseline Gasoline Vapor-exposed animals were sacrificed 24 hours after the 20^{th} exposure. Bone marrow was extracted from femurs and the fixed, unstained slides were prepared and shipped via overnight delivery to Huntingdon's Eye Research Center, Suffolk UK where the slides were stained by the modified Feulgen method. One smear from each animal was examined for the presence of micronuclei in 2000 immature erythrocytes. Slides were coded and evaluated without knowledge of treatment groups. The proportion of immature erythrocytes was assessed by examination of at least 1000 mature and immature erythrocytes from each animal. The incidence of micronucleated mature erythrocytes was also recorded. Statistical methods: The results for each treatment group were compared with the results for the concurrent negative control group using non-parametric statistics. Since there was no substantial difference in response between sexes results for the two sexes are combined to facilitate interpretation and maximise the power of statistical analysis. For incidences of micronucleated immature erythrocytes, exact one-sided p-values are calculated by permutation (StatXact, CYTEL Software Corporation, Cambridge, Mass.). Comparison of several dose levels is made with the concurrent control using the Linear by Linear Association test for trend, in a step-down fashion if significance is detected; for individual intergroup comparisons (i.e. the positive control group) this procedure simplifies to a straightforward permutation test. For assessment of effects on the proportion of immature erythrocytes, equivalent permutation tests based on rank scores are used, i.e. exact versions of Wilcoxon's sum of ranks test and Jonckheere's test for trend.

Test Results – In Vivo Genotoxicity

Concentration (LOAEL/LOAEC/ NOAEL/NOAEC):

LOAEL/LOAEC/ NOAEL/NOAEC	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units
NOAEL	Both	=	20000		mg/m^3

Results Remarks:	The test substance did not cause any statistically significant increases in the number of micronucleated immature erythrocytes [P>0.01]. As expected, the positive control cyclophosphamide caused large, highly significant increases in the frequency of micronucleated immature erythrocytes [P<0.001]. The test substance did not cause any substantial increases in the incidence of micronucleated mature erythrocytes, did not induce differential cytotoxicity and did not cause any significant decreases in the proportion of immature erythrocytes [P>0.01]. Cyclophosphamide caused statistically significant decreases in the proportion of immature erythrocytes [P<0.001].
Conclusion:	Baseline Gasoline Vapor Condensate administered by inhalation for 4 weeks did not induce cytogenetic damage expressed as increases in micronucleated immature erythrocytes, nor bone marrow cell toxicity in this *in vivo* test procedure

Reliability/Data Quality – In Vivo Genetic Toxicity

Reliability:	**1**. Reliable without restriction
Reliability Remarks:	HPV Supporting study from Section 211(b) Testing Consortium, Fuels and Fuel Additives Health Effects Testing Regulation, administered by API, Washington DC
Key Study Sponsor Indicator:	Not a Key Study

Reference – In Vivo Genetic Toxicity

Reference:	Baseline Gasoline Vapor Condensate: A 13-Week Whole Body Inhalation Toxicity Study in Rats with Neurotoxicity Assessments and 4-Week In Vivo Genotoxicity and Immunotoxicity Assessments. HLS Study No. 00-6125: Micronucleus Assay, Vol IV, Appendix X. 2005. Huntingdon Life Sciences Laboratories, East Millstone, NJ and Huntingdon Eye Research Center, Suffolk UK

Genetic Toxicity in vivo

Test Substance - Genetic Toxicity in vivo

Category Chemical:	*No CAS Number Provided*
Test Substance:	*No CAS Number Provided*
Test Substance Purity/Composition and Other Test Substance Comments:	API PS-6 unleaded gasoline. See analytical data file attached to the category.
Category Chemical Result Type:	Measured

Method - Genetic Toxicity in vivo

Type of Study:	Bone Marrow Chromosomal Aberration
Type of Test:	Chromosome aberration assay
Route of Administration:	Intraperitoneal
Type of Exposure:	
Species:	Rat
Strain:	Unknown
Gender:	Male
Dose:	Acute study: 0 024, 0.08 & 0.24 ml/rat; subacute study: 0.01, 0 03 & 0.1 ml/rat
Year Study Performed:	1977
Method/Guideline Followed:	EPA OPPTS 870.5450
GLP:	No Data
Duration of Treatment/ Exposure Period and Units:	5 Days
Frequency of Treatment:	single or 5 consecutive days
Positive, Negative, and Solvent Control Substance(s):	Positive control was 0 3 mg/kg triethylenemelamine Solvent control was 0.1 ml acetone
Number of Animals per Sex and Dose Group:	3, 4, or 5
Method/Guideline and Test Condition Remarks:	Two studies were conducted viz an acute and a subacute study. The test material was administered to the animals intraperitoneally in acetone. Acute study Groups of 15 rats were given either acetone (0.1 ml/rat), or test material at doses of 0.024, 0.80 or 0.24 ml/rat. An additional group of 5 rats were given Triethylenemelamine(TEM)at a dose of 0.3 mg/kg. 6, 24 and 48 hours after administration of the test material 5 animals in each dose group were killed. For the TEM group, all five animals were killed 24 hours after administration of the substance. Two hours prior to being killed , cells were arrested in metaphase by the administration of a single i.p. dose of colchicine (4 mg/kg) Bone marrow was aspirated from the femurs and tibias of the lower limbs of the animals after they had been killed. The marrow plug was washed and then fixed. Slides of the cells were prepared and stained with Giemsa for microscopic examination Fifty spreads were located for each animal and when of suitable quality, the chromosomes were counted and evaluated for the presence of abnormalities.

Subchronic study
18 animals were used in this study They were dosed with three levels of test compound (0 01, 0.03 & 0.1 ml/rat) once each day for 5 days. All animals were killed 6 hours after administration of the last dose and 2 hours prior to being killed they were treated with colchicine in the same way as the animals in the acute study Slides were prepared and examined as for the acute study. A negative and positive control group were also included, again the same as for the acute study

A subsequent study (API ref 26-60099) was also carried out and this supported the negative conclusion of the original study. The second study is not summarized here.

Test Results - Genetic Toxicity in vivo

Systemic Toxicity: Unknown

Genotoxic Effect: Negative

Results Remarks: The results of the acute and repeat dose studies are summarized in the following table:

Material Time No of Total %cells Mitotic
& dose after rats No of with index
(ml/rat) dose cells aber*
Acute study
Acetone (0.1) 6 3 100 1 3.4
 24 3 100 0 4.3
 48 3 150 0 3.8
TEM (0.3 mg/kg)
 24 5 200 30 3.8
PS-6 (0.024) 6 5 250 6 3.9
 24 5 250 1 4.9
 48 5 250 3 4.7
 (0.08) 6 5 250 1 5.6
 24 5 200 3 4 7
 48 5 100 5 2.7
 (0.24) 6 5 187 2 3.2
 24 3 100 0 4.1
 48 5 200 3 4 5
Subacute study
Acetone (0.1) 5 days 3 150 1 5.8
PS-6 (0.01) 5 days 5 200 1 3 5
 (0.03) 5 days 4 159 2 2.9
 (0.1) 5 days 5 174 2 3 2

* = aberrations
The results of the acute study were considered to be negative. There was an increase in aberrations at the 48 hour sacrifice period of the intermediate dose. The increases of 5% was significant, but did not fit into a trend suggestive of a compound-related mutagenic response. No other increases were observed at any dose level or sacrifice time.
The results of the subacute study were considered to be negative. There was no indication of an increased number of cells with aberrations.

Conclusion: The results of the acute study were considered to be negative There was an increase in aberrations at the 48 hour sacrifice period of the intermediate dose The increases of 5% was significant, but did not fit into a trend suggestive of a compound-related mutagenic response. No other increases were observed at any dose level or sacrifice time.
The results of the subacute study were considered to be negative. There was no indication of an increased number of cells with aberrations.

Reliability/Data Quality - Genetic Toxicity in vivo

Reliability: 1 - Valid Without Restrictions

Reliability Remarks:

Key Study Sponsor Indicator:

Reference - Genetic Toxicity in vivo

Reference: American Petroleum Institute (1977) Mutagenicity evaluation of unleaded gasoline
Study conducted by Litton Bionetics, Inc. API HESD Publication No. 28-30173, March 1977

American Petroleum Institute (1977) Rat bone marrow cytogenetic analysis unleaded gasoline Study conducted by Litton Bionetics Inc. API Med. Res Publ. 26-60099, November 1977

Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

Genetic Toxicity in vivo

Test Substance - Genetic Toxicity in vivo

Category Chemical: (64741-78-2) Naphtha, petroleum, heavy hydrocracked

Test Substance: (64741-78-2) Naphtha, petroleum, heavy hydrocracked

Test Substance Purity/Composition and Other Test Substance Comments:

Category Chemical Result Type: Read-Across

Method - Genetic Toxicity in vivo

Type of Study:

Type of Test:

Route of Administration:

Type of Exposure:

Species:

Strain:

Gender:

Dose:

Year Study Performed:

Method/Guideline Followed:

GLP:

Duration of Treatment/ *Exposure* Period and Units:

Frequency of Treatment:

Positive, Negative, and Solvent Control Substance(s):

Number of Animals per Sex and Dose Group:

Method/Guideline and Test Condition Remarks:

Test Results - Genetic Toxicity in vivo

Systemic Toxicity:

Genotoxic Effect:

Results Remarks: See records for CAS No. 64741-66-8, 64741-55-5, 68955-35-1, and gasoline.

Conclusion:

Reliability/Data Quality - Genetic Toxicity in vivo

Reliability:

Reliability Remarks:

Key Study Sponsor Indicator:

Reference - Genetic Toxicity in vivo

Reference:

Genetic Toxicity in vivo

Test Substance - Genetic Toxicity in vivo

Category Chemical:	(64741-87-3) Naphtha, petroleum, sweetened
Test Substance:	(64741-87-3) Naphtha, petroleum, sweetened
Test Substance Purity/Composition and Other Test Substance Comments:	API 81-08, Sweetened Naphtha. See analytical data file attached to category.
Category Chemical Result Type:	Measured

Method - Genetic Toxicity in vivo

Type of Study:	Bone Marrow Chromosomal Aberration
Type of Test:	Chromosome aberration assay
Route of Administration:	Inhalation
Type of Exposure:	Vapor
Species:	Rat
Strain:	Sprague-Dawley
Gender:	Both M/F
Concentration:	0, 65, 300 & 2050 ppm, nominal concentrations; measured average concentrations were 0, 69, 293, and 2012 ppm [approximately 0, 150, 725, 5000 mg/m³]
Year Study Performed:	1986
Method/Guideline Followed:	
GLP:	Yes
Duration of Treatment/ Exposure Period and Units:	5 Days
Frequency of Treatment:	6 hr/day
Positive, Negative, and Solvent Control Substance(s):	A positive control group of 10 rats of each sex were given a single dose (0.8 mg/kg) of TEM intraperitoneally 24 hours before sacrifice. A negative control group of 10 rats of each sex were exposed to air only.
Number of Animals per Sex and Dose Group:	10
Method/Guideline and Test Condition Remarks:	Groups of 10 male and 10 female Sprague Dawley rats were exposed (whole body) to nominal concentrations of 65, 300 and 2050 ppm of test material. Animals were exposed to vapor of the test material 6 hours each day for 5 consecutive days. A positive control group of 10 rats of each sex were given a single dose (0.8 mg/kg) of TEM intraperitoneally 24 hours before sacrifice. A negative control group of 10 rats of each sex were exposed to air only. For the treated and negative control groups bone marrow was harvested 6 hours after the final exposure. For the positive control group the bone marrow was harvested 24 hours after administration of the TEM. Three hours prior to sacrifice by carbon monoxide the rats were given a single intraperitoneal dose of colchicine (4 mg/kg). Immediately after sacrifice bone marrow was obtained from the tibiae of the animals. The marrow was washed and the cells were fixed before being spread on slides for examination. Routinely 50 spreads were prepared for each animal. The location of cells bearing aberrations were identified. A mitotic index based on at least 500 cells counted was also

recorded It was calculated by scoring the number of cells in mitosis per 500 cells on each slide read. Slides were scored for chromosomal aberrations.

The authors give the following as the criteria for a positive response and data interpretation. Gaps were not counted as significant aberrations. Indicators of genetic damage were considered to be: Open breaks, configurations resulting from the repair of breaks. The latter included translocations, multiradials, rings, multicentrics etc. Reunion figures such as these were weighted slightly higher than breaks since they usually resulted from more than one break. The number of cells with aberrations per animal was also considered to indicate more genetic damage than those containing evidence of single events. Consistent variations from the euploid number were also considered in the evaluation of mutagenic potential. Often it is not possible to locate 50 suitable metaphase spreads for each animal, even after preparing additional spreads. Possible causes for this appear to be related to cytotoxic effects which alter the duration of the cell cycle, kill the cell or cause clumping of the chromosomes.
Additional information can be gained from the mitotic index which also appears to reflect cytotoxic effects. The type of aberration, its frequency and its correlation to dose in a given time period was considered in evaluating a test article as being mutagenically positive or negative. Statistical analysis employed a Kruskal-Wallis test of aberrations per cell on a per animal basis.

Vapor of the test material was generated by bubbling nitrogen through heated distillation columns packed with glass beads. The test material was delivered to the top of the glass beads using syringe pumps, a different delivery rate being used for each target dose level. Chamber concentrations were monitored hourly each exposure period. Results of chamber monitoring are:
Target Actual

(ppm) (ppm)
0 0
65 69 ± 18
300 293 ± 42

2050 2012 ± 16

Test Results - Genetic Toxicity in vivo

Systemic Toxicity: No Effects

Genotoxic Effect: Negative

Results Remarks: The mean exposure chamber concentrations were found to be 0, 69±18, 293±42 and 2012±16 ppm

No signs of toxicity were observed in the rats during the exposure phase of the study.
The results of the cytogenetic evaluation are summarized in the following table. NB. Mean values without standard errors are given in the table, although these data are available in the report.

 Exposure concentration
(ppm) Control
 69 293 2012
Positive Negative
Total No. of cells
Male 470 500
410 400 500
Female 500 500
500 474 500
M+F 970 1000
910 874 1000

Frequency of structural aberrations

Male .009 .006 .029 >.708 .016

Female 0 >.014 .030 >.970 .008

M+F .005 >0.01 .029 >.853 .012

Frequency of numerical aberrations
Male .012 0 .013
.023 .01
Female .012 .016 .006 015 .008

M+F .01 .008 .01 .019 .009

% Cells with structural aberrations/animal
1 or more
Male .9
.4 2.2 20 .6
Female 0 1.4
2.6 19 .8
M+F .5 .9
2.4 19 5 7

2 or more
Male 0
.2 .4 11.3 .4
Female 0
.2 .4 14.4 0
M+F 0
.2 .4 12.9 .2

%MI
Male 6.5
6.6 3.8 1 5 7
Female 4.1 4.8
4.5 1 4.2
M+F 5.3 5 7
4.2 12.9 .2

On the basis of the above data, the authors concluded that there was no evidence of a clastogenic effect of the test material and that there was no significant increase in chromosomal aberration in the dosed animals when compared to the negative controls.

Conclusion: Sweetened naphtha at inhalation exposure concentrations up to 2012 ppm was not clastogenic in adult male or female Sprague Dawley rats under these test conditions.

Reliability/Data Quality - Genetic Toxicity in vivo

Reliability: 1 - Valid Without Restrictions

Reliability Remarks:

Key Study Sponsor Indicator:

Reference - Genetic Toxicity in vivo

Reference: American Petroleum Institute (1986) Mutagenicity evaluation in the rat bone marrow cytogenetic assay, API 81-08, Sweetened naphtha (CAS 64741-87-3) Study conducted by Litton Bionetics Inc. API, HESD Research Publication 33-31093, April 1986.

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Genetic Toxicity in vivo

Test Substance - Genetic Toxicity in vivo

Category Chemical:	(64741-66-8) Naphtha, petroleum, light alkylate
Test Substance:	(64741-66-8) Naphtha, petroleum, light alkylate
Test Substance Purity/Composition and Other Test Substance Comments:	Sample API 83-19 is a Light Alkylate Naphtha (LAN). See analtyical data file attached to category.
Category Chemical Result Type:	Measured

Method - Genetic Toxicity in vivo

Type of Study:	Bone Marrow Chromosomal Aberration
Type of Test:	Chromosome aberration assay
Route of Administration:	Intraperitoneal
Type of Exposure:	
Species:	Rat
Strain:	Sprague-Dawley
Gender:	Both M/F
Dose:	0, 0.3, 1 0 & 3.0 g/kg
Year Study Performed:	1985
Method/Guideline Followed:	Other
GLP:	Yes
Duration of Treatment/ Exposure Period and Units:	48 Hours
Frequency of Treatment:	single treatment
Positive, Negative, and Solvent Control Substance(s):	Corn oil was used as vehicle control and TEM (0 5 mg/kg) as the positive control
Number of Animals per Sex and Dose Group:	6 rats/sex/dose and sacrifice time
Method/Guideline and Test Condition Remarks:	Type. Cytogenetic assay The study design was as follows: Treatment Animals/sex/sacrifice time 6 hrs. 24 hrs 48 hrs Corn oil (vehicle) 5 5 5 API 83-19, 3 g/kg 5 5 5 API 83-19, 1 g/kg 5 5 5 API 83-19, 0.3 g/kg 5 5 5 Triethylenemelamine 5 (Positive control) Test material in vehicle was given intraperitoneally at a dose of 5 ml/kg to groups of rats as shown above. Corn oil was used as vehicle control and TEM (0 5 mg/kg) as the positive control Two to four hours prior to sacrifice the rats were given a single intraperitoneal dose of colchicine (1 mg/kg). 2 Males and one female in the high dose group died, these were replaced by substitute animals that were killed approximately 50 hours after administration of the test material Immediately after sacrifice bone marrow was obtained from the femurs of the animals. The marrow was washed and the cells were fixed before being spread on slides (at least 3 from each animal) for examination. Slides were scored for chromosomal aberrations. Where possible, a minimum of 50

metaphase cells from each animal were examined and scored for chromatid and chromosome
gaps and breaks, fragments, structural rearrangements and ploidy (1-3). A mitotic index (= No. of cells in mitosis/500 counted X 100)was calculated and recorded.

The data were evaluated according to the following criteria:
For the test to be considered to be valid, the % of cells in the negative control group demonstrating aberrations of any type, other than gaps, must not exceed 4%. The % of cells with aberrations in the positive control group must be statistically increased (p=0.05) relative to the vehicle control using Chi-square statistics.

The test material is considered positive when the % of cells with aberrations in any treatment group is significantly increased (p = 0 05) relative to the vehicle control using Chi-square analysis and the number of aberrations per
cell is also significantly increasd (p =0.05) relative to the vehicle control using t-test statistics.

Test Results - Genetic Toxicity in vivo

Systemic Toxicity: No Effects

Genotoxic Effect: Negative

Results Remarks: The dose levels used in the assay were selected on the basis of a preliminary screen in which only one male rat died within 24 hours following the administration of API 83-19 as a single i.p. dose to 4 rats of each sex. In the cytogenetics assay, 5 of 18 males and 4 of 18 females receiving 3 g/kg API 83-19 died within 3 days. At this dose level, there was a weight loss of 10% and 9% in males and females respectively within 48 hours of administration Other signs of toxicity included piloerection, crusty eyes and noses and excess lacrimation. No sex-related differences were noted in the study and therefore the data for males and females were combined for the cytogenetics evaluation. The results are summarized in the following table.

0 3 g/kg 1 g/kg 3 g/kg Positive Vehicle
Cells with aberrations
6 hrs 0 2 0 0
24 hrs 1 0 1 171 0
48 hrs 1 0 1 0
Incidence of aberrations (%)
6 hrs 0 0.4 0 0
24 hrs 0.2 0 0.2 34.2 0
48 hrs 0.2 0 0.3 0
No. Gaps
6 hrs 0 2 0 0
24 hrs 0 0 0 15 1
48 hrs 0 0 4 1
No. Breaks
6 hrs 0 2 0 0
24 hrs 1 0 1 197 0
48 hrs 2 0 1 0
Aberrations per cell
6 hrs 0 0 004 0 0
24 hrs 0.002 0 0.002 2.336 0
48 hrs 0.004 0 0.003

NB.1. 500 cells were evaluated for each time point at each dose level.

NB.2. In the API 83-19 and vehicle control groups no rearrangements were observed and no aberrations from severely damaged cells were seen. In contrast 51 rearrangements and 920 aberrations from severely damaged cells were seen in the positive control group

Conclusion: Light Alkylate Naphtha did not induce bone marrow chromosomal aberrations in male or female Sprague-Dawley rats.

Reliability/Data Quality - Genetic Toxicity in vivo

Reliability: 1 - Valid Without Restrictions

Reliability Remarks:

Key Study Sponsor Indicator:

Reference - Genetic Toxicity in vivo

Reference: American Petroleum Institute (1985) Acute In Vivo cytogenetics assay in male and female rats of API sample 83-19. Study conducted by Microbiological Associate Inc. API Health & Environmental Sciences Department, Publication No. 32-32409

Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS. 10/28/2003

Genetic Toxicity in vivo

Test Substance - Genetic Toxicity in vivo

Category Chemical:	*No CAS Number Provided*
Test Substance:	*No CAS Number Provided*
Test Substance Purity/Composition and Other Test Substance Comments:	API PS-6 unleaded gasoline. See analytical data file attached to the category
Category Chemical Result Type:	Measured

Method - Genetic Toxicity in vivo

Type of Study:	Bone Marrow Chromosomal Aberration
Type of Test:	Dominant lethal assay
Route of Administration:	Inhalation
Type of Exposure:	
Species:	Mouse
Strain:	CD-1
Gender:	Both M/F
Concentration:	0, 400 & 1600 ppm; approximately 1, 1500, 6000 mg/m³
Year Study Performed:	1980
Method/Guideline Followed:	
GLP:	Yes
Duration of Treatment/ Exposure Period and Units:	8 Weeks
Frequency of Treatment:	6 hours/day, 5 days/week
Positive, Negative, and Solvent Control Substance(s):	Positive control (10 male rats)was a single i.p. injection of triethylenemelamine at 0.3 mg/kg in saline Negative control (10 male rats) was filtered air.
Number of Animals per Sex and Dose Group:	10 males per group; females were untreated.
Method/Guideline and Test Condition Remarks:	Groups of 10 male mice were exposed to either filtered air (negative controls) or test material at concentrations of 400 or 1600 ppm. Generation of test atmospheres was accomplished by bubbling air through the test material Exposures were for 6 hours a day, 5 days each week for 8 weeks. On the final day of exposure a positive control group of 10 male mice were given Triethylenemelamine (TEM) intraperitoneally as a single i.p. dose, at a dose level of 0.3 mg/kg The dose volume was 0.1 ml/mouse and the TEM was dissolved in 0.9% saline. Chamber concentrations were monitored at least hourly during the exposure periods. After 2 days rest following termination of exposures, each male was caged with 2 unexposed virgin female mice. At the end of 5 days, the females were removed. This weekly mating sequence was continued for 2 weeks Each pair of mated females were transferred to a fresh cage and after 14 days after the midweek of being caged with the male were sacrificed. The uterine contents of the females were examined and scored for the numbers of dead and living implants and total implants Evaluation Criteria: Dominant lethality was determined from a) a

mutation index derived from the ratio of total to dead implants, or b) the number of dead implants per pregnant female.
If true dominant lethality is observed then a significant increase in the number of dead implants per pregnant female should be accompanied by a significant decrease in the number of living implants per pregnant female.
The two ratios are compared with both concurrent and comparable historical control values. Dose-related trends are also looked for. Any statistically significant differences must also be strongly evaluated for their biological significance.

In this study the following parameters were determined:

Fertility index ie. Proportion of pregnant females.
Average No of implants/pregnant female
Average No. of dead implants/pregnant female.
Proportion of females with one or more dead implants.
Proportion of females with two or more dead implants.

Test Results - Genetic Toxicity in vivo

Systemic Toxicity: No Effects

Genotoxic Effect: Negative

Results Remarks: During the exposure phase actual chamber concentrations were found to be 0, 396.4 and 1524.6 ppm. One male died in the 1600 ppm group and another animal in the same group exhibited excessive lacrimation in the seventh week but this cleared in the final week.

The data for each of the parameters determined are as follows for untreated control, historical control, positive control and the two groups exposed to test material.

Week Hist.-ve -ve +ve 400ppm 1600ppm
Fertility index
1 22/24 21/23 19/24 17/20 21/22
2 16/24 19/24 13/24 18/19 16/22
Av. No. of implants/pregnant female
1 267/22 240/21 140/19 203/17 214/21
2 193/16 220/19 91/13 219/18 183/16
Av No. of dead implants/pregnant female
1 12/22 14/21 83/19 9/17 9/21
2 13/16 5/19 66/13 9/18 12/16
Proportion of females with one or more dead implants
1 11/22 9/21 19/19 6/17 8/21
2 9/16 4/19 13/13 8/18 7/16
Proportion of females with two or more dead implants
1 1/22 3/21 17/19 3/17 1/21
2 2/16 1/19 13/13 1/18 3/16
No of dead implants/total implants
1 12/267 14/240 83/140 9/203 9/214
2 13/193 5/220 66/91 9/219 12/183

Interpretation of the results: The test material did not cause any significant reduction i the fertility index The test material had no effect on the average number of implants per pregnant female. With respect to the number of dead implants per pregnant female, the test material showed no significant differences from the values of the concurrent as well as the negative controls.

The results support the conclusion that the test material did not cause increases in post-implantation deaths.

Conclusion: PS-6 unleaded gasoline was not genotoxic in an in vivo dominant lethal assay in CD-1 mice

Reliability/Data Quality - Genetic Toxicity in vivo

Reliability: 1 - Valid Without Restrictions

Reliability Remarks:

Key Study Sponsor Indicator:

Reference - Genetic Toxicity in vivo

Reference: American Petroleum Institute (1980) Mutagenicity evaluation of Gasoline, API PS-6 fuel in the mouse dominant lethal assay. Study conducted by Litton Bionetics Inc. API Publication No 28-31344 April 1980

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Genetic Toxicity in vivo

Test Substance - Genetic Toxicity in vivo

Category Chemical:	(68955-35-1) Naphtha, petroleum, catalytic reformed
Test Substance:	(68955-35-1) Naphtha, petroleum, catalytic reformed
Test Substance Purity/Composition and Other Test Substance Comments:	API 83-05, Catalytic Reformed Naphtha. See analytical data file attached to category
Category Chemical Result Type:	Measured

Method - Genetic Toxicity in vivo

Type of Study:	Bone Marrow Chromosomal Aberration
Type of Test:	Chromosome aberration assay
Route of Administration:	Intraperitoneal
Type of Exposure:	
Species:	Rat
Strain:	Sprague-Dawley
Gender:	Both M/F
Dose:	0, 0 26, 0 82 & 2.42 g/kg
Year Study Performed:	1985
Method/Guideline Followed:	
GLP:	Yes
Duration of Treatment/ Exposure Period and Units:	
Frequency of Treatment:	once
Positive, Negative, and Solvent Control Substance(s):	Positive: Triethylenemelamine at a dose of 0 8 mg/kg in corn oil Corn oil was used as the solvent control
Number of Animals per Sex and Dose Group:	5/sex/dose/sacrifice times
Method/Guideline and Test Condition Remarks:	Two studies were carried out In the first study, the test material did not induce a significant increase in the percentage of aberrant cells above the controls in either sex. Furthermore, the positive control (TEM at a dose of 0 8 mg/kg)) did not induce a significant elevation in the percentage of cells with structural aberrations. The assay was, therefore, repeated using a higher dose of TEM. In this robust summary, only the results of the repeat study are described. The study design was as follows: Treatment Animals/sex/sacrifice time 6 hrs 24 hrs 48 hrs Corn oil (vehicle) 5 5 5 API 83-05, 2 42 g/kg 5 5 5 API 83-05, 0.82 g/kg 5 5 5 API 83-05, 0 26 g/kg 5 5 5 Triethylenemelamine 5 (Positive control) Test material in vehicle was given intraperitoneally at a dose of 5 ml/kg to groups of rats as shown above. Corn oil was used as vehicle control and TEM (1 5 mg/kg) as the positive control Four hours prior to sacrifice the rats were

given a single intraperitoneal dose of colchicine (4 mg/kg). One male in the 2.42 g/kg group and one male in the 0.82 g/kg dose group died immediately after dosing, these were replaced by substitute animals.

Immediately after sacrifice, bone marrow was obtained from the tibiae of the animals. The marrow was washed and the cells were fixed before being spread on slides (at least 3 from each animal) for examination. Slides were scored for chromosomal aberrations Where possible, a minimum of 50 metaphase cells from each animal were examined and scored for chromatid and chromosome gaps and breaks, fragments, structural rearrangements and ploidy (1-3) A mitotic index (= No of cells in mitosis/500 counted x 100) was calculated and recorded.

The type of aberration, its frequency, the statistical significance of any increases and its correlation to dose in a given time period will all be considered in evaluating a test article as being mutagenically positive or negative.
Criteria for a positive response are generally a statistically significant dose-related increase in the number of structural aberrations at three dose levels. The final decision is based on scientific judgment.

Similar cytogenetics assays have been reported for two other aromatic naphtha samples (API 83-04 and API 83-06, approx 42 and 90% aromatics respectively) and both were negative.

Test Results - Genetic Toxicity in vivo

Systemic Toxicity: No Effects

Genotoxic Effect: Negative

Results Remarks: The dose levels used in the assay were selected on the basis of a preliminary screen. In the cytogenetics assay, one male died at each of the dose levels 2.42 and 0,82 g/kg, the mortality occurred imediately after dosing Toxic signs included lethargy and a moribund appearance at the high dose and slow uncoordinated movement in the mid dose group. The results of the cytogenetics evaluations are summarized in the following table.
MALES
 Dose level (g/kg) Positive Vehicle
 0.26 0.82 2 42 control control
% Cells with 1 or more aberrations
6 hrs 0.5 0.4 1 0 0 5
24 hrs 0 4 0.8 1.0 32.4 0
48 hrs 0 1.6 0.5 0.8
% Cells with 2 or more aberrations
6 hrs 0 0 0 0.5
24 hrs 0 0 0 10.8 0
48 hrs 0 0 0 0
Frequency of structural aberrations
6 hrs .005 .004 .01 .05
24 hrs 004 .008 .01 708 0
48 hrs 0 .016 .005 008
Frequency of numerical aberrations
6 hrs 005 0 016 .015
24 hrs .008 008 .01 008 .005
48 hrs .01 .008 0 .004

FEMALES
Cells with 1 or more aberrations
6 hrs 0 0.5 1.6 0 8
24 hrs 0 0.4 1 5 33 2 0
48 hrs 0 1.2 0 8 1 2
Cells with 2 or more aberrations
6 hrs 0 0 0 0
24 hrs 0 0 0.5 13 20 0
48 hrs 0 0 0 5
Frequency of structural aberrations*
6 hrs 0 005 .016 0.008
24 hrs 0 004 .02 0.804 0
48 hrs 0 012 .008 0.012
Frequency of numerical aberrations*
6 hrs 005 005 .020 0
24 hrs .01 .016 .005 0.020 0.020
48 hrs .008 0 .012 0.005
Mitotic Index
6 hrs 5 4 6.3 3.1 6.1
24 hrs 4.9 5.4 4.1 4.7 4.8
48 hrs 5.5 4.9 7.0 5 2
* Frequency based upon the aberration frequency per cell per animal

Note that for simplicity only, mean values without standard errors are shown in the above table although they are given in the laboratory report

On the basis of the criteria defined for assessing the results, the authors concluded that API 83-05 was not mutagenic in this assay

Conclusion: Catalytic reformed naphtha did not cause bone marrow chromosomal aberrations at i p. dosed up to 2.42 g/kg, which was the highest dose tested.

Reliability/Data Quality - Genetic Toxicity in vivo

Reliability: 1 - Valid Without Restrictions

Reliability Remarks:

Key Study Sponsor Indicator:

Reference - Genetic Toxicity in vivo

Reference:

American Petroleum Institute (1985) Mutagenicity evaluation of 83-05 in the rat bone marrow cytogentic assay. Study conducted by Litton Bionetics, Inc API Mes. Res. Publ. 32-32289, June 1985.

American Petroleum Institute (1985) Activity of API 83-06 (heavy catalytic reformed naphtha) in the acute in-vivo cytogenetics assay in male and female rats API HESD Report No. 33-30494

American Petroleum Institute (1986) Mutagenicity evaluation in the rat bone marrow cytogenetic assay. API 83-04, light catalytically cracked reformed
naphtha (CAS 64741-63-5) API HESD Report No. 33-31092

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Genetic Toxicity in vivo

Test Substance - Genetic Toxicity in vivo

Category Chemical:	(64741-55-5) Naphtha, petroleum, light catalytic cracked
Test Substance:	(64741-55-5) Naphtha, petroleum, light catalytic cracked
Test Substance Purity/Composition and Other Test Substance Comments:	Sample API 81-03 is a light catalytically cracked naphtha stream. The PONA analysis for this sample is Type Vol. % Paraffins 42.8 Olefins 36 5 Naphthenes 10.2 Aromatics 10.2 Indans/tetralins 0 3 Naphthalenes 0 Also see analytical data file attached to category
Category Chemical Result Type:	Measured

Method - Genetic Toxicity in vivo

Type of Study:	DNA Effects Damage
Type of Test:	Sister chromatid exchange assay
Route of Administration:	Intraperitoneal
Type of Exposure:	
Species:	Mouse
Strain:	B6C3F1
Gender:	Both M/F
Dose:	0, 200, 1200 and 2400 mg/kg
Year Study Performed:	1988
Method/Guideline Followed:	
GLP:	Yes
Duration of Treatment/ Exposure Period and Units:	
Frequency of Treatment:	
Positive, Negative, and Solvent Control Substance(s):	positive control: 10/mg/kg cyclophosphamide in corn oil Positive control: 4 g/kg API 81-15, Catalytic Cracked Clarified Oil in corn oil solvent control corn oil
Number of Animals per Sex and Dose Group:	5 mice/sex/dose
Method/Guideline and Test Condition Remarks:	Dose levels were selected on the basis of a dose range finding study that had been conducted previously. Six experimental groups of five male and five female mice were used for the SCE assay Four hours prior to administration of test material, the mice were anesthetized with Metofane and an agar-coated 50 mg BrdUrd pellet was implanted subcutaneously in the lower abdominal region. The test material in corn oil or the corn oil alone were administered by ip injection at a rate of 10 ml/kg body weight. The positive control (CP) was injected ip at a dose level of 10 mg/kg. The positive control (API 81-15) was administered at a dose of 4 g/kg, which was administered by ip injection at a rate of 10 ml/kg. All mice were weighed immediately prior to administration of test dose Colchicine, used to arrest dividing cells in metaphase, was administered ip at 1 mg/kg to all mice two to four hours prior to sacrifice. 24 to 26 hours after BrdUrd pellet implantation the mice were sacrificed Marrow was collected from both femurs. After washing and fixing bone marrow cells slides were prepared for subsequent staining and

examination. Two to five slides were prepared from each animal.

A minimum of 50 second-division metaphase spreads from each animal were examined and scored for SCEs and chromosome number. The mitotic index was recorded as the percentage number of cells in mitosis base upon 500 cells counted.

The percentage of first, second and third-division metaphase cells was also recorded as the number per 100 cells counted. A test article is considered to induce a positive response if a dose-related increase in SCEs/metaphase is observed relative to the vehicle control The test is considered valid if the mean number of SCE per second division metaphase cell must not exceed 8 SCEs/cell/animal in the negative (vehicle) control. The mean SCE/cell/animal for the positive control animals must be statistically increased relative to the vehicle control using the Mann Whitney test (P≤ 0.05)

Test Results - Genetic Toxicity in vivo

Systemic Toxicity: No Effects

Genotoxic Effect: Positive

Results Remarks: There was little or no apparent weight loss between the pretreatment body weights and those at the time of colchicine dosing. No clinical signs of toxicity were observed No mitotic delay or adverse effect on mitotic indices were observed at any test article dose level. The results are summarized in the following table.

Sex Range of mean Average SCEs/cell
 SCEs/cell for per mouse(1,2)
 individual animals
Corn oil
M 4 68 5 84 5.44 ±0.47 (5.64)
F 5.28 7.36 6.25 ±0.86 (6.06)
API 81-03 (2 4 mg/kg)
M 7.06 10.46 8.88 ±1.24 (9.14)**
F 8.16 11.58 9.61 ±1.4 (9.12)**
API 81-03 (1.2 mg/kg)
M 8 58 10.2 9.15 ±0.65 (8 96)**
F 8.92 12.28 10.5 ±1.49 (10 2)**
API 81-03 (0.2 mg/kg)
M 7 54 9.28 8.52 ±0 71 (8.86)**
F 9 2 11.44 10.0 ±0.92 (10.14)**
API 81-15 positive control (4 g/kg)
M 6 68 9.28 7.94 ±0.93 (7.94)**
F 7.28 8.54 7.86 ±0.58 (7.56)*
CP (10 mg/kg)
M 36 6 44.18 40.3 ±3.53 (38.5)**
F 18.34 31.44 25 5 ±5 38 (25.06)**
1 Mean± standard deviation (median SCEs/cell)
2 * P≤0.05 ** P≤0.01

There was a significant increase in SCEs/cell when analyzed by sex Pairwise comparisons by sex of each treatment group with its vehicle control were significantly different. CP and 81-15 also caused an increase in SCEs/cell /mouse in both males and females The negative and positive controls fulfilled the requirements for determination of a valid test. Therefore, API 81-03 was shown to be positive in the SCE assay.

Conclusion: API 81-03, Light Catalytic Cracked Naphtha, was positive in an SCE test at all doses tested (up to 2400 mg/kg) in male and female B6C3F1 mice.

Reliability/Data Quality - Genetic Toxicity in vivo

Reliability: 1 - Valid Without Restrictions

Reliability Remarks:

Key Study Sponsor Indicator:

Reference - Genetic Toxicity in vivo

Reference: American Petroleum Institute (1988) In vivo sister chromatid exchange assay with API 81-03 (light catalytic cracked naphtha) HESD Publ. No. 36-30044

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Genetic Toxicity in vivo

Test Substance - Genetic Toxicity in vivo

Category Chemical:	(64741-55-5) Naphtha, petroleum, light catalytic cracked
Test Substance:	(64741-55-5) Naphtha, petroleum, light catalytic cracked
Test Substance Purity/Composition and Other Test Substance Comments:	API 81-04 is an olefinic naphtha stream with the following characterization Type Vol % Paraffins 34.6 Olefins 29.2 Naphthenes 14 5 Aromatics 21.1 Indans/tetralins 0.5 Naphthalenes 0 1 Also see analytical data file attached to category
Category Chemical Result Type:	Measured

Method - Genetic Toxicity in vivo

Type of Study:	Bone Marrow Chromosomal Aberration
Type of Test:	Other
Route of Administration:	Intraperitoneal
Type of Exposure:	
Species:	Rat
Strain:	Sprague-Dawley
Gender:	Both M/F
Dose:	0, 0 3, 1.0 and 3.0 g/kg
Year Study Performed:	1985
Method/Guideline Followed:	
GLP:	Yes
Duration of Treatment/ Exposure Period and Units:	
Frequency of Treatment:	single
Positive, Negative, and Solvent Control Substance(s):	0 5 mg/kg TEM in corn oil was the postive contrtol. 5 ml/kg corn oil was the solvent control
Number of Animals per Sex and Dose Group:	15 rats/sex/dose/sacrifice time
Method/Guideline and Test Condition Remarks:	Test material was given intraperitoneally as a solution in corn oil at a rate of 5 ml/kg to groups of 15 rats of each sex at three different dose levels (0 3, 1.0 & 3 0 g/kg). A group of 15 rats of each sex were given corn oil and these animals served as vehicle controls A group of 5 animals of each sex to be used as positive controls was dosed with triethylenemelamine (TEM) at a level of 0.5 mg/kg and these animals were killed 24 hours afterwards. Two to four hours prior to being killed the rats were given a single ip dose of colchicine (1 mg/kg). For each dose level of test material and the negative controls 5 rats of each sex were killed 6, 24 and 48 hours after dosing Immediately following sacrifice bone marrow was aspirated from the femur. The marrow was washed and the cells were fixed before being spread on slides (at least 3 slides were prepared from each animal. Slides were stained and scored without regard to treatment group. Where possible, a minimum of 50 metaphase cells from each animal were examined and scored for chromatid and chromosome gaps and breaks, fragments, structural rearrangements and ploidy The ratio of the number of cells in mitosis per 500 cells counted x 100 is defined as the mitotic index The data on chromosomal aberrations for the treated animals was compared to that for the negative controls.

In a separate study in which exposure was by inhalation at 63, 297 and 2046 ppm, 6hr/day for 5 days, there was no evidence of a light catalytic cracked naphtha causing chromosomal aberrations in rats. (API Report 32-31300)

Test Results - Genetic Toxicity in vivo

Systemic Toxicity: Yes

Genotoxic Effect: Negative

Results Remarks: There was a 9% weight loss in males 48 hours after receiving 3 g/kg API 81-04 and a 2% weight loss in females at the same time and dose level. Clinical signs of toxicity in the 3 g/kg group included lethargy in both sexes and increased tearing as indicated by a crusty appearance of fur around the eyes of the male animals. Animals in the vehicle control group appeared normal. The report includes for each animal the following information: number of cells scored, mitotic index, modal chromosome number, number of gaps, breaks (chromatid and chromosome) and fragment, number of rearrangements (exchange figures, dicentric and ring) and number of severely damaged cells Treatment with API 81-04 did not affect any of these parameters. There were no apparent sex differences and consequently the data for both sexes are combined in the following summary table.

500 cells were examined for every treatment at each time period shown below. No rearrangements were recorded for either the vehicle control or any of the groups treated with API 81-04, whereas 13 rearrangements were recorded for the positive control group. No aberrations from severely damaged cells were recorded for either the vehicle control or API 81-04 groups but 80 were recorded for the positive control group.

Time Incidence Total No. of Aberrations
(hrs) of Gaps Breaks per cell
 aberrations(%)
Corn oil control (5 ml/kg)
6 0.8 5 4 0.008
24 0.4 3 2 0.004
48 0.4 2 2 0.004

API 81-04 (3 g/kg)
6 1 3 5 0.010
24 0 5 0 0
48 0.4 1 2 0 004
API 81-04 (1 g/kg)
6 0.6 3 3 0.006
24 0.4 2 2 0.004
48 0.4 0 2 0.004
API 81-04 (0.3 g/kg)
6 1.0 1 5 0.010
24 0 2 0 0
48 0.2 3 1 0.002
TEM 0.5 mg/kg)
24 16.6 22 126 0.438

The data above demonstrate that API 81-04 did not cause chromosomal aberrations in either male or female rats at the dose levels tested.

Conclusion: API 81-04, Light Catalytic Cracked Naphtha did not cause chromosomal aberrations in either male or female rats at doses up to 3g/kg, the highest dose tested.

Reliability/Data Quality - Genetic Toxicity in vivo

Reliability: 1 - Valid Without Restrictions

Reliability Remarks:

Key Study Sponsor Indicator:

Reference - Genetic Toxicity in vivo

Reference: American Petroleum Institute (1985) Activity of API 81-04 in the acute in vivo cytogenetics assay in male and female rats API Med Res. Pub. 32-32288

American Petroleum Institute (1985) Mutagenicity evaluation studies in the rat bone marrow cytogenetic assay in the mouse lymphoma forward mutation assay Light catalytic cracked naphtha API sample 81-03 API Med. Res. Pub. 32-31300

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Genetic Toxicity in vitro

Test Substance - Genetic Toxicity in vitro

Category Chemical:	(64741-66-8) Naphtha, petroleum, light alkylate
Test Substance:	(64741-66-8) Naphtha, petroleum, light alkylate
Test Substance Purity/Composition and Other Test Substance Comments:	Sample API 83-19 is a Light Alkylate Naphtha (LAN)
Category Chemical Result Type:	Measured

Method - Genetic Toxicity in vitro

Type of Study:	Other
Concentrations:	0.005 to 0.08 µl/ml without activation and 0.00004 to 0.8 µl/ml with Araclor-induced rat liver S-9 activation
Year Study Performed:	1985
Method/Guideline Followed:	Other
GLP:	Yes
Postive, Negative, and Solvent Control Substance(s):	
Method/Guideline and Test Condition Remarks:	Type: Mouse lymphoma assay System of testing: Forward mutation assay using cell line L5178Y TK+/- The test material was dissolved in acetone for this assay. Two positive control substances were used viz Ethyl methane sulphonate (EMS) at concentrations of 1.0 & 0.5 il/ml and 7, 12-DMBA at concentrations of 7.5 & 5.0 µg/ml. A cytotoxicity study was carried out prior to the mutagenicity assay. The results were difficult to interpret and as a consequence a second study was carried out and the results from this were used to determine the concentrations to be used in the subsequent lymphoma assay. It was established that complete toxicity occurred at 0.05 µl/ml for the non-activated cultures and at 0.5 il/ml for S-9 activated cultures. For the mutation assay the lymphoma cells were exposed for 4 hours to test material at concentrations ranging from 0.005 to 0.08 µl/ml without activation and 0.00004 to 0.8 il/ml with Araclor-induced rat liver S-9 activation. After exposure to the test material, the cells were allowed to recover for 2 days and then cultures were selected for cloning and mutant selection; trifluorothymidine (TFT) was used as the restrictive agent. Eight non-activated and nine activated cultures were selected for cloning based on their degree of toxicity. The non-activated cultures that were cloned were treated with 0.005, 0.01, 0.015, 0.02, 0.025, 0.03, 0.035 or 0.04 il/ml and resulted in a range of growth of 6 to 97%. The activated cultures that were cloned were treated with 0.0002, 0.0009, 0.0028, 0.008, 0.02, 0.045, 0.09, 0.7 or 0.75 µl/ml and produced a range of growth from 24 to 109%. Plates were prepared from TFT-restricted and from the Viable cultures (VC) and after 10 to 12 days incubation these plates were scored for total number of colonies per plate. A mutation frequency was then determined. The following criteria were used in judging the significance of the activity of the test article. Positive -if there is a positive dose response and one or more of the 3 highest doses exhibit a mutant frequency which is two-fold greater than background level. Equivocal -if there is no dose response but any one or more doses exhibit a two-fold increase in mutant frequency over background. Negative -if there is no dose response and none of the test cultures exhibit mutant frequencies which are two-fold greater than background. Six mouse lymphoma assays were conducted but for technical reasons four of the assays were invalid. In the fifth assay none of the cultures that were cloned, whether in the presence or absence of S-9 activation exhibited mutant frequencies that were greater than those for the solvent control. However, the toxic response in the S-9 activation portion of the assay was erratic and this portion of the assay was repeated. This summary includes information from the fifth and sixth assays only, since they are the only ones considered to be valid.

Test Results - Genetic Toxicity in vitro

Details on Cytogenetic Assay:

Statistics:

Effect :

Species	Other Species	Strain	Other Strain	Metabolic Activation	Genotoxic Effect	Conclusion
Mammalian Cell Line		Mouse Lymphoma L5178Y Cells		With and Without	Negative	Negative

Results Remarks:

The results of the fifth assay are as follows: After the 2 day recovery period, eight non-activated cultures and nine S-9 activated cultures were cloned based on their degree of toxicity. The mutant frequencies and the percentage total growth at each of the test concentrations is summarized in the following table.

Concentration Mutant %Total
(µl/ml) frequency growth
Non-Activated
0 04 0 34
0.035 0.5 3
0.03 0.2 30
0.025 0 46
0.02 0 93
0.015 -0 2 102
0.01 0 79
0 005 0 93
Solvent 1 0.5
Solvent 2 0.6
DMBA 7.5 µl/ml 3.6 27
DMBA 5 µl/ml 1.9 57

S-9 Activated
0.75 0.2 101
0.7 0 2 16
0.09 0 88
0.045 -0.1 107
0.02 0 107
0.008 0.1 104
0.0028 0 100
0.0009 0 113
0.0002 -0 1 111
Solvent 1 0 6
Solvent 2 0.6
EMS 1µl/ml 8.7 3
EMS 0.5 µl/ml 6.8 29

The sixth assay was with S-9 activation only and the results were as follows.
S-9 Activated
0.8 0.2 50
0.75 0 84
0.7 -0.1 90
0.65 -0.4 143
0.6 -0.1 99
0.5 -0.1 18
0.45 0 1 89
0.4 -0.1 72
0.35 0.1 76
0.25 -0.3 31
Solvent 1 0.8
Solvent 2 0.8
DMBA 7.5 µl/ml 1.4 62
DMBA 5 µl/ml 1.1 86

The authors concluded that according to the criteria used to judge the activity of the test material, the sample produced a negative response in the presence and absence of S-9 activation.

Conclusion:

Reliability/Data Quality - Genetic Toxicity in vitro

Reliability: 2 - Valid With Restrictions

Reliability Remarks:

Key Study Sponsor Indicator:

Reference - Genetic Toxicity in vitro

Reference:

American Petroleum Institute (1985) L5178Y +/-Mouse lymphoma assay, API 83-19 Light Alkylate Naphtha. Study conducted by Microbiological Associates Inc. API Health and Environmental Sciences Dept. Report 32-32746

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Genetic Toxicity in vitro

Test Substance - Genetic Toxicity in vitro

Category Chemical:	(64741-87-3) Naphtha, petroleum, sweetened
Test Substance:	(64741-87-3) Naphtha, petroleum, sweetened
Test Substance Purity/Composition and Other Test Substance Comments:	API 81-08
Category Chemical Result Type:	Measured

Method - Genetic Toxicity in vitro

Type of Study:	Mammalian cell gene mutation assay
Concentrations:	12.5 -300 µl/ml
Year Study Performed:	1985,
Method/Guideline Followed:	
GLP:	Yes
Postive, Negative, and Solvent Control Substance (s):	
Method/Guideline and Test Condition Remarks:	Type: Mouse lymphoma assay System of testing: Forward mutation assay using cell line L5178Y TK+/- Based on a preliminary test, ethanol was selected as solvent for this assay. Concentrations of 0.061 to 1000 µl/ml appeared soluble in the assay medium and no change in color was noted. Two positive control substances were used viz Ethyl methane sulphonate (EMS) at a concentration of 0.5 µl/ml in the assay without activation and Dimethylnitrosamine (DMN) at a concentrations of 0.3 il/ml. A cytotoxicity study was carried out prior to the mutagenicity assay. The results were difficult to interpret and as a consequence a second study was carried out and the results from this were used to determine the concentrations to be used in the subsequent lymphoma assay. It was established that complete toxicity occurred at 0.05 µl/ml for the non-activated cultures and at 0.5 µl/ml for Araclor-induced rat liver S-9 activated cultures. For the mutation assay the lymphoma cells were exposed for 4 hours to test material at concentrations ranging from 0.005 to 0.08 µl/ml without activation and 0.00004 to 0.8 µl/ml with S-9 activation. After exposure to the test material, the cells were allowed to recover for 2 days and then cultures were selected for cloning and mutant selection; 5-trifluorothymidine (TFT) was used as the restrictive agent. Eight non-activated and nine activated cultures were selected for cloning based on their degree of toxicity. The non-activated cultures that were cloned were treated with 0.005, 0.01, 0.015, 0..02, 0.025, 0.03, 0.035 or 0.04 µl/ml and resulted in a range of growth of 6 to 97%. The activated cultures that were cloned were treated with 0.0002, 0.0009, 0.0028, 0.008, 0.02, 0.045, 0.09, 0.7 or 0.75 µl/ml and produced a range of growth from 24 to 109%. Plates were prepared from TFT and from the viable culture (VC) and after 10 to 12 days incubation these plates were scored for total number of colonies per plate. A mutation frequency was then determined. The following criteria were used in judging the significance of the activity of the test article. Positive -if there is a positive dose response and one or more of the 3 highest doses exhibit a mutant frequency which is two-fold greater than background level. Equivocal -if there is no dose response but any one or more doses exhibit a two-fold increase in mutant frequency over background. Negative -if there is no dose response and none of the test cultures exhibit mutant frequencies which are two-fold greater than background.

Test Results - Genetic Toxicity in vitro

Details on Cytogenetic Assay:	Cycotoxic concentr.: 0.05 µl/ml without activation; 0.5 µl/ml with activation
Statistics:	

Effect :

Species	Other Species	Strain	Other Strain	Metabolic Activation	Genotoxic Effect	Conclusion
Mammalian Cell Line		Mouse Lymphoma L5178Y Cells		With and Without	Negative	Negative

Results Remarks: The data from each of the 3 trials that were considered valid are tabulated below.
Conc. Relative growth Mutant frequency
(µl.ml) (%) (10-6 units)
TRIAL 1 No activation
15.6 118.6 18.1
31.3 64.4 27
62.5 97.8 15.7
125 78.2 24.2
250 20.1 48.8
Solvent control 1 100 13.9
Solvent control 2 100 20.3
Untreated control 191.7 21.5
EMS 0.5 µl/ml 17.4 258.2

TRIAL 1 with S-9 activation
15.6 78.1 59.1
31.3 53.8 49.3
62.5 63.3 49
125 46.5 79.7
250 46.3 41.6
Solvent control 1 100 34
Solvent control 2 100 24
Untreated control 100.7 30.5
DMN 0.3 µl/ml 5 327.5

TRIAL 4 No activation
12.5 47.8 19.5
25 49.7 19.2
50 37.7 13.5
100 113.3 8.5
200 86.2 9.3
300 19.8 36.4
Solvent control 1 100 18.3
Solvent control 2 100 18.5
Untreated control 163.9 16.2
EMS 0.5 µl/ml 13.5 700

TRIAL 4 with S-9 activation
12.5 81.6 52.3
25 60.2 85.7
50 57.3 59.1
100 44.7 63.8
200 71.8 21
300 3.1 19.3
Solvent control 1 100 23.2
Solvent control 2 100 22.9
Untreated control 78.2 22.2
DMN 0.3 µl/ml 8.8 469.4

TRIAL 5 with S-9 activation
150 76.9 13.6
150 28.4 25.2
200 42.5 24
200 41.9 15.3
250 59.6 24.2
250 15.6 31.1
300 4.9 30.2
300 7.3 32
Solvent control 1 100 27.1
Solvent control 2 100 19.2
Solvent control 3 100 22.4
Solvent control 4 100 24.5
Untreated control 1 63.8 31
Untreated control 2 49.9 29.2
DMN 0.3 µl/ml 16.6 352.9
DMN 0.3 µl/ml 2.2 333.3

TRIAL 1:
Non activation conditions.: The percent relative growths of the assayed treatments ranged from 118.6% to 20.1% which demonstrated non-detectable to moderate toxicities. The minimum criterion for mutagenesis in this assay was a mutant frequency that exceeding 37.8x10-6. The highest, most toxic treatment (250 µl/ml) induced a mutant frequency that exceeded the minimum criterion, but the increase in the mutant frequency was not accompanied by an increase in the total mutant clones. In order to determine if the increase was repeatable, another nonactivation assay was performed.
Activated assay: Test material was assayed at concentrations ranging from 15.6 to 250 µl.ml. The minimum criterion for mutagenesis inhis assay was a mutant frequency exceeding 54.2x10-6. Two treatments induced mutant frequencies that exceeded the minimum criterion, but the increases were sporadic and unrelated to dose or toxicity. Another assay was therefore performed.

TRIAL 4
Non activated assay.: The test material was assayed at concentrations ranging from 12.5 to 300 µl/ml. In order for a treatment to be considered mutagenic in this assay, a mutant frequency of 36.5x10-6 was required. None of the assayed treatments induced mutant frequencies that exceeded the minimum criterion. The observed toxicities ranged from non toxic to moderate toxicity. Although it is preferable to consider results from treatments that induce high toxicity, it was not possible in this assay because of a sharp toxicity curve. The test material was therefore considered non mutagenic without activation in this assay at treatments that approached lethality.
Activated assay.: Concentrations ranging from 12.5 to 300 µl/ml were used in this assay and low to very high toxicity was induced. Sporadic increases in the mutant frequency were induced. The minimum criterion for mutagenesis in this assay was a mutant frequency exceeding 44.2x10-6 and three treatments did exceed the minimum criterion (25, 50 & 100 nl/ml). However, the highest concentrations assayed were non-mutagenic. A further assay was therefore performed.

TRIAL 5:
Activated assay: The test material was assayed in duplicate at concentrations ranging from 150 to 300 nl/ml. A wide range of toxicities were induced. The sporadic increases in mutant frequency observed in Trials 1 and 4 were not repeatable. None of the treatments induced mutant frequencies that exceeded the minimum criterion of 48.4x10-6. The test material was therefore considered non-mutagenic with activation in this assay.

Conclusion:

Reliability/Data Quality - Genetic Toxicity in vitro

Reliability: 2 - Valid With Restrictions

Reliability Remarks: multiple assays needed to get usable studies

Key Study Sponsor Indicator:

Reference - Genetic Toxicity in vitro

Reference: American Petroleum Institute (1985) Mutagenicity evaluation studies in the mouse lymphoma forward mutation assay, sweetened naphtha, sample 81-08. Study carried out by Litton Bionetics Inc. API Medical Research Publication No. 32-31233

Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

Genetic Toxicity in vitro

Test Substance - Genetic Toxicity in vitro

Category Chemical:	*No CAS Number Provided*
Test Substance:	*No CAS Number Provided*
Test Substance Purity/Composition and Other Test Substance Comments:	Unleaded gasoline
Category Chemical Result Type:	Measured

Method - Genetic Toxicity in vitro

Type of Study:	Bacterial reverse mutation assay
Concentrations:	Test doses % Concentration Bacteria Yeast 1/8 50% survival 0.375 0.625 1/4 50% survival 0 75 1.25 1/2 50% survival 1.5 2.5 50% survival 3 5
Year Study Performed:	1977
Method/Guideline Followed:	
GLP:	Yes
Postive, Negative, and Solvent Control Substance(s):	DMSO was used as solvent.
Method/Guideline and Test Condition Remarks:	The solubility, toxicity and dose levels for the test material were determined prior to the mutagenicity screening. Plate tests: For non-activation assays cells in broth were exposed to the test material at the concentrations shown above. The contents of the tubes of broth plus test material were poured over selective agar plates which were then incubated. The test was conducted with and without Araclor-induced rat liver S-9 metabolic activation. Positive control substances (see results section) were also run in the same assay. The following evaluation criteria were used in this plate test. Strains TA1535, 1537 and 1538: If the solvent control value is within the normal range a chemical which produces a positive response over three concentrations with the lowest increase equal to twice the solvent control value is considered to be mutagenic. Strains TA98, 100 and D4: If the solvent control value is within the normal range, a chemical which produces a positive response over three concentrations with the highest increase equal to twice the solvent control value for TA100 and two to three times the solvent control value for strains TA98 andD4 is considered to be mutagenic. For these strains, the dose response increase should start at approximately the solvent control value. Pattern. Because TA1535 and TA100 were both derived from the same parental strain (G-46) and because TA1538 and TA98 were both derived from the same parental strain (D3052), there is a built-in redundancy in the microbial assay. In general the two strains of a set respond to the same mutagen and such a pattern is sought. It is also anticipated that if a given strain responds to a mutagen in non-activation tests it will generally do so in activation tests, but the converse of this is not anticipated. While similar response patterns are not required for all mutagens, they can be used to enhance the reliability of an evaluation decision. Reproducibility: If a chemical produces a response in a single test which cannot be repeated in one or more additional runs, the initial positive test data loses significance. The above criteria are not absolute and other extenuating factors may enter into a final evaluation decision. Suspension tests: Bacteria and yeast cultures were grown in complete broth. The cells were removed, washed and exposed to the test material at the concentrations shown in the results section. For the yeast cells exposure to the test material was for 4 hours whereas for the bacterial cells exposure was for 1 hour. Aliquots of the cells were plated onto the appropriate complete media. After suitable incubation periods, the number of revertant colonies were counted. This assay was also conducted with and without metabolic activation and positive control substances

were also included.

The following criteria were used in the suspension assay.

Surviving population counts: A certain level of chemically-induced toxicity is anticipated, but occasionally isolated tests show very low (<25%) survival compared to the tissue controls Data of this type are generally unacceptable and these experiments are repeated at a lower dose level.

Total mutant counts: For non mutagens, the ratio of mutant to surviving population should be roughly equivalent for each test point in a given experiment. A mutagenic chemical will produce an altered mutant/surviving population ratio. An attempt is made to keep the surviving population of cells high and to look for positive responses that show increases in both numbers of mutants and mutation frequencies

Dose-response: Dose-related increases in mutants and mutation frequencies are the most convincing data when assessing mutagenic activity. To ensure a proper dose response, dose levels are kept within a relatively low range.

Test Results - Genetic Toxicity in vitro

Details on Cytogenetic Assay:

Statistics:

Effect :

Species	Other Species	Strain	Other Strain	Metabolic Activation	Genotoxic Effect	Conclusion
Bacteria		S. typhimurium TA 98		With and Without	Negative	Negative
Bacteria		S. typhimurium TA 100		With and Without	Negative	Negative
Bacteria		S. typhimurium TA 1535		With and Without	Negative	Negative
Bacteria		S. typhimurium TA 1537		With and Without	Negative	Negative
Bacteria		S. typhimurium TA 1538		With and Without	Negative	Negative
Yeast		Saccharomyces cerevisiae		With and Without	Negative	Negative

Results Remarks:

Plate test: There was no increase in revertants caused by exposure to the test material at any concentration. The results in this assay were negative both with and without metabolic activation.
Suspension test: The mutation frequencies are summarized in the following table for assays with and without metabolic activation.

Non activation assay
Salmonella strains Yeast
Dose TA100 TA1535 TA1537 TA1538 TA98* D4**
level
-ve control 5.48 3.59 6.15 7.1 41.99 23.69
+ve control 125.51 185.65 161.54 84.75 100 66.29
1 (low) 18.18 2.26 12.54 27.78 233.33 9.52
2 2.9 2.15 8.97 11.76 63.04 36.99
3 3.1 2.98 7.19 10 9.56 30.02
4 (high) 4.13 2.66 9.68 3.21 35.74 32.38

Assay repeated for negative control and lowest 2 doses. Results were 54.59 for -ve control, 10.84 for lowest dose, 14.11 for next highest dose

** Assay repeated at all dose levels
Results were: -ve control 4.66, +ve control 97.73, dose level 1 1.3, dose level 2 8.33, dose level 4 12.65.

Slight increases are observed at the high dose levels with TA100, TA1537 and TA1538. However the responses are not adequate enough to be considered positive. The increases with TA98 could not be reproduced.

With activation
 Salmonella strains Yeast
 Dose TA100 TA1535 TA1537 TA1538 TA98* D4**
 level
-ve controls*
 A+C 17.08 5.25 6.01 4.8 21.01 52.66
 A-C 17 29 8.77 9.29 8.25 62.02 7.96
 AL1 17.34 7.32 3.99 6.48 45.03 30.06
+ve control 25.51 89.92 0.22 1253.4 555.35 115.3
1 (low) 22.97 41 67 100 71.43 100
2 15.64 7.21 0 300 30 66 27.22
3 17.26 9.57 20 15.38 83.33 27.03
4 22.31 7.21 5.43 6.93 60.13 29.04

* Controls were
A+C No activation system but including positive control
A-C Solvent control, no test chemical or activation system
AL1 Liver homogenate control plus solvent

Scattered increases were found at one or more dose levels (see table above). All apparent positive effects were repeated and were not reproducible indicating problems associated with the initial runs. When the raw data were inspected it was observed that the increases were due to anomalous reductions in viable cell counts. The results of this assay were therefore considered to be negative.

Conclusion:

Reliability/Data Quality - Genetic Toxicity in vitro

Reliability: 2 - Valid With Restrictions

Reliability Remarks: Valid with restrictions due to poor quality of initial assay.

Key Study Sponsor Indicator:

Reference - Genetic Toxicity in vitro

Reference: American Petroleum Institute (1977) Mutagenicity evaluation of unleaded gasoline
Study conducted by Litton Bionetics, Inc. API HESD Publication No 28-30173, March 1977

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Genetic Toxicity in vitro

Test Substance - Genetic Toxicity in vitro

Category Chemical:	(64741-55-5) Naphtha, petroleum, light catalytic cracked
Test Substance:	(64741-55-5) Naphtha, petroleum, light catalytic cracked
Test Substance Purity/Composition and Other Test Substance Comments:	
Category Chemical Result Type:	Measured

Method - Genetic Toxicity in vitro

Type of Study:	Mammalian cell gene mutation assay
Concentrations:	Treatments from 50 to 800 nl/ml without activation and with treatments from 25 to 500 nl/ml with Araclor-induced rat liver S-9 activation.
Year Study Performed:	1987
Method/Guideline Followed:	
GLP:	Yes
Postive, Negative, and Solvent Control Substance(s):	
Method/Guideline and Test Condition Remarks:	The test material was dissolved in Ethanol for this assay. Two positive control substances were used viz Ethyl methane sulfonate (EMS) at concentrations of 0.25 & 0.5 il/ml for non activation assays and 3-methylcholanthrene (MCA) at concentrations of 2.5 & 4.0 ig/ml for activation assays. A cytotoxicity study carried out prior to the mutagenicity assay established that the sample was highly toxic at 500 nl/ml without activation and lethal at the same concentration in the presence of metabolic activation. Therefore, for the mutation assay the lymphoma cells were exposed for 4 hours to test material at treatments from 50 to 800 nl/ml without activation and with treatments from 25 to 500 nl/ml with Araclor-induced rat liver S-9 activation. After exposure to the test material, the cells were allowed to recover for 2 days and then cultures were selected for cloning and mutant selection. Plates containing colonies of selected cells were incubated for 10 to 14 days after which they were scored for total number of colonies per plate. A mutation frequency was then determined. Assay evaluation criteria were: The minimum criterion considered necessary to demonstrate mutagenesis for any given treatmnet is a mutant frequency that is at least 150% of the concurrent background frequency plus 10 x 10-6. The background frequency is defined as the average mutant frequency of the solvent negative controls. The minimum increase is based on extensive experience which indicates that assay variability increases with higher backgrounds and the calculated minimum increase as defined above is often a repeatable result; statistical analysis for the confidence limits is not yet available. The observation of a mutant frequency that meets the minimum criterion for a single treated culture within a range of assayed concentrations is not sufficient evidence to evaluate a test material as a mutagen. The following test results must be obtained to reach this conclusion for either activation or non-activation conditions. A dose-related or toxicity-related increase in mutant frequency should be observed. It is desirable to obtain this relation for at least three doses, but this depends on the concentration steps chosen for the assay and the toxicity at which mutagenic ativity appears. If an increase of about two times the minimum criterion or greater is observed for a single dose near the highest testable toxicity, as defined in the Assay acceptance criteria, the test material will be considered mutagenic. Smaller increases at a single dose near the highest testable toxicity will require confirmation by a repeat assay. Treatments that induce less than 10% relative growth are included in the assay, but are not used as primary evidence for mutagenicity as it relates to risk assessment In the assay reported in this particular study, under non-activation conditions, the test material was excessively toxic at 300

nl/ml. Five treatments from 50 to 250 nl/ml were therefore chosen for the analysis of mutant induction and non-detectable to moderate toxicities were induced (relative growths 205.3% to 25.5%). None of the assayed treatments induced a mutant frequency that exceeded the minimum criterion of 89.7x10. However, since it is desirable to include highly toxic treatments (10 to 20% relative growth) in an analysis, another non activation assay was performed in an attempt to obtain a wider range of toxicities. In the second assay the test material was analyzed for mutant induction from 50 to 150 nl/ml

In the presence of metabolic activation six treatments from 75 to 400 nl/ml were analyzed for mutant induction and a wide range of toxicities was induced (86.3 to 6.9% relative growths). The minimum criterion for mutagenesis in this assay was a mutant frequency exceeding 81.4x10 None of the acceptable treatments induced a mutant frequency that exceeded the minimum criterion. One treatment with less than 10% relative growth (400 nl/ml) induced a mutant frequency that exceeded the minimum criterion, but the treatment was not acceptable for analysis becasue it did not fulfill the requirements of the assay evaluation criteria. A second assay was therefore performed at treatments ranging from 200 to 300 nl/ml.

Two other olefinic naphtha streams have been tested in a mouse lymphoma assay. The results are summarized below.
Sample Result API Report
API 81-03 Negative 32-31300
 With or without S9
API 81-04 Negative without S9 32-31710
 Equivocal with S9
S9 source: Araclor-induced rat liver

Test Results - Genetic Toxicity in vitro

Details on Cytogenetic Assay:

Statistics:

Effect :

Species	Other Species	Strain	Other Strain	Metabolic Activation	Genotoxic Effect	Conclusion

Results Remarks:

Only the results of the second assays are summarized since the first assay was not considered acceptable (for the reasons given in the method section above).

 Cloning efficiency Relative growth Mutant frequency
Test condition (%) (10E units)
Non activation
Solvent control 100.5 100 49.1
Solvent control 109.7 100 42.5
Solvent control 107.5 100 45.6
EMS 0.25 il/ml 86.8 82.5 286.7
EMS 0.4 il/ml 72.7 56.2 469.7
Sample 83-20
50 nl/ml 128.4* 144.7 38.5
100 nl/ml 100.1* 88.8 58 2
150 nl/ml 78.5* 81.6 60.5

S9 activation
Solvent control 114 7 100 46.5
Solvent control 121 0 100 44.3
Solvent control 100.2 100 57.2
MCA 2.5 ig/ml 87.3 55 5 235.1
MCA 4 ig/ml 73.2 53.5 210.0
Sample 83-20
200 nl/ml 88.7* 62.4 48.3
250 nl/ml 88 1* 68.8 65.5
250 nl/ml 64.3* 8 6 66.2
300 nl/ml 63.7* 11.1 74.3
300 nl/ml 59.7* 7.3 96.7
* Cloning efficiency relative to solvent control

In the non activation assay, at most, low toxicities were induced without inducing significant increases above the background mutant frequency (average of solvent controls). Higher toxicities could not be assayed because of a very sharp toxicity curve; a small increase in concentration from 150 to 175 nl/ml was excessively toxic. The test material was, therefore, considered non mutagenic without activation at concentrations that approached excessive toxicity.

In the activation assay, the 250 and 300 nl/ml treatments were duplicated to determine reproducibility. Low and high toxicities were induced by the assayed treatmnets (68.8 to 7.3% relative growths). For a treatment to be considered mutagenic in

this trial, a mutant frequency exceeding 84.0x10 was required. One treatment at 300 nl/ml induced a mutant frequency that exceeded this criterion but the increase was observed at less than 10% relative growth and a duplicate treatment at the same concentration was inactive. The test material was, therefore, considered non-mutagenic with activation in this assay.

In the assays used in this evaluation, the average cloning efficiencies for the solvent controls varied from 70.5% and 105 9% without activation to 96 2% and 112.0% with activation, which demonstrated acceptable cloning conditions for the assays The negative control mutant frequencies were all within the expected range and the positive control compounds yielded mutant frequencies that were greatly in excess of the background. Sample 83-20 is considered inactive in the mouse lymphoma assay, with and without metabolic activation.

Conclusion:

Reliability/Data Quality - Genetic Toxicity in vitro

Reliability: 1 - Valid Without Restrictions

Reliability Remarks:

Key Study Sponsor Indicator:

Reference - Genetic Toxicity in vitro

Reference: American Petroleum Institute (1985) L5178Y TK +/-Mouse lymphoma mutagenesis assay of API 81-04 API Med. Res. Pub. 32-31710

American Petroleum Institute (1985) Mutagenicity evaluation studies in the rat bone marrow cytogenetic assay in the mouse lymphoma forward mutation assay Light catalytic cracked naphtha API sample 81-03 API Med. Res. Pub. 32-31300

American Petroleum Institute (1987) Mutagenicity of API 83-20, Light catalytic cracked naphtha (CAS 64741-55-5) in a mouse lymphoma mutation assay HESD Pub No. 34-30633

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Genetic Toxicity in vitro

Test Substance - Genetic Toxicity in vitro

Category Chemical:	(64741-66-8) Naphtha, petroleum, light alkylate
Test Substance:	(64741-66-8) Naphtha, petroleum, light alkylate
Test Substance Purity/Composition and Other Test Substance Comments:	Sample API 83-19 is a Light Alkylate Naphtha (LAN)
Category Chemical Result Type:	Measured

Method - Genetic Toxicity in vitro

Type of Study:	Other
Concentrations:	0.005 to 0.08 µl/ml without activation and 0.00004 to 0.8 µl/ml with Araclor-induced rat liver S-9 activation
Year Study Performed:	1985
Method/Guideline Followed:	Other
GLP:	Yes
Postive, Negative, and Solvent Control Substance (s):	
Method/Guideline and Test Condition Remarks:	Type: Mouse lymphoma assay System of testing: Forward mutation assay using cell line L5178Y TK+/- The test material was dissolved in acetone for this assay. Two positive control substances were used viz Ethyl methane sulphonate (EMS) at concentrations of 1.0 & 0.5 il/ml and 7, 12-DMBA at concentrations of 7.5 & 5.0 µg/ml. A cytotoxicity study was carried out prior to the mutagenicity assay. The results were difficult to interpret and as a consequence a second study was carried out and the results from this were used to determine the concentrations to be used in the subsequent lymphoma assay. It was established that complete toxicity occurred at 0.05 µl/ml for the non-activated cultures and at 0.5 il/ml for S-9 activated cultures. For the mutation assay the lymphoma cells were exposed for 4 hours to test material at concentrations ranging from 0.005 to 0.08 µl/ml without activation and 0.00004 to 0.8 il/ml with Araclor-induced rat liver S-9 activation. After exposure to the test material, the cells were allowed to recover for 2 days and then cultures were selected for cloning and mutant selection; trifluorothymidine (TFT) was used as the restrictive agent. Eight non-activated and nine activated cultures were selected for cloning based on their degree of toxicity. The non-activated cultures that were cloned were treated with 0.005, 0.01, 0.015, 0.02, 0.025, 0.03, 0.035 or 0.04 il/ml and resulted in a range of growth of 6 to 97%. The activated cultures that were cloned were treated with 0.0002, 0.0009, 0.0028, 0.008, 0.02, 0.045, 0.09, 0.7 or 0.75 µl/ml and produced a range of growth from 24 to 109%. Plates were prepared from TFT-restricted and from the Viable cultures (VC) and after 10 to 12 days incubation these plates were scored for total number of colonies per plate. A mutation frequency was then determined. The following criteria were used in judging the significance of the activity of the test article. Positive -if there is a positive dose response and one or more of the 3 highest doses exhibit a mutant frequency which is two-fold greater than background level. Equivocal -if there is no dose response but any one or more doses exhibit a two-fold increase in mutant frequency over background. Negative -if

there is no dose response and none of the test cultures exhibit mutant frequencies which are two-fold greater than background.

Six mouse lymphoma assays were conducted but for technical reasons four of the assays were invalid. In the fifth assay none of the cultures that were cloned, whether in the presence or absence of S-9 activation exhibited mutant frequencies that were greater than those for the solvent control. However, the toxic response in the S-9 activation portion of the assay was erratic and this portion of the assay was repeated. This summary includes information from the fifth and sixth assays only, since they are the only ones considered to be valid.

Test Results - Genetic Toxicity in vitro

Details on Cytogenetic Assay:

Statistics:

Effect :

Species	Other Species	Strain	Other Strain	Metabolic Activation	Genotoxic Effect	Conclusion
Mammalian Cell Line		Mouse Lymphoma L5178Y Cells		With and Without	Negative	Negative

Results Remarks:

The results of the fifth assay are as follows: After the 2 day recovery period, eight non-activated cultures and nine S-9 activated cultures were cloned based on their degree of toxicity. The mutant frequencies and the percentage total growth at each of the test concentrations is summarized in the following table.

Concentration (µl/ml) Mutant frequency %Total growth
Non-Activated
0.04 0 34
0.035
0.5 3
0.03 0.2 30
0.025
0 46
0.02 0 93
0.015
0.2 102
0.01 0 79
0.005
0 93
Solvent 1 0.5
Solvent 2
0.6
DMBA 7.5 µl/ml 3.6 27
DMBA 5 µl/ml 1.9 57

S-9 Activated
0.75 0.2 101
0.7
0.2 16
0.09 0 88
0.045
0.1 107
0.02 0 107
0.008
0.1 104
0.0028 0
100
0.0009 0 113
0.0002 -0.1
111
Solvent 1 0.6
Solvent 2 0.6
EMS 1µl/ml 8.7 3
EMS 0.5 µl/ml
6.8 29

The sixth assay was with S-9 activation only and the results were as follows:
S-9 Activated
0.8 0.2 50
0.75
0 84
0.7 -0.1 90
0.65
0.4 143
0.6 -0.1 99
0.5
0.1 18
0.45 0.1 89
0.4
0.1 72
0.35 0.1 76
0.25
0.3 31
Solvent 1 0.8
Solvent 2 0.8
DMBA 7.5 µl/ml 1.4 62
DMBA 5 µl/ml 1.1
86

The authors concluded that according to the criteria used to judge the activity of the test material, the sample produced a negative response in the presence and absence of S-9 activation.

Conclusion:

Reliability/Data Quality - Genetic Toxicity in vitro

Reliability: 2 - Valid With Restrictions

Reliability Remarks:	
Key Study Sponsor Indicator:	

Reference - Genetic Toxicity in vitro

Reference:	American Petroleum Institute (1985) L5178Y +/-Mouse lymphoma assay, API 83-19 Light Alkylate Naphtha. Study conducted by Microbiological Associates Inc. API Health and Environmental Sciences Dept. Report 32-32746 Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

Genetic Toxicity in vitro

Test Substance - Genetic Toxicity in vitro

Category Chemical: *No CAS Number Provided*

Test Substance: *No CAS Number Provided*

Test Substance Purity/Composition and Other Test Substance Comments: Unleaded gasoline

Category Chemical Result Type: Measured

Method - Genetic Toxicity in vitro

Type of Study: Mammalian cell gene mutation assay

Concentrations: 0.065 to 1.04 il/ml

Year Study Performed: 1977

Method/Guideline Followed:

GLP: Yes

Postive, Negative, and Solvent Control Substance(s): The test material was dissolved in acetone for this assay. The positive control substances were Ethyl methane sulphonate (EMS) and Dimethylnitrosamine (DMN).

Method/Guideline and Test Condition Remarks: Type Mouse lymphoma assay
System of testing: Forward mutation assay using cell line L5178Y TK+/-

A cytotoxicity study was carried out prior to the mutagenicity assay. For the mutation assay the lymphoma cells were exposed for 5 hours to test material at concentrations ranging from 0.065 to 1.04 il/ml for both the activation and non-activation assays. Metabolic activation was accomplished using Araclor-induced rat liver S-9 suspension. After exposure to the test material, the cells were allowed to recover for 3 days and then cultures were selected for cloning and mutant selection. Surviving cell populations were determined by plating diluted aliquots in non-selective growth medium.

A mutation index was derived by dividing the number of clones formed in the BUdR-containing selection medium by the number found in the same medium without BUdR. The ratio was then compared to that obtained from other dose levels and from positive and negative controls

A compound is considered mutagenic if:
A dose response relationship is observed over 3 of the 4 dose levels employed.
The minimum increase at the high level of the dose response curve is at least 2.5 times greater than the solvent control value.
The solvent control data are within the normal range of the spontaneous background for the TK locus.

Test Results - Genetic Toxicity in vitro

Details on Cytogenetic Assay:

Statistics:

Effect :

Species	Other Species	Strain	Other Strain	Metabolic Activation	Genotoxic Effect	Conclusion
Mammalian Cell Line		Mouse Lymphoma L5178Y Cells		With and Without	Negative	Negative

Results Remarks: Little toxicity was observed with the test material. Positive control values exhibited significant responses over the negative controls, and the negative controls were within the normal range.

All results for the test material from the non-activation assay were negative.
The results from the activation assay were also considered to be negative. There was an increase in the number of mutants at the 0.52 il/ml concentration but this appeared to result from a slight increase in the number of viable
clones There was no trend indicating a dose-related response and, therefore, the increases were not believed to be compound related.
The results are summarized below.

 Dose	Rel.	Mutant	Viable	%Rel	Mutant (il/ml)
susp.	clones	clones	growth	frequency 	growth Non-
activation 0.065	121.8	76	159	139.3	0 478 0.13
103.7	29	215	160.4	0.1349 0.26	114 6
44	211	174	0.2085 0.52	141.8	66
161					
164.3	0 4099 1.04	107.5	58	270	
208.9	0.2148 Solvent	100	14	139	
100	0.1007 Negative	129.9	41	140	
130.8	0.2929 EMS	58.7	227	67	28 3
3.3881 					
 Activation 0.065	120.6	66			
87	79.5	0.7586 0.13	108.6	46	126
103.7	0.3651 0.26	106	70	130	
104.4	0.5385 0.52	112.4			
92	108	92	0 8519 1 04	68.9	21
193					
100.8	0.1088 Solvent	100	30	132	
100	0 2273 Negative	92 1	41	150	
104.7	0.2733 DMN	16 7	91	7	0.9
13					

Conclusion:

Reliability/Data Quality - Genetic Toxicity in vitro

Reliability: 1 - Valid Without Restrictions

Reliability Remarks:

Key Study Sponsor Indicator:

Reference - Genetic Toxicity in vitro

Reference: American Petroleum Institute (1977) Mutagenicity evaluation of unleaded gasoline
Study conducted by Litton Bionetics, Inc. API HESD Publication No. 28-30173, March 1977

Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

Genetic Toxicity in vitro

Test Substance - Genetic Toxicity in vitro

Category Chemical:	(64741-55-5) Naphtha, petroleum, light catalytic cracked
Test Substance:	(64741-55-5) Naphtha, petroleum, light catalytic cracked
Test Substance Purity/Composition and Other Test Substance Comments:	Sample API 81-03 is a light catalytically cracked naphtha stream. The PONA analysis for this sample is Type Vol. % Paraffins 42.8 Olefins 36.5 Naphthenes 10.2 Aromatics 10.2 Indans/tetralins 0.3 Naphthalenes 0.0
Category Chemical Result Type:	Measured

Method - Genetic Toxicity in vitro

Type of Study:	Sister chromatid exchange assay in mammalian cells
Concentrations:	
Year Study Performed:	1988
Method/Guideline Followed:	
GLP:	Yes
Postive, Negative, and Solvent Control Substance(s):	
Method/Guideline and Test Condition Remarks:	A cytotoxicity study was performed in order to select dose levels for the SCE assay. For the SCE assay CHO cells were seeded in duplicate for each treatment condition and were incubated at 37°C in a humidified atmosphere for 16 to 24 hours. Treatment was carried out by re-feeding two complete sets of flasks with complete medium for the non activation study or with Araclor-induced rat liver S-9 reaction mixture for the activated study to which was added 50 µl of dosing solution of test control or article in solvent or solvent alone. An untreated control of cells in complete medium was also included. In the non-activation study the cells were exposed for 28 hours. Two hours after exposure 0.01 mM BrdUrd was added to the treatment medium. At the end of the treatment period, the treatment medium was removed, the cells were rinsed and were then exposed to colcemid (0.1 µg/ml) for a further 2 hours. In the activation study exposure was for 2 hours. After the exposure period, the treatment medium was removed, the cells were washed with PBS, re-fed with medium containing BrdUrd and then incubated for a further 28 hours. Colcemid was added at a final concentration of 0.1 µg/ml for the last 2 hours of incubation. For activated and non-activated assays, metaphase cells were harvested 2 hours after addition of colcemid. Cells were collected and fixed and stored until slides were prepared. Slides were coded and scored without regard to treatment group. Only cells with 20 ± 2 centromeres were selected for evaluation of SCEs. A total of 4 doses were scored including the highest test article dose where sufficient second-division metaphase cells were available. SCEs were scored in 25 cells from each duplicate culture to make up a total of 50 cells per treatment. The percentage of cells in first (M1), second (M2) or third division (M3) metaphase was also recorded for a total of 100 metaphase cells scored. TEM was used as positive control at a concentration of 0.025 µg/ml. in the activated assay. In the activated assay CP was used at a concentration of 2.5 µg/ml. The solvent vehicle for the test article was used as the solvent control. A test was deemed valid if the mean SCE/cell in the untreated control did not exceed 13 and the mean SCE/cell for the positive control must be at least double that of the negative control. A test material is considered positive if it induces a doubling in SCE frequency over the solvent control at a minimum of three consecutive dose levels or if a dose responsive and statistically significant increase is observed over a minimum of 3 dose levels affected. A statistically significant increase at one or more dose levels with no evidence of a dose response is assessed as equivocal or as negative according to the magnitude of the response and the number of dose levels affected

Test Results - Genetic Toxicity in vitro

Details on Cytogenetic Assay:

Statistics:

Effect :

Species	Other Species	Strain	Other Strain	Metabolic Activation	Genotoxic Effect	Conclusion

Results Remarks:

Dose levels for the SCE assay were selected following a preliminary toxicity test based upon cell proliferation after treatment relative to the solvent control. CHO cells were exposed to solvent alone and to nine concentrations of test material ranging from 1 to 0 0001 µl/ml in the absence and presence of an S-9 reaction mixture. The test material was partially insoluble at 1 µl/l. Further dilutions were completely soluble. Based on the growth inhibition and cell cycle delay, dose levels of 0.3, 0 2, 0.1 and 0.05 µl/ml were selected for use in the assay without metabolic activation. For the assay with metabolic activation concentrations of 0.2, 0.1, 0.05 and 0.03 µl/ml were selected. A harvest time of 30 hours after treatment initiation was selected to assure collection of enough analyzable second division metaphases at the high dose

Summarized results for the assays are as follows:

Treatment/ Cell cycle kinetics SCEs/ Group mean

replicate M1 M2 M3 chromosome SCEs/cell(±SD)

Without metabolic activation
Untreated A 2
98 0 0.5
 B 5
95 0 0.48 9.92 (3.16)
Acetone A 4
96 0 0.52
 B 5
95 0 0.50 9.94 (3.03)
API 81-03 (µl/ml)

0.05 A 3 97 0 0.51
 B 2
98 0 0.51 9 88 (3.12)
0 1 A 12
88 0 0.54
 B 9
91 0 0.52 10.32 (3.01)
0.2 A 6
94 0 0.51
 B 5
95 0 0.52 9.94 (3.11)
0.3 A 1
99 0 0.53
 B 4
96 0 0.53 10.34 (2.58)
TEM (µg/ml)
0.025 A
0 65 35 2.79
 B 0 81
19 3.21 59.02 (12.31)

With metabolic
activation
Untreated A 2
97 1 0.52
 B 2
95 3 0.51 10.10 (3.12)
Acetone A 4
96 0 0.45
 B 2
98 0 0.51 9.38 (3.36)
API 81-03 (µl/ml)

0.03 A 3 97 0 0.48
 B 5
95 0 0.44 8.82 (2.46)
0.05 A 8
92 0 0.54
 B 5
95 0 0.56 10.54 (2.7)
0.1 A 6
94 0 0.59
 B 3
97 0 0.55 11.20 (3.45)
0.2 A 2
96 2 0.48
 B 1
94 5 0.57 10.10 (2.59)
CP (ug/ml)
2.5
A 2 98 0 1.63
 B 4
96 0 1.72 32.72 (6.51)

In the assay with metabolic activation, the group mean SCEs/cell were significantly increased compared to controls, P= 0.05 for 0.05 µl/ml concentration and P= 0.01 for the 0.02 µl/ml concentration. Positive controls in both assays were significant P=0.01

The positive and negative controls fulfilled the requirements for a valid test. API 81-03 did not induce an increase in sister chromatid exchanges in CHO cells when tested in the absence of metabolic activation. However the test material did induce a small but statistically significant increase in SCEs at two intermediate dose levels in the presence of metabolic activation which was

concluded to be equivocal

Conclusion:

Reliability/Data Quality - Genetic Toxicity in vitro

Reliability: 1 - Valid Without Restrictions

Reliability Remarks:

Key Study Sponsor Indicator:

Reference - Genetic Toxicity in vitro

Reference: American Petroleum Institute (1988) Sister chromatid exchange assay in Chinese hamster ovary (CHO) cells with API 81-03 (Light catalytic cracked naphtha) HESD Pub No. 36-30045

Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

High Production Volume Information System (HPVIS)

Genetic Toxicity *in vitro*

TEST SUBSTANCE	
Category Chemical:	64741-68-0 Naphtha, petroleum, heavy catalytic reformed **Type in if not listed:**
Test Substance:	64741-68-0 Naphtha, petroleum, heavy catalytic reformed **Type in if not listed:**
Test Substance Purity/Composition and Other Test Substance Comments:	Test material was a heavy catalytically reformed naphtha, CAS # 64741-68-0 Test material designation by study sponsor was API # 85-06. Compositional information on this test material can be found in the analytical data report attached to the Gasoline Blending Stream Category.
Category Chemical Result Type:	measured
Unable to Measure or Estimate Justification:	
METHOD	
Type of Study:	Mouse lymphoma forward mutation
Concentration:	
Concentrations:	The non-activated cultures that were cloned were treated with 18, 24, 32, 42, 56, and 75 nl/ml of test material. Trial # 1: The activated cultures that were cloned were treated with 67, 89, and 120 nl/ml of test material. Trial #2 : The activated cultures that were cloned were treated with 70, 110, 150, 180, and 220 µl/ml of

	test material.
Year Study Performed:	1986
Method/Guideline Followed:	
GLP:	yes
Positive, Negative and Solvent Control Substance(s):	Two positive control substances were used: Ethyl methane sulphonate (EMS) at concentrations of 0.5 & 1.0 µl/ml for the non-activation assay, Dimethybenzanthrene (DMBA) was used at a concentration of 5.0 & 7.5 µg/ml for the activation assay. Two negative solvent (ethanol) controls were used. For test substances assayed with activation, the solvent controls included the activation mixture.
Method/Guideline and Test Condition Remarks:	Type: Mouse lymphoma assay System of testing: Forward mutation assay using cell line L5178Y TK+/- The test material was dissolved in ethanol for this assay. Two positive control substances were used: Ethyl methane sulphonate (EMS) at concentrations of 0.5 & 1.0 µl/ml for the non activation assay, Dimethybenzanthrene (DMBA) was used at a concentration of 5.0 & 7.5 µg/ml for the activation assay. Two negative solvent (ethanol) controls were used. For test substances assayed with activation, the solvent controls included the activation mixture. Araclor-induced rat liver was the source of the S-9 homogenate for the activation assay. A cytotoxicity study was carried out prior to the mutagenicity assay. For the mutation assay, the lymphoma cells were exposed for 4 hours to test material. After exposure to the test material, the cells were allowed to recover for 2 days and then cultures were selected for cloning and mutant selection; 3 µg/ml 5-Trifluorothymidine (TFT) was used as the restrictive agent. The non-activated cultures (A & B) that were cloned were treated with 18, 24, 32, 42, 56, and 75 nl/ml of test material and resulted in a range of growth of 1 – 115% compared to the solvent control. Two activated cultures (A & B) that were cloned were treated with 67, 89, and 120 nl/ml of test material in Trial #1 and 70, 110, 150, 180, and 220 µl/ml in Trial #2. This resulted in growth ranging from 4% to 28% (compared to solvent control) in Trial #1 and 10% to 91% (as compared to controls) in Trial #2. Plates were prepared from TFT and from the viable cultures (VC) and after 10 to 12 days incubation these plates were scored for total number of colonies per plate. A mutation frequency was then determined. Trials 1 and 2 were conducted more than one year apart, so the cytotoxicity study was repeated for trial 2.

	The following criteria were used in judging the significance of the activity of the test article. Positive -if there is a positive dose response and one or more of the doses in the 10% or greater total growth range exhibit a mutant frequency which is two-fold greater than background level. Equivocal -if there is no dose response but any one or more of the three highest doses with 10% or greater total growth exhibit a two-fold increase in mutant frequency over background; or if there is a dose response but no culture exhibits a two-fold increase in mutant frequency over background. Negative -if there is no dose response in cultures with 10% or greater growth and none of the test cultures exhibit mutant frequencies which are two-fold greater than background.

TEST RESULTS

Details for Cytogenetic Assay (if applicable):	
Statistics:	

Species:	**Strain:**	**Metabolic Activation:**	**Genotoxic Effect:**	**Conclusion:**
Mammalian cell line	Mouse lymphoma L5178Y cells	without	equivocal	Equivocal without activation
Other Species:				
Other Strain:				
Mammalian cell line	Mouse lymphoma L5178Y cells	with	equivocal	Equivocal with activation
Other Species:				
Other Strain:				
Other Species:				
Other Strain:				

Other Species:	
Other Strain:	
Other Species:	
Other Strain:	
Other Species:	
Other Strain:	

Results Remarks:

TRIAL # 1

The mutant frequencies and the percentage total growth at each of the test concentrations are summarized in the following tables.

Test Group	% Total Growth	Mutant frequency
Non-Activated		
Solvent Control 1	100	0.6
Solvent Control 2	100	0.7
EMS 0. 5 µl/ml	31	10.2
EMS 1.4 µl/ml	2	27.3
Test Compound (nl/ml)		
18 A	115	0.5
18 B	109	0.8
24 A	110	0.6
24 B	83	0.7
32 A	85	0.7
32 B	89	0.7
42 A	31	1.0
42 B	47	0.9
56 A	85	0.6
56 B	10	1.4
75 A	1	21.7
75 B	2	2.5

Test Group	% Total Growth	Mutant frequency
S-9 Activated		
Solvent Control	100	0.9
Solvent Control	100	1.0
DMBA 5 µl/ml	22	6.8
DMBA 7.5 µl/ml	too toxic to clone	
Test Compound (nl/ml)		
67 A	11	1.8
67 B	27	1.3
89 A	7	2.5
89 B	16	1.7
120 A	13	1.7
120 B	4	2.1

TRIAL # 2 (S-9 Activated groups only)

The mutant frequencies and the percentage total growth at each of the test concentrations are summarized in the following tables.

Test Group	% Relative growth	Mutant frequency
S-9 Activated		
Solvent Control	100	0.9
Solvent Control	100	1.0
DMBA 5 µl/ml	55	3.9
DMBA 7.5 µl/ml	34	4.8
Test Compound (nl/ml)		
70 A	83	1.4
70 B	91	1.5
110 A	61	1.6
110 B	53	1.4
150 A	44	1.6
150 B	28	1.5
180 A	28	1.6
180 B	23	1.6
220 A	20	1.7
220 B	10	2.1

Three non-activated cultures (75 A, 75 B and 56 B nl/ml) exhibited mutant frequencies which were 31.0, 3.6 or 2.0 times, respectively, the mean mutant frequency of the solvent controls. The Total Growth of these cultures was 1%, 2%, and 10%, respectively. The remaining non- activated culture mutant frequencies did not differ significantly from control. It is customary to consider that significant increases observed only at highly toxic concentrations (<10% Total Growth) may be due to epigenetic events. Because this test article has a very steep toxic response curve in this system, very minute differences in dose result in large differences in Total Growth. The Total Growth exhibited by each culture may be more representative of dose delivered than the test article concentration indicated. A comparison of induced Mutant Frequency with Total Growth indicated a dose dependent response and the data are judged to be equivocal.

Two trials were conducted in the presence of the S-9 mix, with a time interval exceeding one year between each trial. In Trial #1, two cloned cultures, 89 nl/ml A and 120 nl/ml B, had mutant frequencies that were 2.5 and 2.1 times greater than solvent controls, respectively. Percent Total Growth was 4% for the 120 nl/ml culture, and 7% for the 89 nl/ml culture. Since the Total Growth of these cultures was below 10%, the increase in mutant frequency was not considered significant because TFT resistance observed at these highly toxic levels may be due to epigenetic events.

In Trial #2, one culture, 220 nl/ml B, exhibited a mutant frequency that was 2.1 times greater than solvent controls, and had a Total Growth of 10%. A dose dependent response was noted. The mutagenic response of the test article in this trial was judged to be equivocal since a reproducible positive response was not observed at any dose.

Overall, the results from these tests indicated that, under the conditions of these tests, test article API 83-06 produced an equivocal response in the presence and absence of exogenous metabolic activation.

Mouse lymphoma forward mutation assays have been carried out on two other aromatic naphtha samples, as well as another study (API report # 32-32460) for 83-06 in a separate testing facility. The results were:

Sample No.	Aromatic content (vol. %)	Response with S-9	Response without S-9
83-04	42.1	negative	negative
83-05	62.5	positive	negative
83-06	89.8		
Laboratory 1		positive	negative
Laboratory 2	(this study)	equivocal	equivocal

	These additional studies are summarized in separate robust study summary records.
Conclusion Remarks:	The test material API#83-06, CAS # 64741-68-0 was tested in a mouse lypmphoma assay with L5178Y TK+/- cell with and without metabolic activation. The results indicated that the test material was equivocal for causing forward mutations both with and without metabolic activation.
RELIABILITY/DATA QUALITY	
Reliability:	1 – valid without restriction
Reliability Remarks:	
Key Study Sponsor Indicator:	Key
REFERENCE	
Reference:	American Petroleum Institute (1986) L5178Y TK +/-Mouse lymphoma assay API 83-06 Heavy catalytically cracked reformed naphtha (CAS 64741-68-0). Study conducted by Microbiological Associates, Inc. Testing facility No. MAT 2420.701 and T2420.701012. API HESD Publ. 33-31641, May 1986. Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

High Production Volume Information System (HPVIS)

Genetic Toxicity *in vitro*

TEST SUBSTANCE	
Category Chemical:	64741-63-5 Naphtha, petroleum, light catalytic reformed **Type in if not listed:**
Test Substance:	64741-63-5 Naphtha, petroleum, light catalytic reformed **Type in if not listed:**
Test Substance Purity/Composition and Other Test Substance Comments:	Test material was a light catalytically reformed naphtha, CAS # 64741-63-5 Test material designation by study sponsor was API # 85-04. Compositional information on this test material can be found in the analytical data report attached to the Gasoline Blending Stream Category.
Category Chemical Result Type:	measured
Unable to Measure or Estimate Justification:	
METHOD	
Type of Study:	Mouse lymphoma forward mutation
Concentration:	
Concentrations:	The non-activated cultures that were cloned were treated with 25, 50, 75, 100 and 125 nl/ml of test material. The activated cultures that were cloned were treated with 25, 50, 75, 100, and 150 nl/ml of test material.
Year Study Performed:	1985
Method/Guideline Followed:	

GLP:	yes
Positive, Negative and Solvent Control Substance(s):	Three positive control substances were used: Ethyl methane sulphonate (EMS) at concentrations of 0.25 & 0.4 µl/ml for the non activation assay, Dimethylnitrosamine (DMN) at a concentration of 0.3 and Methylcholanthrene (MCA) at a concentration of 2.5 µg/ml for the activation assay. Three negative controls were used: 2 solvent (ethanol) controls (not to exceed 1% of of growth medium) and one untreated control. For test substances assayed with activation, the solvent controls included the activation mixture.
Method/Guideline and Test Condition Remarks:	Type: Mouse lymphoma assay System of testing: Forward mutation assay using cell line L5178Y TK+/- The test material was dissolved in ethanol for this assay. Three positive control substances were used viz Ethyl methane sulphonate (EMS) at concentrations of 0.25 & 0.4 µl/ml for the non activation assay, Dimethylnitrosamine (DMN) at a concentration of 0.3 and Methylcholanthrene (MCA) at a concentration of 2.5 µg/ml for the activation assay. Three negative controls were used: 2 solvent (ethanol) controls (not to exceed 1% of of growth medium) and one untreated control. For test substances assayed with activation, the solvent controls included the activation mixture. Araclor-induced rat liver was the source of the S-9 homogenate for the activation assay. A cytotoxicity study was carried out prior to the mutagenicity assay. For the mutation assay, the lymphoma cells were exposed for 4 hours to test material. After exposure to the test material, the cells were allowed to recover for 2 days and then cultures were selected for cloning and mutant selection; 5-Trifluorothymidine (TFT) was used as the restrictive agent. Six non-activated and six activated cultures were selected for cloning based on their degree of toxicity. The non-activated cultures that were cloned were treated with 25, 50, 75, 100, and 125 nl/ml of test material and resulted in a range of growth of 1.6 to 53.1% compared to the solvent control. The highest concentration of test material was not used to determine non-activated mutagenicity due to the low (1.6%) growth rate. The activated cultures that were cloned were treated with 25, 50, 75, 100, 125, and 150 nl/ml of test material. This resulted in growth ranging from 14.1 to 94.4% compared to solvent control. Plates were prepared from TFT and from the viable cultures (VC) and after 10 to 12 days incubation these plates were scored for total number of colonies per plate. A mutation frequency was then determined. The following criteria were used in judging the significance of the activity of the test article. Positive -if there is a positive dose response and one or more of the 3 highest doses exhibit a mutant frequency which is two-fold greater than background level. The minimum criterion for mutagenesis in this assay was a mutant frequency exceeding 52.0×10^{-6} and 72.9×10^{-6}, for non-activated and S-9 activated groups, respectively.

	Equivocal -if there is no dose response but any one or more doses exhibit a two-fold increase in mutant frequency over background. Negative -if there is no dose response and none of the test cultures exhibit mutant frequencies which are two-fold greater than background.

TEST RESULTS

Details for Cytogenetic Assay (if applicable):	
Statistics:	

Species:	Strain:	Metabolic Activation:	Genotoxic Effect:	Conclusion:
Mammalian cell line	Mouse lymphoma L5178Y cells	without	negative	Negative without activation
Other Species:				
Other Strain:				
Mammalian cell line	Mouse lymphoma L5178Y cells	with	negative	Negative with activation
Other Species:				
Other Strain:				
Other Species:				
Other Strain:				
Other Species:				
Other Strain:				

Other Species:	
Other Strain:	
Other Species:	
Other Strain:	

Results Remarks:

The mutant frequencies and the percentage total growth at each of the test concentrations is summarized in the following table.

Concentration (nl/ml)	Mutant frequency	% Relative growth
Non-Activated		
25	32.1	53.1
50	34.6	43.7
75	31.7	26.4
100	48.7	14.2
125**	63.3**	1.6**
Solvent 1	33.0	100
Solvent 2	27.1	100
Untreated control	23.9	110.6
EMS 0.25 µl/ml	350.2	58.9
EMS 0.4 µl/ml	585.3	22.2

** not used to determine mutagenicity due to low relative growth

S-9 Activated		
25	49.0	94.4
50	80.1	49.4
75	77.5	55.8
100	98.8	36.7
125	72.5	28.7
150	66.6	14.1
Solvent 1	45.2	100
Solvent 2	37.5	100
Untreated control	43.1	123.9
DMN 0.3 µl/ml	237.8	12.7
MCA 2.5 µl/ml	340.9	78.5

	The authors concluded that the test material was not mutagenic in the non-activated assay because there was no dose response relationship and furthermore the mutant frequency was not significantly different from the solvent and untreated controls. The highest concentration was not used un the mutagenicity determination due to excessive toxicity (1.6% of solvent control growth). The minimum criteria for indicating mutagenesis would have been 47x10-6. this assay was considered sufficient to evaluate the test material as non-mutagenic under non-activation conditions. In the presence of metabolic activation, three treatments (50, 75, and 100 nl/ml) induced mutation frequencies that exceeded the 72.9x10-6 mutation frequency criterion determined to designate a positive response. However, the increases were small (80.1, 77.5 and 98.8, respectively), and only one was more than 2-fold above background. The response was not dose related, and no increases with respect to control were observed at the two highest concentrations, i.e. higher, more toxic concentrations were not mutagenic. The observed increases were therefore considered spurious and the test material was considered nonmutagenic with activation in this assay. Mouse lymphoma forward mutation assays have been carried out on two other aromatic naphtha samples. The results, including this study, were: Sample No. / Aromatic content (vol. %) / Response with S-9 / Response without S-9 83-04 / 42.1 (this study) / negative / negative 83-05 / 62.5 / positive / negative 83-06 / 89.8 / / Laboratory 1 / / positive / negative Laboratory 2 / / equivocal / equivocal These additional studies are summarized in separate robust study summary records.
Conclusion Remarks:	The test material API#83-05, CAS # 64741-63-5 was tested in a mouse lymphoma assay with L5178Y TK+/- cell with and without metabolic activation. The test material was negative for causing forward mutations both with and without metabolic activation.
RELIABILITY/DATA QUALITY	
Reliability:	1 – valid without restriction
Reliability Remarks:	

Key Study Sponsor Indicator:	Key Study
REFERENCE	
Reference:	American Petroleum Institute (1985) Mutagenicity evaluation of API 83-04 in the mouse lymphoma forward mutation assay API Report No. 32-32168 Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

High Production Volume Information System (HPVIS)

Genetic Toxicity *in vitro*

TEST SUBSTANCE	
Category Chemical:	68955-35-1 Naphtha, petroleum, catalytic reformed **Type in if not listed:**
Test Substance:	68955-35-1 Naphtha, petroleum, catalytic reformed **Type in if not listed:**
Test Substance Purity/Composition and Other Test Substance Comments:	Test material was a catalytically reformed naphtha, CAS # 68955-35-1 Test material designation by study sponsor was API # 85-05. Compositional information on this test material can be found in the analytical data report attached to the Gasoline Blending Stream Category.
Category Chemical Result Type:	measured
Unable to Measure or Estimate Justification:	
METHOD	
Type of Study:	Mouse lymphoma forward mutation
Concentration:	
Concentrations:	The non-activated cultures that were cloned were treated with 6.25, 25, 37.5 50, 75 and 100 nl/ml of test material. The activated cultures that were cloned were treated with 18.8, 37.5, 75, 100, 150 and 200 nl/ml of test material.
Year Study Performed:	1985
Method/Guideline Followed:	

GLP:	yes
Positive, Negative and Solvent Control Substance(s):	Three positive control substances were used viz Ethyl methane sulphonate (EMS) at concentrations of 0.25 & 0.4 µl/ml for the non activation assay, Dimethylnitrosamine (DMN) at a concentration of 0.3 and Methylcholanthrene (MCA) at a concentration of 2.5 µg/ml for the activation assay. Three negative controls were used: 2 solvent (ethanol) controls (not to exceed 1% of of growth medium) and one untreated control. For test substances assayed with activation, the solvent controls included the activation mixture.
Method/Guideline and Test Condition Remarks:	Type: Mouse lymphoma assay System of testing: Forward mutation assay using cell line L5178Y TK+/- The test material was dissolved in ethanol for this assay. Three positive control substances were used viz Ethyl methane sulphonate (EMS) at concentrations of 0.25 & 0.4 µl/ml for the non activation assay, Dimethylnitrosamine (DMN) at a concentration of 0.3 and Methylcholanthrene (MCA) at a concentration of 2.5 µg/ml for the activation assay. Three negative controls were used: 2 solvent (ethanol) controls (not to exceed 1% of of growth medium) and one untreated control. For test substances assayed with activation, the solvent controls included the activation mixture. Araclor-induced rat liver was the source of the S-9 homogenate for the activation assay. A cytotoxicity study was carried out prior to the mutagenicity assay. The test material was lethal at a concentration of 500 µl/ml and highly toxic at 250 µl/ml without S-9. These results were used to select a dose range of 6.25 to 500 µl/ml for the non-activation assay and 3.13 to 400 µl/ml for the activation assay. For the mutation assay, the lymphoma cells were exposed for 4 hours to test material. After exposure to the test material, the cells were allowed to recover for 2 days and then cultures were selected for cloning and mutant selection; 5-Trifluorothymidine (TFT) was used as the restrictive agent. six non-activated and six activated cultures were selected for cloning based on their degree of toxicity. The non-activated cultures that were cloned were treated with 6.25, 25, 37.5 50, 75 and 100 nl/ml of test material and resulted in a range of growth of 30 to 97% compared to the solvent control. The activated cultures that were cloned were treated with 18.8, 37.5, 75, 100, 150 and 200 nl/ml of test material. This resulted in growth ranging from 4.6 to 67.9% compared to solvent control. Plates were prepared from TFT and from the viable cultures (VC) and after 10 to 12 days incubation these plates were scored for total number of colonies per plate. A mutation frequency was then determined. The following criteria were used in judging the significance of the activity of the test article. Positive -if there is a positive dose response and one or more of the 3 highest doses exhibit a mutant frequency which is two-fold greater than background level. The minimum criterion for mutagenesis in this assay was a mutant frequency exceeding 47.0 x 10^{-6} and 62.1x10^{-6}, for non-activated and S-9

	activated groups, respectively. Equivocal -if there is no dose response but any one or more doses exhibit a two-fold increase in mutant frequency over background. Negative -if there is no dose response and none of the test cultures exhibit mutant frequencies which are two-fold greater than background.
TEST RESULTS	
Details for Cytogenetic Assay (if applicable):	
Statistics:	

Species:	**Strain:**	**Metabolic Activation:**	**Genotoxic Effect:**	**Conclusion:**
Mammalian cell line	Mouse lymphoma L5178Y cells	without	negative	Negative without activation
Other Species:				
Other Strain:				
Mammalian cell line	Mouse lymphoma L5178Y cells	with	positive	Positive with activation
Other Species:				
Other Strain:				
Other Species:				
Other Strain:				
Other Species:				
Other Strain:				

Other Species:	
Other Strain:	
Other Species:	
Other Strain:	

Results Remarks:

The mutant frequencies and the percentage total growth at each of the test concentrations is summarized in the following table.

Concentration (nl/ml)	Mutant frequency	% Relative growth
Non-Activated		
6.25	24.2	97.3
25	22.5	64.3
37.5	18.2	32.6
50	23	47.8
75	39.6	59.4
100	22.3	29.6
Solvent 1	22.7	100
Solvent 2	30.6	100
Untreated control	20.7	110.6
EMS 0.25 µl/ml	364.5	53.8
EMS 0.4 µl/ml	504.5	23.2
S-9 Activated		
18.8	54.2	67.9
37.5	57.3	56.1
75	72.1	60.3
100	85.2	32.8
150	73	27.4
200	146.2	4.6
Solvent 1	31.3	100
Solvent 2	30.8	100
Untreated control	42.1	123.9
DMN 0.3 µl/ml	258.8	12.7
MCA 2.5 µl/ml	243.6	78.5

	The authors concluded that the test material was not mutagenic in the non-activated assay because there was no dose response relationship and furthermore the mutant frequency was not significantly different from the solvent and untreated controls. The minimum criteria for indicating mutagenesis would have been 47x10-6. Since the 100 nl/ml treatment represented a close approach to the excessively toxic treatment at 150 nl/ml, this assay was considered sufficient to evaluate the test material as non-mutagenic under non-activation conditions. In the presence of the S-9 mix, the test material was converted into one or more mutagenic products. The minimum criterion for a significant response was a mutant frequency exceeding $62.1x10^{-6}$. This value was exceeded for 4 of the 6 analyzed cultures. The response was dose related. The results were judged sufficient to evaluate the test material as mutagenic in the presence the metabolic activation system. Mouse lymphoma forward mutation assays have been carried out on two other aromatic naphtha samples. The results, including this study, were: Sample No. / Aromatic content (vol. %) / Response with S-9 / Response without S-9 83-04 / 42.1 / negative / negative 83-05 / 62.5 (this study) / positive / negative 83-06 / 89.8 Laboratory 1 / positive / negative Laboratory 2 / equivocal / equivocal These additional studies are summarized in separate robust study summary records.
Conclusion Remarks:	The test material API#83-05, CAS # 68955-35-1 was tested in a mouse lymphoma assay with L5178Y TK+/- cell with and without metabolic activation. The test material was negative for causing forward mutations without metabolic activation. The test material was positive for causing forward mutations with metabolic activation.
RELIABILITY/DATA QUALITY	
Reliability:	1 – valid without restriction
Reliability Remarks:	
Key Study Sponsor Indicator:	Key study

REFERENCE	
Reference:	American Petroleum Institute (1985) Mutagenicity evaluation in the mouse lymphoma forward mutation assay, API 83-06 Heavy catalytically reformed naphtha API Report No. 32-32460 American Petroleum Institute (1985) Mutagenicity evaluation of API 83-04 in the mouse lymphoma forward mutation assay API Report No. 32-32168 American Petroleum Institute (1985) Mutagenicity evaluation of catalytically reformed naphtha API #83-05 in the mouse lymphoma forward mutation assay. Study conducted by Litton Bionetics, Inc. API Med. Res. Publ. 32-32459, July 1985. American Petroleum Institute (1986) L5178Y TK +/-Mouse lymphoma assay API 83-06 Heavy catalytically cracked reformed naphtha (CAS 64741-68-0) API Report No. 33-31641 Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

High Production Volume Information System (HPVIS)

Reproduction Toxicity – 2 generation

Test Substance – ReproductionToxicity

Category Chemical:	No CAS number
Test Substance:	No CAS number
Test Substance Purity/Composition and Other Test Substance Comments:	Unleaded baseline gasoline [API 99-01] Vapor Condensate Test material is a complex mixture of volatile hydrocarbons. The purity of mixture is 100% and stable based on analysis of chamber atmospheres.

Representative Components [98.44%] monitored in Study

Component	Area %
Isobutane	2.14
n-butane	10.89
3-methyl-1-butene	0.41
Isopentane	35.13
n-pentane	10.44
Trans-2-pentene	2.71
2,3-dimethylbutane	2.26
2-methylpentane	7.82
3-methylpentane	4.62
n-hexane	4.14
Methylcyclopentane	2.05
2,4-dimethylpentane	1.42
Benzene	2.89
2-methylhexane	1.71
2,3-dimethylpentane	1.74
3-methylhexane	1.93
Isooctane	2.15
Toluene	4.03

Category Chemical Result Type:	Measured

Method – Reproductive Toxicity

Route of Administration:	Inhalation
Type of Exposure:	Whole body
Species:	Rat
Mammalian Strain:	Sprague Dawley [Crl: CD IGS BR]
Gender:	Male and female
Number of Animals per Dose:	26 males, 26 females/group
Dose:	Target: 0, 2000, 10,000, and 20,000mg/m^3 Actual: 0, 2014, 10,139, and 20,004 mg/m^3

Year Study Performed:	2006
Method/Guideline Followed:	EPA OPPTS 870.3800
GLP:	Yes
Exposure Period:	P0 and F1: 10 weeks before mating, 2 weeks during mating, 3weeks gestation, 4 weeks lactation prior to weaning.
Frequency of Treatment:	6 hours/day, 7 days/week
Post-Exposure Period:	None
Method/Guideline and Test Condition Remarks:	Baseline Gasoline Vapor Condensate was administered via whole-body exposures to Sprague Dawley rats over 2 generations at target concentrations of 2000, 10000 and 20000 mg/m^3 for 6 hours/day, 7 days/week. In addition, an Air Control group received nitrogen-enriched air only while in chamber. Exposure levels were determined using an infra-red spectrophotometer 4 times per chamber per day. The test substance's major components were assayed once per chamber per week. Particle size distribution measurements were also made once per chamber per week using a TSI Aerodynamic Particle Sizer. Viability checks were performed twice daily to check for mortality and signs of severe toxic or pharmacologic effects. Physical observations and body weights were collected twice pretest (P0 generation) and at least weekly during the study (P0 and F1). Feed consumption was measured beginning the week prior to treatment initiation (P0 generation) and at least weekly during the study (P0 and F1). For P0 and F1 dams, body weight and food consumption were measured on Gestation Days [GD] 0, 7, 14, 20 and on Lactation Days [LD] 1,4,7,14,21 and 28. After approximately 16 weeks of exposure, all parental male animals (P0 and F1) were sacrificed and all parental females (P0 and F1) were sacrificed on their respective LD28. Females that failed to mate were sacrificed 25 days after the end of the mating period and females with confirmed mating but without delivery were sacrificed on presumed GD25. Selected organs [adrenals, brain, heart, liver, lungs, kidneys, spleen, thymus, ovaries, uterus testes, seminal vesicles, prostate, epididymides] were weighed and organ/body weight and organ/brain weight ratios calculated. Macroscopic examinations were performed on all parental rats and histological evaluations of the tissue samples from the weighed organs of 10 randomly selected rats in the Control and 20000mg/m^3 groups were performed. Reproductive organs from all male and bred female rats in control and high dose groups were evaluated. Sperm evaluations included motility, testicular homogenization-resistant sperm and cauda epididymal sperm count, sperm morphology in the cauda epididymis. Ovary histopathology included evaluation of the primordial follicle population, number of growing follicles and corpora lutea. Mating: Vaginal smears were taken daily for each female beginning three weeks prior to cohabitation for P0 and F1 rats and continuing until there was evidence of mating or

	until the 14-day mating period was ended. Following 10 weeks premating exposure, one male and one female from the same group were mated overnight until evidence of mating was observed or 14 days had elapsed. Animals were not paired during the daily exposure period. During mating of F1 generation, male and female littermates were never paired together. At weaning of each F1 litter on Lactation day 28, one pup/sex/litter was chosen at random to continue with exposure to BGVC as the F1 parental generation. When less than 26 litters were available in a group, additional pups from other litters within the group were selected at random to make up 26 mating pairs/group. Parturition and Lactation: On Day 18 of gestation exposure was ended and each female was transferred to a plastic shoebox with bedding material and observed for evidence of parturition. The day on which parturition was observed was Day 0 of Lactation. These females were not exposed from GD19 [P0 and F1 dams] until exposure was resumed on LD5 to weaning at LD28. Pups (F1 and F2 generations) were observed as soon as possible after delivery for sex, number of live and dead pups and pup abnormalities. Pup dead at delivery were identified as stillborn or liveborn found dead based on lung floatation evaluation. Thereafter litters were observed twice daily. On LD 4, F1 litters with more than 10 pups were randomly culled to 10 pups with sex distribution equalized if possible. Pups were examined and weighed on LD1 (delivery day), 4 (preculled), 7, 14, 21 and 28. At weaning one pup/sex/group was selected for mating to produce the F2 generation. F1 pups [5/sex/group/assessment] not selected for F1 mating were evaluated for standard Tier 2 neuropathology [40 CFR79.66] or for GFAP assessments [40 CFR79.67] on postpartum day 28 [Results of GFAP study are reported in separate Neurotoxicity Robust Summary]. The remaining pups were sacrificed. Three pups/sex/litter in each group (F1 and F2) were selected from macroscopic examination and selected organs [brain, spleen, thymus] were weighed from one pup /sex/litter. Statistical methods: For continuous data [Body weights, Body weight change, Feed consumption, Organ weight data, Gestation length, Pup body weights, Number of pups (live, dead, total), Mean age-to-criteria for vaginal opening and preputial separation], mean values of all exposure groups were compared to the mean value for the control group at each time interval. Evaluation of equality of group means was made with standard one-way analysis of variance (ANOVA) using the F ratio followed by Dunnett's if needed. Sperm and ovary analysis: The following parameters were analysed statistically: Mean sperm count (testicular sperm count and caudal epididymal sperm count) and motility data and numbers of primordial and growing follicles by ovary and total. If a significant difference occurred ($p<0.05$) between groups using the nonparametric Kruskal-Wallis test, the Wilcoxon (Mann-Whitney U) test was used for pair-wise comparisons of each treated group to the vehicle control group.

	Incidence data [Mortality, Mating Indices, Pregnancy rates, Male fertility Indices, Live birth indices, and Pup viability indices (Days 0-4) and lactation indices (Days 4-28)] were analyzed using the Chi-square test (2 x n). If Chi-square analysis was not significant, no additional analyses were performed. If Chi-square is significant, a Fisher Exact Test with Bonferroni correction was performed to identify differences between the groups.

Test Results – Reproductive Toxicity

Concentration (LOAEL/LOAEC/ NOAEL/NOAEC):

LOAEL/LOAEC/ NOAEL/NOAEC	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units
NOAEL	Repro.	≥	20000		mg/m^3
LOAEL	Systemic for P0 females, F1 males	=	20000		mg/m^3
NOAEL	Systemic for P0 females, F1 males	=	10000		mg/m^3

Results Remarks:

Exposure conditions: The analytically measured exposure levels of the airborne test substance were reasonably close to the targeted exposure levels. Chamber environmental conditions averaged 24°C and 43% relative humidity. Particle sizing results indicated that the atmospheres were essentially vapor only. Analysis of the major components in the neat test substance and the test atmospheres showed a reasonably close comparison between the neat test substance and the vaporized test substance. This data demonstrated that the test animals were exposed, as expected, to all of the major components of the test substance in their reasonably proper proportion. The data was consistent from week-to-week during the study indicating stability of the test substance and the atmosphere generation techniques.

Parental data (P0 and F1 generations): There was no effect of treatment on survival. The test animals were generally unremarkable in-chamber during the exposure periods and during the non-exposure periods (afternoon evaluations) during the premating period in both sexes, the mating/postmating period in the male rats, and the gestation and lactation periods in the female rats. There were exposure-related differences in body weights or weight changes in the test substance exposed animals compared to the Air Control animals. These differences were decreases in weight gain in the P0 female rats in the 20000mg/m^3 group during the latter 3 weeks of the premating period and in the F1 male rats in the 20000 mg/m^3 group during the initial 8 weeks of the premating period. There were no exposure-related differences in feed consumption in the test substance exposed animals compared to the Air Control animals. There were no exposure-related differences in estrous cycle data (as measured by cycle length and number of estrous cycles) in the test substance exposed animals compared to the Air Control animals. Mating indices for the male rats treated with the test substance were

	comparable to the Air Control group. Mating, fertility and gestation indices for the female rats treated with the test substance were comparable to the Air Control group. The pregnancy rates for the Air Control, 2000, 10000 and 20000 mg/m³ groups were 96.0%, 96.2%, 92.3% and 100%, respectively, for the P0 animals and 100%, 100%, 91.7% and 100%, respectively, for the F1 animals. Treatment with the test substance also resulted in no statistically significant differences in most other reproductive parameters including the percent of females completing delivery and the duration of gestation, when compared to the Air Control group. There were no exposure-related differences in body weights or weight changes in the test substance exposed animals compared to the Air Control animals during the gestation and lactation periods. There were no exposure-related differences in feed consumption during the gestation and lactation periods in the test substance exposed animals compared to the Air Control animals. Treatment with the test substance resulted in no statistically significant differences in all parturition parameters including the total number of pups delivered, the number of pups dying, the viability (4 day survival) and lactation (28 day survival) indices, the number of implantation sites per litter, the sex ratio and the number of live pups/litter, when compared to the Air Control group. There were no exposure-related temporal differences in males showing preputial separation and females showing vaginal opening in the F1 pups weaned from test substance exposed animals compared to the F1 pups weaned from Air Control animals. There were no exposure-related differences in macroscopic postmortem evaluations in the test substance exposed animals compared to the Air Control animals. Exposure-related effects on organ weights included statistically significant increases in kidney weights (absolute and relative to body and brain weight) at the 2 higher exposure levels in the P0 and F1 males and at the highest exposure level in the P0 females. These differences for the males (but not the females) were consistent with the microscopic findings discussed below. The percent sperm motility, caudal epididymal and homogenization-resistant testicular sperm counts, sperm morphology, and primordial and growing follicle counts, as individual ovaries and total per animal, were not affected by treatment with test substance at an exposure level of 20,000 mg/m³. Microscopic findings that were considered exposure-related were found only in the kidneys of male animals exposed to 20,000 mg/m³ of test substance and are consistent with hyaline droplet nephropathy, attributable to attributable to accumulation of alpha-2 microglobulin within renal tubular epithelial cells. This species- and gender-specific change has been well documented in male rats exposed to a variety of hydrocarbon compounds and is not considered relevant to humans. No test substance related microscopic changes were noted in male and female reproductive organs or other protocol-specified tissues in this study. Pup data (F1 & F2 generations): There were no exposure-

	related differences in body weights and weight changes in the pups from test substance exposed animals compared to the pups from Air Control animals. The pups were unremarkable during the lactation period. There were no exposure-related differences in macroscopic postmortem evaluations and organ weights in the pups from test substance exposed animals compared to the pups from Air Control animals. No adverse neuropathological findings were observed.
Conclusion:	Exposure of rats to 2000, 10000 and 20000mg/m³ of vapor of test substance resulted in decreased body weight gains in the P0 females and F1 males prior to mating in the 20000 mg/m³ exposed group. Increases in kidney weights in parental male animals exposed to the 2 higher exposure levels of vapor were consistent with hydrocarbon nephropathy seen in these animals, a finding has been generally accepted not to be relevant to human risk assessment (US EPA, 1991). There was no effect at any of the exposure levels on reproductive performance in the study, including mating, fertility, parturition, lactation, offspring survival and development or maturation, in either the P0 or F1 generations. There was no evidence of any neuropathology in F1 pups as a result of the exposures [GFAP results reported in separate Robust summary]. The NOAEL for systemic toxicity [excluding kidney effects in male rats] is 10000mg/m³. The NOAEL for neuropathology in F1 animals is >20,000mg/m³ The Reproductive NOAEL is ≥20,000mg/m³.
Reliability/Data Quality – Reproductive Toxicity	
Reliability:	1. Reliable without restriction
Reliability Remarks:	HPV Supporting study from Section 211(b) Testing Consortium, Fuels and Fuel Additives Health Effects Testing Regulation, administered by API, Washington DC
Key Study Sponsor Indicator:	Not a Key Study
Reference – Reproductive Toxicity	
Reference:	Baseline Gasoline Vapor Condensate: A Two-Generation Whole Body Inhalation Reproductive Study in Rats. 2006. HLS Study No. 00-4207. Huntingdon Life Sciences Laboratories, East Millstone, NJ US EPA 1991. Alpha 2 microglobulin: Association of chemically induced renal toxicity and neoplasia in male rats. In Risk Assessment Forum, p.85. US Govt Printing Office, Washington DC

High Production Volume Information System (HPVIS)

Reproductive Toxicity

Test Substance

Category Chemical: (CAS#)	64741-41-9
Test Substance: (CAS#)	64741-41-9
Test Substance Purity/Composition and Other Test Substance Comments:	Naphtha, petroleum, heavy straight-run, Colorless liquid. MW 111.25. The test substance is a mixture that contains approximately 225 volatile hydrocarbons. The purity of the mixture is 100% Stable based on analyses of chamber atmosphere.

12 Representative Components monitored in Study

Component	Volume %
2-Methyl C6 + C7-olefin	4.50
3-Methylhexane	3.52
t-1,3-Dimethylcyclopentane	1.45
t-1,2-Dimethylcyclopentane	1.61
n-Heptane	7.23
Methylcyclohexane	6.76
Toluene	3.44
2-Methylheptane	3.25
n-Octane	5.81
Ethylcyclohexane	1.95
m-Xylene	1.71
n-Nonane	4.47

Category Chemical Result Type:	Measured

Method

Route of Administration:	Inhalation
Type of Exposure:	Whole Body
Species:	Rat
Mammalian Strain:	Sprague Dawley Crl:CD(SD)
Gender:	Male and female
Number of Animals per Dose:	12 males/ 12 satellite breeding females/group
Dose:	Target: 0, 100, 500, 3000ppm (0, 455, 2275, 13650mg/m^3) Actual: 0, 100, 520, 2950ppm (0, 455, 2366, 13423mg/m^3) The mean concentrations (±SE) representing the total area for the approximately 225 components contained in the

	test substance over the test period were 100 ± 0.8, 500 ± 2.0, and 3000 ± 8.3ppm in chambers targeted at 100, 500, and 3000ppm, respectively. Results from the cryogenic GC analysis indicated that the components were present in the chamber atmosphere within expected concentrations
Year Study Performed:	2008
Method/Guideline Followed:	OECD 422 [Reproductive Toxicity Screening segment of study described in the Repeated Dose Toxicity section]
GLP:	Yes
Exposure Period:	30 days for subchronic males; approximately 34-47 days for pregnant satellite females included 14 days pre-mating, up to 14 days mating and Gestation days 0-19;and 54 days for females with no evidence of copulation
Frequency of Treatment:	6 hours/day. 7 days/week
Post-Exposure Period:	Lactation days 0-4 for dams with litters only.
Method/Guideline and Test Condition Remarks:	Concentrations of Naphtha vapor were generated by flash evaporation of the test material. An air control group was also evaluated using a similar generation apparatus; however, no test material was supplied to this vapor generator. Vapor concentrations of Naphtha were measured by gas chromatography (GC) using the area sum function and integrating all of the eluted peaks. Additional air samples were collected weekly and analyzed for 12 of the larger, most representative components of the test substance using a cryogenic GC. Temperature, humidity, and airflow were also recorded periodically during each exposure day. Exposures were conducted for 6 hours per day, 7 days per week. Groups of 12 young, adult, male Crl:CD(SD) rats were exposed to atmospheres containing 0, 100, 500, or 3000ppm of Naphtha for 30 days. Satellite groups of 12 young, nulliparous, non-pregnant female rats were exposed to 0, 100, 500, or 3000ppm during a premating period of approximately 2 weeks, a cohabitation period of up to 2 weeks, and a gestation period of approximately 3 weeks. Following the 2 week premating period, each satellite female was paired with a male of the same respective dosage group during an approximately 2 week cohabitation period. Presumed pregnant females were exposed from gestation day [GD] 0-19 but were not exposed after gestation day 19, or during the approximately 4-day lactation period [LD]. Females without evidence of mating continued to be exposed for 26 days after the end of the cohabitation period. Body weights, clinical signs, and food consumption were recorded throughout the study. Body weight data were collected weekly for males, and satellite females without evidence of copulation. Satellite females were weighed weekly during premating and cohabitation, on GD0, 7, 14, 21 and on LD0 and 4. Food consumption data were collected at the same intervals except for non-bred satellite females post cohabitation. After approximately 30 days of

	exposure, blood samples were collected from all males for measurement of haematology and clinical chemistry parameters. An abbreviated neurobehavioral evaluation was conducted on all males, and satellite females prior to test substance administration in order to obtain baseline measurements, and again during week 4 in the morning prior to daily exposure for males and on lactation day 4 for satellite females with litters. Neurobehavioral evaluation consisted of motor activity and a modified Functional Observational Battery [FOB] of open field (approach and touch response, auditory response and tail pinch), papillary response, and fore and hind limb grip strength. Males were sacrificed after 30 days of exposure, organs (liver, kidneys, lungs, adrenal glands, thymus, brain, spleen, heart, testes with epididymides, prostate, were weighed, and 36 selected tissues were evaluated microscopically. On postpartum day 4, lactating females and offspring were sacrificed, organs (liver, kidneys, lungs, ovaries with oviducts and uterus with cervix) were weighed, and reproductive organs were evaluated microscopically. Offspring were evaluated for external abnormalities. Statistical analysis: Preliminary statistical analyses included Levene's test for homogeneity and Shapiro-Wilk test for normality, followed by one-way analysis of variance [ANOVA] and Dunnett/Tamhane-Dunnett's test or Kruskall-Wallis and Dunn's test as appropriate. Analysis of covariance [ANCOVA] and Dunnett-Hsu, or non-parametric ANCOVA was used for pup sex ratio and pup weights. Repeated measure ANOVA with Linear contrasts or Jonckheere-Terpstra trend test was used for motor activity and grip strength.
Pre-Mating Exposure / Males:	14 days
Pre-Mating Exposure / Females:	14 days

Test Results

Concentration (LOAEL/LOAEC/NOAEL/NOAEC)

Type	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units
NOAEL	Repro-duction	≥	13650 target 13423 actual		mg/m^3
LOAEL	Parental maternal	=	13650 target 13423 actual		mg/m^3
NOAEL	Parental maternal	=	2275 target 2366 actual		mg/m^3
NOAEL	Parental male-Repro	=	13650 target 13423 actual		

Results and Remarks:	Details of systemic effects in males are presented in detail in the Repeated Dose Subchronic Toxicity Robust Summary for this OECD 422 study. Slightly decreased body weight and/or weight gain occurred in 3000ppm males; however the magnitude of the effect was not considered

	adverse. Successful reproductive performance was observed for all males although of one high dose female failed to mate but the other female bred to that male became pregnant. No adverse effects were seen in histo-pathological evaluation of reproductive organs. A NOAEL for reproductive performance in males was 3000ppm (13650mg/m^3). The systemic NOAEL of 500ppm (2275 mg/m^3) reported in the Subchronic Toxicity robust summary for males were based on hypertrophy of thyroid follicular epithelium observed in 3000ppm males. Mortality did not occur at any exposure concentration. Test substance-related increases in the incidence of stained and wet fur in males and satellite females were observed in the 3000ppm group; however, this did not adversely impact the health of the animals. Satellite females showed no significant test substance related effects on body weight or weight gain during premating or mating. Test substance related effects on body weight and weight gain were observed in 3000ppm females during the three-week gestation period. Body weight at GD 21 was 7% lower than controls, and weight gain from GD0-21 was 14% lower than controls. The lower body weight on GD21 correlates with the statistically significant lower weight on LD0 and was considered an adverse effect. The statistically significant lower maternal body weight at LD0 (7%) correlated with the lower weight trend in high dose females during gestation. The overall weight gain from LD0-4 was comparable to controls although the absolute weight of high dose females did not fully recover to control levels but was not significantly lower. No adverse effect on body weight or weight gain were seen in any animals in the 500 or 100ppm groups Decreases in food consumption correlated with decreased body weight and weight gains for animals in the 3000ppm group. Food efficiency was slightly decreased in 3000ppm satellite females during premating and gestation but not during LD0-4. No test-substance related effects were seen on food consumption or efficiency in 100 or 500ppm groups No adverse clinical chemistry, haematologic, or histopathology effects compared to controls were seen in females with litters at Day 4 of lactation. Reproductive Toxicology: There were no significant test substance related differences in mean number of pregnant animals, number of animals delivering, mating index, fertility index, precoital interval, gestation length, number of corpora lutea, number of implantation sites or percent of post implantation loss for any exposure group. No test substance-related differences were observed in number of fetuses born, live born index, viability index, sex ratio incidence, or clinical observations or mean pup body weight on postnatal days 0 or 4. One female in the 3000ppm group failed to mate. The Mating Indices were 100% for controls and groups 100 and 500 and 91.7% in the 3000ppm group. The duration of gestation was 22 days for controls and 21.9 days for treated groups. There were 12

	viable litters in controls, 100 and 500ppm groups and 11 litters in the 3000ppm group. One dam [#434] in the 3000ppm group was not identified as pregnant and delivered her litter during exposure in the chamber. Her mating date could not be determined, pups were small and 5/12 pups died between lactation days 0-4. Liveborn index was 100% in all groups. There were no statistically significant differences in average number of pups born alive: 15.3, 14.3, 15.1 and 13.8 pups in control, 100, 500 and 3000ppm groups respectively. By LD4, one pup each died in control and 100ppm groups, none died in 500ppm group and the only deaths in the 3000ppm group were the 5/12 pups indicated above, all other litters at 3000ppm had 100% survival. Viability Indices at LD4 were 99.5%, 99.5%, 100%, and 100% in control, 100, 500 and 3000ppm groups respectively. Combined average pup weights at birth were 6.5g, 6.6g, 6.4g, and 6.2g and 10.3g, 10.6g, 10.0g and 9.7g in control, 100, 500 and 3000ppm groups respectively. When LD4 pup weights from dam #434 were omitted from the mean and offspring body weights re-analyzed, the 3000ppm weights were comparable to controls. Pup weight gains from LD0 to LD4 for all treated groups were comparable to controls. The NOAEL for reproductive toxicity was 3000ppm (13650mg/m^3), the highest concentration tested. Neurobehavioral Toxicology: There were no test substance-attributed or statistically significant differences in forelimb or hindlimb grip strength in satellite lactating females at any concentration of the test substance. Pupillary constriction response and open field parameters consisting of approach and touch response, auditory response and tail pinch response were comparable for all treated groups and controls. Motor activity [duration of movement and number of movements] did not demonstrate any test substance related adverse effects. The NOAEL for neurobehavioral toxicity in lactating females was 3000ppm (13650mg/m^3), the highest concentration tested.
Conclusion:	Exposure to this heavy straight run naphtha at 3000ppm induced some systemic toxicity in breeding female rats expressed as reduced body weight and weight gain, and slight decreased food consumption at 3000pppm (13650mg/m^3). No significant adverse reproductive effects were seen for breeding males. This naphtha did not induce reproductive, or neurotoxic adverse effects in maternal animals and is not considered a reproductive/ developmental or a maternal neurobehavioral toxicant.
Reliability/Data Quality	
Reliability:	1. Reliable without restrictions
Reliability Remarks:	
Key Study Sponsor Indicator:	Key study. This is the reproductive/developmental toxicity screen segment of OECD 422 described in the Repeated Dose Toxicity Section.
Reference	

Reference:	Naphtha, Petroleum, Heavy Straight-run: Combined Repeated Dose Toxicity Study With the Reproduction/Developmental Toxicity Screening Test in Rats (OECD 422). 2008. DuPont Haskell Global Centers for Health and Environmental Sciences Project ID DuPont-18331. Newark, DE. Sponsored by Petroleum HPV Testing Group, API, Washington, DC.

Reproductive Toxicity

Test Substance - Reproductive Toxicity

Category Chemical: (64741-78-2) Naphtha, petroleum, heavy hydrocracked

Test Substance: (64741-78-2) Naphtha, petroleum, heavy hydrocracked

Test Substance Purity/Composition and Other Test Substance Comments:

Category Chemical Result Type: See Test Plan and Category Analysis

Method - Reproductive Toxicity

Route of Administration:

Type of Exposure:

Species:

Mammalian Strain:

Gender:

Number of Animals per Dose:

Dose:

Year Study Performed:

Method/Guideline Followed:

GLP:

Exposure Period:

Frequency of Treatment:

Post-Exposure Period:

Method/Guideline and Test Condition Remarks:

Pre-Mating Exposure / Males:

Pre-Mating Exposure / Females:

Test Results - Reproductive Toxicity

Concentration (LOAEL/ LOAEC/ NOAEL/ NOAEC) :

LOAEL/ LOAEC/ NOAEL/ NOAEC	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units

Results: Testing proposed for this endpoint

Results Remarks:

Conclusion:

Reliability/Data Quality - Reproductive Toxicity

Reliability:

Reliability Remarks:

Key Study Sponsor Indicator:

Reference - Reproductive Toxicity

Reference:

Reproductive Toxicity

Test Substance - Reproductive Toxicity

Category Chemical:	*No CAS Number Providec*
Test Substance:	*No CAS Number Providec*
Test Substance Purity/Composition and Other Test Substance Comments:	Volatile fraction of gasoline The test material was a condensate of gasoline vapor that had been collected from a vapor recovery unit during normal operations. This test material was selected since it was representative of the exposures that normally occur for the general public during self-service refueling. Analytical studies were conducted on the condensate and the results compared with exposure studies that had been carried out during refueling operations. The results confirmed that the vapor recovery condensate was similar in composition to the vapors to which the public are exposed during refueling. Test atmospheres for the inhalation study were generated by fully volatilizing the condensate and diluting with air to achieve target concentrations of 5000, 10 000 and 20 000 mg/m³. The highest concentration was approximately 50% of the lower explosive limit and several orders of magnitude greater than the concentrations to which the public are exposed. Chamber analyses of the test atmospheres confirmed the actual concentrations to be: 5076, 10 274 and 20 241 mg/m³. Analysis of the vapor recovery condensate gave the following results: Component Vol % Non aromatics C3 1.0 C4 51 7 C5 37.2 C6 8.3 C7 0.4 C8 0.2 C9 - C9+ - Total saturates (vol%) - Total olefins (vol%) - Aromatics Benzene 0.7 Toluene 0 7 C8 - C9 - C9+ - Total aromatics (vol%) - NB-denotes no data available.
Category Chemical Result Type:	Measured

Method - Reproductive Toxicity

Route of Administration:	Inhalation
Type of Exposure:	
Species:	Rat
Mammalian Strain:	Sprague-Dawley
Gender:	Both M/F
Number of Animals per Dose:	60
Concentration:	5000, 10000 & 20000 mg/m³
Year Study Performed:	2000
Method/Guideline Followed:	OECD 416
GLP:	Yes
Exposure Period:	20 Days
Frequency of Treatment:	6 hours/day, seven days/week
Post-Exposure Period:	
Method/Guideline and Test Condition Remarks:	Type: Two generation study Premating exposure period: 10 weeks (male and female) Groups of 30 male and 30 female Sprague Dawley rats were exposed 6 hours/day, seven days/week to volatilized test material at target concentrations of 5000, 10000 and 20000 mg/m³. Singly housed animals were exposed for 10 weeks prior to mating. There was then a 3 week mating period and mating was confirmed by either presence of sperm in a vaginal rinse or by

the presence of a vaginal plug.
Exposure of females was continued until gestation day 20.
Exposure was then suspended until post partum day 5 to avoid unduly stressing the dams during birth and was then re-commenced and continued until sacrifice of parental females after weaning.
The pups were culled on a random basis to approximately 5/sex/litter At weaning on postnatal day 28, the F1 pups were selected for the second generation. Among the pups not selected, 3/sex/litter were sacrificed and examined for internal abnormalities. The remainder were examined for external abnormalities, sacrificed and discarded.

The pups selected for F1 were exposed for a 13 week premating period and the for a 3 week mating period as described above.
The males were sacrificed at this time and the females continued to be exposed until gestation day 20. As described above exposures were resumed on post partum day 5 and was continued until weaning, when all remaining animals were sacrificed Other than during the period from gestation day 20 until post partum day 5, all F1 offspring were exposed from conception to sacrifice.

All animals were examined regularly for viability and clinical observations. Body weights and food intakes were also recorded regularly throughout the study.
All pups were counted and examined externally on a daily basis and weighed at regular intervals until post natal day 21 F1 pups were examined regularly between post natal days 21 to 28 and were weighed on days 28 and 35
All surviving F1 and F2 pups were examined for developmental landmarks, including pinna detachment, hair growth, incisor eruption, eye opening and the development of the surface righting reflex. Surviving F1 female offspring were monitored for vaginal opening and males were examined for preputial separation. Reproductive parameters evaluated included: male and female fertility indices, male mating index, female fecundity and gestational indices, mean litter size, mean days of gestation, female estrous cycle length and number of females cycling normally. Live birth index, survival index, survival indices (post partum days 1, 4, 7, 14 and 21), viability index at weaning, mean live and dead offspring on day 0, sex ratio at day 0, offspring in-life observations, offspring body weight and offspring gross postmortem findings were also assessed.
All animals dying or sacrificed in a moribund condition were necropsied
Culled pups were examined externally but were only necropsied if external evidence warranted it Randomly selected pups were necropsied and the weight of the following organs was determined: ovaries, liver, adrenals, testes, kidneys, spleen and brain Additionally a wide range of tissues were taken for histology.
Similar evaluations were also carried out on all adults surviving to scheduled sacrifice. Tissues taken from the high dose group and controls were evaluated histologically and since there were no untoward findings, tissues from the lower dose groups were not examined
Samples of sperm from the left distal cauda epididymis were collected from all males at terminal sacrifice for evaluation of sperm parameters These included assessments of total caudal epididymal sperm numbers, % progressively motile sperm and homogenization resistant spermatid count, % morphologically normal sperm and % sperm with an identified abnormality. An ovarian examination was carried out in the females that included confirmation of growing follicles and corporea lutea and quantification of primordial oocytes.
This was done in the high dose and control groups and since there were no abnormal findings other groups were no evaluated.

Pre-Mating Exposure / Males:

Pre-Mating Exposure / Females:

Test Results - Reproductive Toxicity

Concentration (LOAEL/ LOAEC/ NOAEL/ NOAEC) :

LOAEL/ LOAEC/ NOAEL/ NOAEC	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units
NOAEL	Parental (F0)	=	20000		mg/m3
NOAEL	Offspring (F1)	=	20000		mg/m3

Results: There were no treatment-related clinical signs, or effects on mortality, body weight or food intake in either parents or pups Furthermore, there were no treatment-related post mortem findings.

There were no significant differences in absolute organ weights in either males or females from the first parental generation. In the second parental generation , however, there were some statistically significant increases in absolute organ weights, including liver, kidneys and testis in the males and lungs in the females, but none of the differences between controls and the high dose group were statistically significant In the absence of a clear dose-response relationship the significance of the result was unclear. When expressed as organ/body weight ratios, the only significant difference was seen in male kidney weights in the lowest dose group of the first parental generation and an increase in the highest dose group of the second parental generation. Although this latter may have been treatment related it was not considered to be of clinical importance.

There were no compound-related microscopic changes in any of the reproductive tissues or in the upper or lower respiratory tract from any of the P1 or P2 rats exposed to 20 000 mg/m³ The only microscopic changes seen were in the kidneys of males of both generations. There was an exposure related increase in the amount and size of hyaline droplets In three male rats of the high exposure group from both P1 and P2 animals granular casts were observed in the medullary tubules of the kidneys. These kidney changes and the accompanying weight increases are regarded as a sex and species specific effect and of no relevance for man

In the first generation there were no differences in mating index, fecundity, pregnancy or length of gestation. Among the offspring there were no differences in litter size, fraction of live births or sex ratio Results in the second generation were similar. There were no differences in survival of offspring through weaning in the first generation and in the second generation early survival was slightly higher among the offspring from the exposed dams There were no differences in the weight of the offspring through weaning in either generation There were no unusual post mortem observations.

The sperm analysis carried out on both P1 and P2 (F1) males revealed no effects on sperm count, progressive motility or gross appearance.

No effects were found on the estrous cycle length, quantification of primordial oocytes or % females with abnormal cycles in the P1 or P2 generations.

There were no significant differences in incisor eruption, pinna detachment, or surface righting reflex in the F1 or F2 offspring Hair growth was delayed by just less than one day in males only of the F1 pups and in both sexes of the lowest dose group (approx half day) for the F2 pups Eye opening was advanced by approximately one-half day for the high dose males of the F2 offspring.

Results Remarks:

Conclusion:

Reliability/Data Quality - Reproductive Toxicity

Reliability: 1 - Valid Without Restrictions

Reliability Remarks:

Key Study Sponsor Indicator:

Reference - Reproductive Toxicity

Reference: McKee, R. H., Trimmer, G W , Whitman, F. T., Nessel, C. S., Mackerer, C R., Hagemann, R., Priston, R A. J., Riley, A. J., Simpson, B J and Urbanus, J H. (2000) Assessment in rats of the reproductive toxicity of gasoline from a gasoline vapor recovery unit. Reproductive Toxicology Vol 14, No. 4, pp 337-353

Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS. 10/28/2003

Reproductive Toxicity

Test Substance - Reproductive Toxicity

Category Chemical:	(64741-63-5) Naphtha, petroleum, light catalytic reformed
Test Substance:	*No CAS Number Provided*
Test Substance Purity/Composition and Other Test Substance Comments:	LCRN-D
Category Chemical Result Type:	Measured

Method - Reproductive Toxicity

Route of Administration:	Inhalation
Type of Exposure:	
Species:	Rat
Mammalian Strain:	Sprague-Dawley
Gender:	Both M/F
Number of Animals per Dose:	20
Concentration:	Target conc.: 750, 2500 & 7500 ppm. Actual conc.: 750, 2490 & 7480 ppm
Year Study Performed:	2000
Method/Guideline Followed:	OECD 421
GLP:	Yes
Exposure Period:	
Frequency of Treatment:	6 hours/day, 7 days/week
Post-Exposure Period:	
Method/Guideline and Test Condition Remarks:	Groups of 10 rats of each sex were exposed to 750, 2500 or 7500 ppm. LCRN-D for 6 hours /day, seven days/week. A group of 10 rats of each sex served as sham treated controls. Parental females were exposed for 14 consecutive days prior to mating, throughout mating and days 0-10 of gestation. Dams and their litters were sacrificed on post partum day 4. Unmated females and parental males were exposed to the test material for 14 days prior to mating, throughout mating and 18 additional days following completion of the mating period. These animals were sacrificed shortly after the last litters were delivered reached post partum day 4. Mating: Within each group one male was co-housed with the same female until evidence of mating was observed (presence of sperm in vaginal smear or copulatory plug). The day of mating was designated day 0 of gestation. Following mating, the females were housed individually and continued their exposures to test material until day 19 of gestation Females not showing evidence of mating following a 14 day mating period continued their exposures. If such a female showed signs of being pregnant, it was removed from the exposure regimen and observed for parturition. Observations: All parental animals were regularly observed for mortality and gross pharmacologic signs. A physical examination, including palpation for tissue masses was carried out daily 30 mins. after removal from the exposure chambers. Body weights and food consumption were measured throughout the study. From day 20 of gestation, females (pregnant and non-pregnant) were observed for signs of parturition As soon as possible after delivery, litters were observed for the number of live and dead pups and for any abnormalities. Litters were also observed twice daily for unusual

findings and dead pups. On days 0 and 4 of lactation, the pups wee counted, weighed and sex was determined by external observation.

Pathology. Males were killed as a group shortly after the last litters delivered had reached day 4 of lactation. Females with litters that reached day 4 of lactation were killed the next day or shortly thereafter. Unmated females and those that did not deliver were killed 23 days after completion of the mating period. At post mortem, a complete macroscopic examination was carried out on all adult animals The following organs were weighed and organ/body weight ratios were calculated: adrenals, brain, heart, kidneys, liver, lung, spleen, epididymes, testes and thymus. Post mortem examination of females included a count of uterine implantation scars when present.

Pups were sacrificed on day 4 of lactation and underwent a complete macroscopic examination and a determination of sex by internal examination. All pups were preserved ith viscera intact. Pups found dead at birth and that died prior to day 4 of lactation also underwent a gross external and internal examination. Dead pups were not eviscerated, the intact pups were preserved.

27 tissues were preserved from all adult animals in all dose groups. Ovaries, testes, epididymes, nose with nasal turbinates, and any grossly observed abnormalities were processed and sections examined histologically for all males and female parental animals in the control and highest dose group Four sections were prepared and examined microscopically of the skull containing the nasal turbinates. These were area between upper incisor and incisive papilla area between incisive papilla and first palatal ridge area between second palatal ridge and first upper molar area between first upper molar and nasopharynx.

Premating exposure period
Male: weeks
Female: weeks

Pre-Mating Exposure / Males:

Pre-Mating Exposure / Females:

Test Results - Reproductive Toxicity

Concentration (LOAEL/ LOAEC/ NOAEL/ NOAEC) :

LOAEL/ LOAEC/ NOAEL/ NOAEC	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units

Results:

All parental animals survived to scheduled sacrifice and no treatment related clinical signs were observed. Except for a slight reduction in body weights in the high dose males there were no other effects on either body weight or food consumption. When compared to the controls, at week 3 the decrease in weight of the high dose males was 3.8% and at week 7 was 7 8 The only treatment related organ weight changes was an increase in relative kidney (15%) and relative liver (5%) weights in the high dose males No other organ weight changes were recorded. There were no treatment-related microscopic changes in the testes, epididymes, ovaries or nasal turbinates in the animals in the high dose group.

Reproductive/fertility effects. All groups had a mating index and a fertility index of 100% and all animals in all groups had mated within 4 days of cohabitation. Delivery and litter data did not demonstrate any effects of treatment see data summarized below
Parameter Dose group (ppm)
 0 750 2500 7500
Females on study 10 10 10 10
Litters with liveborn 10 10 10 10
Implantation sites 147 154 155 154
Mean 14 7 15.1 15.5 15.4
Pups delivered (total) 145 151 146 145
Liveborn 142 151 143 144
Live birth index (%) 98 100 98 99
Pups dying
Day 0 0 1 1 1
Days 1-4 2 4 0 0
Pups surviving 4 days 140 146 142 143
Viability index (%) 99 97 99 99
pup sex distribution
Day 0 M/F (ratio) 63/79 67/84 9/74 68/76
Day 4 M/F (ratio) 63/77 64/82 68/74 68/75
Pup weight/litter (g)
Day 0 6 0 6.6 6.2 6.1
Day 4 9.3 8.9 9.2 9.6

External and internal examination of pups sacrificed on day 4 of lactation resulted in only one pup

in a single litter of the control group with abnormalities.

Results Remarks:

Conclusion:

Reliability/Data Quality - Reproductive Toxicity

Reliability: 1 - Valid Without Restrictions

Reliability Remarks:

Key Study Sponsor Indicator:

Reference - Reproductive Toxicity

Reference: Schreiner, C , Bui, Q., Brelia, R., Burnett, D., Koschier, F., Podhasky, P., White, R., Hoffman, G. and Schroder, R (2000) Toxicity evaluation of petroleum blending streams: reproductive and developmental effects of light catalytic
reformed naphtha distillate in rats. J. Tox. and Env. Health, part A., Vol 60, pp 101-116

Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

Reproductive Toxicity

Test Substance - Reproductive Toxicity

Category Chemical:	(64741-55-5) Naphtha, petroleum, light catalytic cracked
Test Substance:	(64741-55-5) Naphtha, petroleum, light catalytic cracked
Test Substance Purity/Composition and Other Test Substance Comments:	
Category Chemical Result Type:	Measured

Method - Reproductive Toxicity

Route of Administration:	Inhalation
Type of Exposure:	
Species:	Rat
Mammalian Strain:	Sprague-Dawley
Gender:	Both M/F
Number of Animals per Dose:	
Concentration:	Target: 750, 2500 & 7500 ppm. Actual: 752, 2512 & 7518 ppm
Year Study Performed:	1999
Method/Guideline Followed:	OECD 421
GLP:	Yes
Exposure Period:	
Frequency of Treatment:	6 hours/day, 7 days/week
Post-Exposure Period:	
Method/Guideline and Test Condition Remarks:	Groups of 10 rats of each sex were exposed to 750, 2500 or 7500 ppm. LCRN-D for 6 hours /day, seven days/week. A group of 10 rats of each sex served as sham treated controls. Parental females were exposed for 14 consecutive days prior to mating, throughout mating and days 0-19 of gestation. Dams and their litters were sacrificed on post partum day 4. Unmated females and parental males were exposed to the test material for 14 days prior to mating, throughout mating and for 23 additional days following completion of the mating period. These animals were sacrificed shortly after the last litters were delivered reached post partum day 4. Mating: Within each group one male was co-housed with the same female until evidence of mating was observed (presence of sperm in vaginal smear or copulatory plug). The day of mating was designated day 0 of gestation. Following mating, the females were housed individually and continued their exposures to test material until day 19 of gestation. Females not showing evidence of mating following a 14 day mating period continued their exposures. If such a female showed signs of being pregnant it was removed from the exposure regimen and observed for parturition. Observations: All parental animals were regularly observed for mortality and gross pharmacologic signs. A physical examination, including palpation for tissue masses was carried out daily 30 mins after removal from the exposure chambers. Body weights and food consumption were measured throughout the study. From day 20 of gestation, females (pregnant and non-pregnant) were observed for signs of parturition. As soon as possible after delivery, litters were observed for the number of live and dead pups and for any abnormalities Litters were also observed twice daily for unusual findings and dead pups. On days 0 and 4 of lactation, the pups were counted, weighed and their

sex was determined by external observation

Pathology: Males were killed as a group shortly after the last litters delivered had reached day 4 of lactation. Females with litters that reached day 4 of lactation were killed the next day or shortly thereafter. Unmated females and those that did not deliver were killed 23 days after completion of the mating period. At post mortem, a complete macroscopic examination was carried out on all adult animals. The following organs were weighed and organ/body weight ratios were calculated: adrenals, brain, heart, kidneys, liver, lung, spleen, epididymes, testes and thymus. Post mortem examination of females included a count of uterine implantation scars when present.

Pups were sacrificed on day 4 of lactation and underwent a complete macroscopic examination and a determination of sex by internal examination. All pups were preserved with viscera intact. Pups found dead at birth and that died prior to day 4 of lactation also underwent a gross external and internal examination. Dead pups were not eviscerated, but were preserved intact. 27 tissues were preserved from all adult animals in all dose groups. Ovaries, testes, epididymes, nose with nasal turbinates, and any grossly observed abnormalities were processed and sections examined histologically for all males and female parental animals in the control and highest dose group. Four sections were prepared and examined microscopically of the skull containing the nasal turbinates. These were:
area between upper incisor and incisive papilla
area between incisive papilla and first palatal ridge
area between second palatal ridge and first upper molar
area between first upper molar and nasopharynx.

The LCCN-D was wholly vaporized using a countercurrent volatilization chamber. The volatilized LCCN-D was diluted with air to achieve the desired atmospheric concentrations. The target and actual chamber concentrations are as follows
Target concentration (ppm) Actual concentration (ppm) Total mass aerosol
concentration (ig/m3)
0 0 4.8 ± 4.5
 750 752 ± 35 4.1 ± 3.5
 2500 2512 ± 66 3.7 ± 3.3
 7500 7518 ± 146 4.1 ± 3.9

The LCCN-D was characterized pre-and post study. The results (given in weight %) of the characterization are as follows:
Component LCCN-D liquid Study start Study end
n-Butane 0.43 0.40 0.43
n-Pentane 3.28 3.23 3.24
iso-Pentane 15.22 15.87 15.74
1-Pentane 2.82 2.64 2.70
2-Pentene (trans) 7.30 6.96 7.02
2-Pentene (cis) 4.12 3.96 4.02
2-Methyl-2-butene 10.81 10.37 10.43
2-Methyl-1-butene 5.60 5.23 5.33
Cyclopentane 1.34 1.28 1.31
n-Hexane 1.56 1.58 1.56
Methylcyclopentane 1.95 2.15 2.12
2,3-Dimethylbutane 1.36 2.30 2.27
2-Methylpentane 5.57 6.28 6.15
3-Methylpentane 3.08 3.18 3.12
1-Methylcyclopentane 1.23 1.24 1.25
Benzene 1.15 1.30 1.20
2-Methylhexane 1.09 1.20 1.17

Pre-Mating Exposure / Males:

Pre-Mating Exposure / Females:

Test Results - Reproductive Toxicity

Concentration (LOAEL/ LOAEC/ NOAEL/ NOAEC) :

LOAEL/ LOAEC/ NOAEL/ NOAEC	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units
NOAEL	Parental (F0)	=	2500		ppm
NOAEL	Offspring (F1)	=	7500		ppm

Results:

All animals survived to scheduled sacrifice. Red staining on the snout was seen with increasing frequency in the mid and high dose animals of both sexes throughout the study. Microscopic examination of the nasal turbinates of the sham-exposed and high dose animals did not reveal any significant changes

Although all treated groups gained slightly less weight than the sham

treated controls the differences were not statistically significant. Food consumption was comparable in all groups. Apart from those listed below, absolute and relative organ weights were unaffected by treatment.

High dose Males:
Absolute kidney weight increased (18%)
Relative kidney weights increased (24%)
Relative liver weights increased (15%)

High dose females:
Absolute spleen weights increased by (19%)
Relative spleen weights increased by (19%)

At necropsy, no organs appeared abnormal. Microscopic examination of kidneys from one high dose male with a dilated renal pelvis at necropsy revealed hyaline droplet formation and tubular dilatation of tubules in the cortico-medullary junction. This finding is consistent with male-rat-specific light hydrocarbon nephropathy. No test-related microscopic changes were observed in the testes or epididymes of adult male rats or ovaries of adult female rats in the high dose group.

Reproductive/fertility effects: All groups had a fertility index of >90% and all groups had a live birth index greater than or equal to 98%. Data are summarized below

Parameter Dose group (ppm)
 0 750 2500 7500
Females on study 10 10 10 10
Litters with liveborn 9 8 9 10
Implantation sites 155 126 139 160
Mean 17.2 15.8 15.4 16
Pups delivered (total) 149 110 132 152
Liveborn 149 108 131 151
Live birth index (%) 100 98 99 99
Pups dying
 Day 0 0 2 1 1
 Days 1-4 4 2 2 1
Pups surviving 4 days 145 106 129 150
Viability index (%) 97 98 99 99
pup sex distribution
 Day 0 M/F (ratio) 72/77 50/58 65/66 87/64
 Day 4 M/F (ratio) 72/73 49/57 65/64 87/63
Pup weight/litter (g)
 Day 0 6.3 6.6 6.4 6.4
 Day 4 9.9 10.8 10.1 10.3

External and internal examination of pups sacrificed on day 4 of lactation were unremarkable.

Results Remarks:

Conclusion:

Reliability/Data Quality - Reproductive Toxicity

Reliability: 1 - Valid Without Restrictions

Reliability Remarks:

Key Study Sponsor Indicator:

Reference - Reproductive Toxicity

Reference: Schreiner, C. Bui, Q., Burnett, D., Koschier, F , Podhasky, P., Lapadula, E., White, R. and Schroeder, R. E. (1999) Toxicity evaluation of petroleum blending streams: reproductive and developmental effects of light catalytic cracked naphtha distillate in rats. J. Toxicol. and Env. Health, Part A, Vol 58, pp 365-382

Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

Reproductive Toxicity

Test Substance - Reproductive Toxicity

Category Chemical:	(64741-66-8) Naphtha, petroleum, light alkylate
Test Substance:	*No CAS Number Provided*
Test Substance Purity/Composition and Other Test Substance Comments:	Distillate of light alkylate naphtha (LAN-D) The test material (LAN-D) was prepared to be representative of the fraction of light alkylate naphtha to which man would normally be exposed during normal handling and use. It was obtained by the distillation of light alkylate naphtha (LAN) and collecting that fraction that boiled over the temperature range 78 to 145°F. The sample was analyzed and its composition compared to the light alkylate naphtha from which it was derived (See section 1.1.1. above). The compositions of the distillate and starting material were as follows: Compound Weight % LAN-D LAN n-butane 3.42 0.84 isopentane 63.59 12.61 n-pentane 1.33 0.23 2,3-dimethylbutane 22.51 4.74 2-methylpentane 6.44 1.57 3-methylpentane 2.26 0 74 2,4-dimethylpentane 0 29 4.09 2,2,4-trimethylpentane 0.06 23.92 2,3,3-trimethylpentane 0 8.99 2,3,4-trimethylpentane 0 11.56
Category Chemical Result Type:	Measured

Method - Reproductive Toxicity

Route of Administration:	Inhalation
Type of Exposure:	
Species:	Rat
Mammalian Strain:	Sprague-Dawley
Gender:	Both M/F
Number of Animals per Dose:	20
Concentration:	5, 12.5 and 25 g/m³
Year Study Performed:	1995
Method/Guideline Followed:	OECD 421
GLP:	Yes
Exposure Period:	7 - 8 Weeks
Frequency of Treatment:	6 hr/day
Post-Exposure Period:	
Method/Guideline and Test Condition Remarks:	Type: One generation study Premating exposure period: Male and Female: 14 days Duration of test: Females 7 weeks, males 8 weeks Method: Adaptation of OECD No. 421 The test material was totally vaporized and diluted with air to achieve the desired concentrations for the study. Exposures were conducted in one cubic meter whole-body chambers Chamber concentrations were monitored three times daily by GC/FID. All animals were housed individually in suspended mesh cages 10 animals of each sex were exposed 6 hours each day to test material at target concentrations of 5, 12.5 and 25 g/m³. The animals were exposed for 6 hours each day. Parental females were exposed for 14 days prior to mating, throughout mating and gestation days 0-19 (7 consecutive weeks). Dams and their litters were sacrificed on postpartum day 4. Parental males were also exposed for 14 days prior to mating, during mating, throughout

the female gestation and post partum period and throughout the female necropsy period (8 consecutive weeks). Rats were mated in a 1:1 ratio and females were monitored for evidence of mating by the examination of a vaginal lavage sample for sperm or vaginal plug. If sperm or a vaginal plug were observed the female was considered to be at day 0 of gestation and the male was removed from the female at this stage. If there was no evidence that mating had occurred the pairs were allowed to remain together up to a period of 2 weeks after which time the female was assumed to be pregnant. All animals were observed for clinical signs at least twice daily throughout the study. Body weights and food consumption were recorded throughout the study. Each litter was examined as soon as possible after delivery to establish number and sex of pups, stillbirths, live births and presence of gross abnormalities Neonatal survival was monitored and all pups were killed postpartum days 4 or 5. Parental females were killed on gestation day 25 if they had not delivered, otherwise they were killed on postpartum days 4 or 5. At necropsy each parental animal was examined macroscopically for structural abnormalities and pathological changes with emphasis on reproductive organs Additionally the number of implantation sites and corporea lutea of each female were recorded. Lungs, trachea and larynx were removed in their entirety The right middle lobe of the lung was weighed, the remaining lobes were fixed for subsequent histopathological examination. The testes and epididymes of the males were weighed and then fixed for histological examination as were the ovaries of the females.

This study has also been reported in the open literature (Bui et al, 1998) but the open literature publication does not contain as much information as the original laboratory report summarized here.

Pre-Mating Exposure / Males: 14

Pre-Mating Exposure / Females: 14

Test Results - Reproductive Toxicity

Concentration (LOAEL/ LOAEC/ NOAEL/ NOAEC) :

LOAEL/ LOAEC/ NOAEL/ NOAEC	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units
NOAEL	Parental (F0)	>	24700		mg/m3
NOAEL	Offspring (F1)	>	24700		mg/m3

Results:

The chamber concentrations of test material were found to be between 96 and 104% of nominal, the mean highest dose concentration being 24.7 mg/m³. The vapor compositions were also found to be similar to that of the parent test material. No parent animals died or were killed during the study and there were no clinical signs. Body weights and food consumption were unaffected by exposure to test material Results on reproductive capacity and fertility are summarized in the following table.
 Treatment group (g/m³)
Parameter 0 5 12.5 25
Pregnancy (%) 80 80 100 80
Litters with live pups 8 8 9 8
Implantation sites 14.9 16 8 13.9 17.3
Pups delivered 14 4 15.6 14.3 15.6
Live pups/litter 14.4 14 8 13.8 15.5
No. liveborn 115 118 124 124
Live birth index (%) 100 94 96 99
Pups surviving 4 days 113 114 122 123
Viability index (%) 98 97 98 99
Pup wt /Litter day 1 7 2 7.3 7.1 7.1
Pup wt./Litter day 4 10.8 11.1 11.2 10 5

There were no treatment-related findings observed at necropsy. Organ weights were unaffected by treatment and there were no treatment-related histological findings.

Results Remarks:

Conclusion:

Reliability/Data Quality - Reproductive Toxicity

Reliability:	1 - Valid Without Restrictions
Reliability Remarks:	
Key Study Sponsor Indicator:	

Reference - Reproductive Toxicity

Reference:	Bui, Q , Burnett, D. M., Breglia, R. J., Koschier, F. J., Lapadula, E S , Podhasky, P. I., Schreiner, C A. and White, R. D. (1998) Toxicity evaluation of petroleum blending streams: reproductive and developmental effects of a distillate from light alkylate naphtha. J. Tox. Env. Health, Part A, Vol 53, pp 121-133 Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS. 10/28/2003 Stonybrook Laboratories Inc (1995) Reproductive/developmental toxicity screening test of light alkylate naphtha distillate in rats Study No. 65874 Stonybrook Laboratories Inc. Princeton, NJ

High Production Volume Information System (HPVIS)

Developmental Toxicity/Teratogenicity

Test Substance

Category Chemical:	none
Test Substance:	none
Test Substance Purity/Composition and Other Test Substance Comments:	Unleaded baseline gasoline API 99-01 Vapor Condensate Test material is a complex mixture of volatile hydrocarbons. The purity of mixture is 100% and stable based on analysis of chamber atmospheres.

Representative Components monitored in Study

Component	Area % range for the three exposure levels
Isobutane	2.0 - 2.9
n-butane	11 - 15
Isopentane	33 - 39
n-pentane	10 - 14
Trans-2-pentene	2.5 - 3.5
2-methyl-2-butene	0.17 - 3.9
2,3,-dimethylbutane	1.5 - 1.9
2-methylpentane	6.8 - 7.9
3-methylpentane	3.9 - 4.5
n-hexane	3.2 - 4.0
methylcyclopentane	1.6 - 1.8
2,4-dimethylpentane	1.1 - 1.4
Benzene	2.2 - 3.4
2-methylhexane	1.1 - 1.5
2,3-dimethylpentane	1.1 - 1.5
3-methylhexane	1.4 - 1.7
Isooctane	1.5 - 1.8
Toluene	2.7 - 4.0

Category Chemical Result Type:	Measured

Method

Route of Administration:	Inhalation
Type of Exposure:	Vapor
Species:	Rat (Crl:CD®(SD)IGSBR)
Mammalian Strain:	Sprague Dawley
Gender:	female
Number of Animals per Dose:	25

Concentration:	Target: 0, 2000, 10000, 20000 mg/m^3 Analytical: 0, 1979, 10676, 20638
Year Study Performed:	2008
Method/Guideline Followed:	EPA OPPTS 870.3600
GLP:	yes
Exposure Period:	Gestation Day 5 - 20
Frequency of Treatment:	6 hr/day
Post-Exposure Period:	none
Method/Guideline and Test Condition Remarks:	Baseline Gasoline Vapor Condensate (BGVC) was administered by whole-body inhalation exposure to 25 confirmed-mated Crl:CD®(SD)IGSBR female rats at target doses of 0 (air control) 2000, 10,000, and 20,000 mg/m^3 for six hours (plus the theoretical equilibration time) daily from Gestation Day (GD) 5 through GD 20. The Sponsor selected the exposure levels based upon safety considerations and previously conducted mammalian toxicity studies. The highest exposure level was one-half the lower explosive limit. The concentration of the test atmosphere in each chamber and the chamber room was determined approximately hourly during each exposure by on-line gas chromatography. The chamber concentrations were measured in the breathing zone of the rats. Additionally, a sorbent tube sample of the test atmosphere was collected once during each week of the study. These samples were analyzed by the detailed capillary/GC method used for the initial characterization analysis of the liquid test substance. This analysis was done to determine component proportions of the test material atmosphere compared to the liquid test material. Chamber Homogeneity was evaluated during the validation of the exposure system for this study. Distribution samples were drawn from twelve different points within the chamber at each exposure level. A particle size determination of the aerosol portion of the test atmosphere was conducted three times during the chamber trials from the 20,000 mg/m^3 concentration. The samples were taken using a multistage cascade impactor. Preweighed glass fiber filters were used to collect aerosol on each stage, which are associated with specific cutoff diameters for aerodynamic particle size in microns. Since minimal aerosol was present, no further calculations were performed. Clinical observations were made daily during gestation. Body weight and food consumption measurements were made on GD 0, 5, 8, 11, 14, 17, 20, and 21. On GD 21, animals were sacrificed by CO_2 asphyxiation followed by

	exsanguination. Cesarean sections were then conducted. The reproductive organs and the abdominal and thoracic cavities were examined grossly. Evaluations of dams during cesarean section were conducted without knowledge of treatment group in order to minimize bias. Uterine weights with ovaries attached were recorded. Uterine contents were examined, and the numbers of live, dead and resorbed fetuses were recorded. Corpora lutea were also counted. All fetuses were weighed, sexed externally, and examined externally for gross malformations. Apparent non-gravid uteri were placed in 10% ammonium sulfide solution for confirmation of non-pregnancy status. The fetuses were placed in a refrigerator to slow down and eventually terminate vital signs after the external examination and weighing. The viscera of approximately one-half of the fetuses of each litter were examined by fresh dissection. After these fetuses were examined, they were decapitated. The heads were preserved in Bouin's solution for at least two weeks, rinsed, and subsequently stored in 70% ethanol. The fetal heads were sectioned and examined with a dissecting microscope for the presence of abnormalities. The remaining fetuses judged to be alive at the C-section were eviscerated, processed for skeletal staining, stained for bone and cartilage, and examined for the presence of skeletal malformations and variations. Statistical Analysis: Statistical evaluation of equality of means was done by an appropriate one way analysis of variance and a test for ordered response in the dose groups. First, Bartlett's Test was performed to determine if the dose groups had equal variance (Snedecor and Cochran, 1989). If the variances were equivalent, the hypothesis that there was no difference in response between the groups was tested using a standard one-way analysis of variance (Snedecor and Cochran, 1989). If the variances were equal, the testing was done using parametric methods, otherwise nonparametric techniques were used. Continuous data will be tested for statistical significance as follows: Where applicable, percentages were calculated and transformed by Cochran's transformation, followed by the arc sine transformation (Snedecor and Cochran, 1989). The raw percentages and the transformed percentages both were tested for statistical significance. For the parametric procedures, a standard one way ANOVA using the F distribution to assess significance was used (Snedecor and Cochran, 1989). If significant differences among the means were indicated, Dunnett's Test was used to determine which treatment groups differed significantly from control (Dunnett, 1964). In addition to the ANOVA, a standard regression

	analysis for linear response in the dose groups was performed. The regression also tested for linear lack of fit in the model. For the nonparametric procedures, the test of equality of means was performed using the Kruskal-Wallis Test (Hollander and Wolfe, 1973). If significant differences among the means were indicated, Dunn's Summed Rank Test was used to determine which treatment groups differed significantly from the control (Hollander and Wolfe, 1973). In addition to the Kruskal-Wallis Test, Jonckheere's Test for monotonic trend in the dose response was performed. Bartlett's Test for equal variance was conducted at the 1% level of significance. All other tests were conducted at the 5% and 1% level of significance. The following data was not included in the statistical analyses: • Gestation body weight and body weight change data for females that were not pregnant • Gestation food consumption for females that were not pregnant Means and standard deviations were calculated for animal, exposure and chamber environmental data. The coefficient of variation also was calculated when considered relevant for the exposure data. Fetal body weight was analyzed by a mixed model analysis of variance that provided an accurate statistical model of the biology. The analysis used the litter as the basis for analysis and effectively used the litter size as a covariate. The model considered dose group, litter size, and fetal sex as explanatory variables. If the overall effect of dose, or the dose by sex effect, was statistically significant the dose groups means were tested pairwise vs. the control group using least squares means. The least squares means allowed comparisons that accounted for differences in litter size and sex. The mathematical model was based on a paper by Chen, et al (1996). The analysis was run using SAS with code suggested in Little, et al (1997). The analysis of anomalies (malformations or variations) was based on a Generalized Estimating Equation (GEE) application of the linearized model, Ryan (1992). The model used the litter as the basis for analysis and considered correlation among littermates by incorporating an estimated constant correlation and the litter size as a covariate. If the overall effect of dose, or the dose by sex effect, was statistically significant the dose groups were

	tested pairwise vs. the control group using least squares means. The least squares means allowed comparisons that accounted for differences in litter size. Three categories of anomalies were tested, and within each category specific anomalies also were tested. In addition to the category specific anomalies a series of combined analyses were performed within each category as applicable: Combined Malformations and Variations for All Fetuses Combined Malformations and Variations for Alive Fetuses Malformations for All Fetuses Malformations for Alive Fetuses Variations for All Fetuses Variations for Alive Fetuses

Test Results

Concentration (LOAEL/LOAEC/NOAEL/NOAEC)

Type	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units
NOAEL	Maternal (dams)	≥	20000		mg/m^3
NOAEL	Fetal (F1)	≥	20000		mg/m^3

Results Remarks:

The mean analytical exposure concentrations [± standard deviation (S.D.)] were 1979 ± 98.0, 10676 ± 309.8, and 20638 ± 452.1 for the target concentrations of 2000, 10000, and 20000 mg/m^3, respectively. Chamber uniformity was also within acceptable limits with 12 point sampling means (± S.D.) of 1997 ± 56.4, 10495 ± 195.0, and 19996 ± 275.8 mg/m3 for the respective target concentrations.

There was no evidence of maternal toxicity in this study at any concentration tested. All dams survived to scheduled terminal sacrifice on GD 21 and were free of clinical or postmortem effects attributable to treatment with BGVC. However there was a statistically significant linear trend (decrease) in dose response in the GD 5-8 body weight change and a statistically significant linear trend (increase) in dose response in the GD 14-17 body weight change. However, the pairwise analyses of the control data versus each treated group was not statistically significant; mean maternal body weight for the 20,000 mg/m^3 target concentration group on GD 8 was 98.9% of the control mean value. The linear trend for the GD 14-17 body weight change was also not considered biologically significant due to the absence of statistically significant differences between the treated and control groups.

There were no statistically significant differences between the control and the BGVC treated groups for uterine implantation data, and external, visceral, and skeletal observations. The most frequently noted observation during fetal examinations was rudimentary lumbar ribs. The incidence of this observation was similar across all groups and was within the historical control range of this laboratory.

A statistically significant decrease in mean fetal body weight was evident in all exposed groups. This could be interpreted as an indication of developmental toxicity. However, these decreases are probably neither treatment related nor biologically significant for the following reasons:

	• The mean fetal weights of the treatment groups were within the historical control range of the laboratory. The mean fetal body weights determined in the control group were greater than this laboratory's historical control mean fetal body weight range and likewise the MARTA historical control data base (mean fetal body weights) for Charles River (Raleigh facility) rat fetuses obtained from dams on GD 21. • A comparison of mean litter weights (mean of the sum of all fetus weights/group) revealed that the litter weights of all groups were comparable and the control litter weights were the most variable. • The mean litter size in the control group was smaller than any treated group. Consequently, it must be remembered, however, that among animals which deliver multiple offspring, individual fetal body weights tend to be heavier in smaller litters, as was seen in this study (Romero, 1992). • There was no dose response in the mean fetal weights of the treated groups. The fetal weights of the treated groups were not statistically significantly different from each other. If the lower fetal weights in the treated groups were related to treatment, one would expect that the mean fetal weight of the group exposed to a target concentration of 20,000 mg/m^3 would be at least substantially lower than the mean fetal weight of the group exposed to a target concentration of 2000 mg/m^3. No other observations were evident in the treated groups that were statistically or biologically significantly different from the observations in the control group. In conclusion, administration of the test substance to rats by whole-body inhalation exposure during the period of organogenesis and fetal growth did not result in maternal or developmental toxicity. Therefore, the No Observable Adverse Effect Levels (NOAELs) for maternal and developmental toxicity in this study was established at 20,000 mg/m^3 target concentration.

Conclusion:	BGVC was not a developmental toxicant in Sprague Dawley rats at exposure concentrations up to 20000 mg/m^3. The NOAEL for both maternal and developmental toxicity was ≥ 20000 mg/m^3.
Reliability/Data Quality	
Reliability:	**1**. Reliable without restriction
Reliability Remarks:	
Key Study Sponsor Indicator:	Not a key study
Reference	
Reference:	Whole-Body Inhalation Developmental Toxicity Study in Rats with Baseline Gasoline Vapor Condensate (MRD-00-695). Laboratory (EMBSI) study number 169534. ExxonMobil Biomedical Sciences, Inc., Annadale, NJ. Study conducted for the American Petroleum Institute 211(b) Research Group in compliance of the Clean Air Act 211(b) testing requirements. Other references cited in study summary: Dunnett, C., New Tables for Multiple Comparisons with a Control, Biometrics 20, 1964, pp. 482-491. Hollander, M. and Wolfe, D.A. Nonparametric Statistical Methods, John Wiley and Sons, New York, 1973. Little, Milliken, Stroup, and Wolfinger, "SAS System for Mixed Models", SAS Institute, Cary, NC, 1997, section 5.6.2, pg 203. Romero, A., Villamayor, F., Grau, M. T., Sacristan, A., and Ortiz, J. A. "Relationship between Fetal Weight and Litter Size in Rats: Application to Reproductive Toxicology Studies", Reproductive Toxicology 6: 453-456, 1992. Ryan, L., "The use of generalized estimating equations for risk assessment in developmental toxicity", Risk Analysis, 12(3), pg 439-447, 1992. Snedecor, G.W., and Cochran, W.G., Statistical Methods, 8th ed., Iowa State University Press, Ames, Iowa, 1989.

High Production Volume Information System (HPVIS)

Developmental Toxicity/Teratogenicity

Test Substance

Category Chemical: (CAS #)	64741-41-9
Test Substance: (CAS #)	64741-41-9
Test Substance Purity/Composition and Other Test Substance Comments:	Naphtha, petroleum, heavy straight-run, Colorless liquid. MW 111.25. The test substance is a mixture that contains approximately 225 volatile hydrocarbons. The purity of the mixture is 100% Stable based on analyses of chamber atmosphere. 12 Representative Components monitored in Study

Component	Volume %
2-Methyl C6 + C7-olefin	4.50
3-Methylhexane	3.52
t-1,3-Dimethylcyclopentane	1.45
t-1,2-Dimethylcyclopentane	1.61
n-Heptane	7.23
Methylcyclohexane	6.76
Toluene	3.44
2-Methylheptane	3.25
n-Octane	5.81
Ethylcyclohexane	1.95
m-Xylene	1.71
n-Nonane	4.47

Category Chemical Result Type:	Measured

Method

Route of Administration:	Inhalation
Type of Exposure:	Whole body
Species:	Rat
Mammalian Strain:	Sprague Dawley Crl:CD(SD)
Gender:	Male and female
Number of Animals per Dose:	12 males/12 satellite breeding females/group
Concentration:	Target: 0, 100, 500, 3000ppm (0, 455, 2275, 13650mg/m^3) Actual: 0, 100, 520, 2950ppm (0, 455, 2366, 13423mg/m^3) The mean concentrations (±SE) representing the total area for the approximately 225 components contained in the test

	substance over the test period were 100 ± 0.8, 500 ± 2.0, and 3000 ± 8.3ppm in chambers targeted at 100, 500, and 3000ppm, respectively. Results from the cryogenic GC analysis indicated that the components were present in the chamber atmosphere within expected concentrations
Year Study Performed:	2008
Method/Guideline Followed:	OECD 422 [Developmental Toxicity Screening segment of study described in the Repeated Dose Toxicity section]
GLP:	Yes
Exposure Period:	30 days for subchronic males used for breeding; approximately 34-47 days for pregnant satellite females included 14 days pre-mating, up to 14 days mating and Gestation days 0-19;and 54 days for females with no evidence of copulation.
Frequency of Treatment:	6 hours/day, 7 days/week
Post-Exposure Period:	none
Method/Guideline and Test Condition Remarks:	Concentrations of Naphtha vapor were generated by flash evaporation of the test material. An air control group was also evaluated using a similar generation apparatus; however, no test material was supplied to this vapor generator. Vapor concentrations of Naphtha were measured by gas chromatography (GC) using the area sum function and integrating all of the eluted peaks. Additional air samples were collected weekly and analyzed for 12 of the larger, most representative components of the test substance using a cryogenic GC. Temperature, humidity, and airflow were also recorded periodically during each exposure day. Exposures were conducted for 6 hours per day, 7 days per week. Groups of 12 young, adult, male Crl:CD(SD) rats were exposed to atmospheres containing 0, 100, 500, or 3000ppm of Naphtha for 30 days. Satellite groups of 12 young, nulliparous, non-pregnant female rats were exposed to 0, 100, 500, or 3000ppm during a premating period of approximately 2 weeks, a cohabitation period of up to 2 weeks, and a gestation period of approximately 3 weeks. Following the 2 week premating period, each satellite female was paired with a male of the same respective dosage group during an approximately 2 week cohabitation period. Presumed pregnant females were exposed from gestation day [GD] 0-19 but were not exposed after gestation day 19, or during the approximately 4-day lactation period [LD]. Females without evidence of mating continued to be exposed for 26 days after the end of the cohabitation period. Body weights, clinical signs, and food consumption were recorded throughout the study. Body weight data were collected weekly for males, and satellite females without evidence of copulation. Satellite females were weighed weekly during premating and cohabitation, on GD0, 7, 14, 21. Food consumption data were collected at the same intervals except for non-bred satellite females post cohabitation. After approximately 30 days of exposure,

	blood samples were collected from all males for measurement of haematology and clinical chemistry parameters. An abbreviated neurobehavioral evaluation was conducted on all males, and satellite females prior to test substance administration in order to obtain baseline measurements, and again during week 4 in the morning prior to daily exposure for males and on lactation day 4 for satellite females with litters [details available in Repeated Dose Toxicity robust summary section for males and Reproductive Toxicity robust summary section for LD4 females]. On postpartum day 4, lactating females and offspring were sacrificed, organs (liver, kidneys, lungs, ovaries with oviducts and uterus with cervix) were weighed, and reproductive organs were evaluated microscopically. Offspring were evaluated for external abnormalities [see Reproductive Toxicity robust summary]. Statistical analysis: Preliminary statistical analyses included Levene's test for homogeneity and Shapiro-Wilk test for normality, followed by one-way analysis of variance [ANOVA] and Dunnett/Tamhane-Dunnett's test or Kruskall-Wallis and Dunn's test as appropriate. Analysis of covariance [ANCOVA] and Dunnett-Hsu, or non-parametric ANCOVA was used for pup sex ratio and pup weights. Repeated measure ANOVA with Linear contrasts or Jonckheere-Terpstra trend test was used for motor activity and grip strength.

Test Results

Concentration (LOAEL/LOAEC/NOAEL/NOAEC)

Type	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units
NOAEL	Develop	>	13650 target 13423 actual		mg/m^3
LOAEL	Parental females	=	13650 target 13423 actual		mg/m^3
NOAEL	Parental females	=	2275 target 2366 actual		mg/m^3

Results Remarks:	Systemic effects in males bred to satellite females are presented in detail in the Repeated Dose Subchronic Toxicity Robust Summary for this OECD 422 study. Mortality did not occur at any exposure concentration. Test substance-related increases in the incidence of stained and wet fur in satellite females were observed in the 3000ppm group; however, this did not adversely impact the health of the animals. Satellite females showed no significant test substance related effects on body weight or weight gain during premating or mating. Test substance related effects on body weight and weight gain were observed in 3000ppm females during the three-week gestation period. Body weight gain at GD 21 was 7% lower than

	controls, and weight gain from GD0-21 was 14% lower than controls. The lower body weight on GD21 correlates with the statistically significant lower weight on LD0 [See Reproductive toxicity section robust summary] and was considered an adverse effect. No adverse effects on body weight or weight gain were seen in any dams in the 500 or 100ppm groups Decreases in food consumption correlated with decreased body weight and weight gains for animals in the 3000ppm group. Food efficiency was slightly decreased in 3000ppm satellite females during premating and gestation. No test-substance related effects were seen on food consumption or efficiency in 100 or 500ppm groups Reproductive/Developmental Toxicology: There were no test substance related significant differences in mean number of pregnant animals, number of animals delivering, mating index, fertility index, precoital interval, gestation length, number of corpora lutea, number of implantation sites or percent of post implantation loss for any exposure group. No test substance-related differences were observed in number of fetuses born, live born index, viability index, sex ratio incidence, or clinical observations or mean pup body weight at delivery. One female in the 3000ppm group failed to mate. The duration of gestation was 22 days for controls and 21.9 days for treated groups. There were 12 viable litters in controls, 100 and 500ppm groups and 11 litters in the 3000ppm group. One dam [#434] in the 3000ppm group was not identified as pregnant and delivered her litter during exposure in the chamber. Her mating date could not be determined, pups were small and 5/12 pups died between lactation days 0-4. There were no statistically significant differences in average number of pups born alive: 15.3, 14.3, 15.1 and 13.8 pups in control, 100, 500 and 3000ppm groups respectively. Liveborn index was 100% in all groups. Combined average pup weights at birth were 6.5g, 6.6g, 6.4g, and 6.2g in control, 100, 500 and 3000ppm groups respectively. No overt teratogenic abnormalities were seen in any pup. Pups were allowed to nurse to day 4 of lactation. No soft tissue or skeletal evaluations were performed. The NOAEL for developmental toxicity was 3000ppm (13650mg/m^3), the highest concentration tested.
Conclusion:	Exposure to this heavy straight run naphtha at 3000ppm induced some systemic toxicity in breeding female rats expressed as reduced body weight and weight gain, and slight decreased food consumption at 3000pppm (13650mg/m^3). This naphtha did not induce reproductive or developmental adverse effects and is not considered a developmental toxicant under conditions of this screening procedure.
Reliability/Data Quality	
Reliability:	**1.**- Reliable without restrictions
Reliability Remarks:	OECD 422 Developmental screening protocol, not a complete developmental study

Key Study Sponsor Indicator:	Key study This is the reproductive/developmental toxicity screen segment of OECD 422 described in the Repeated Dose Toxicity Section.
Reference	
Reference:	Naphtha, Petroleum, Heavy Straight-run: Combined Repeated Dose Toxicity Study With the Reproduction/Developmental Toxicity Screening Test in Rats (OECD 422). 2008. DuPont Haskell Global Centers for Health and Environmental Sciences Project ID DuPont-18331. Newark, DE. Sponsored by Petroleum HPV Testing Group, API, Washington, DC.

High Production Volume Information System (HPVIS)

Developmental Toxicity/Teratogenicity	
Test Substance	
Category Chemical:	64741-55-5
Test Substance:	64741-55-5
Test Substance Purity/Composition and Other Test Substance Comments:	Gasoline Blending Streams Category CAS# 64741-55-5 Light Catalytically Cracked Naphtha (LCCN)
Category Chemical Result Type:	measured
Method	
Route of Administration:	oral
Type of Exposure:	
Species:	rat
Mammalian Strain:	Sprague Dawley
Gender:	female
Number of Animals per Dose:	12
Concentration:	0 or 2000 mg/kg-bw
Year Study Performed:	1994
Method/Guideline Followed:	none
GLP:	unknown
Exposure Period:	1 day
Frequency of Treatment:	Single acute
Post-Exposure Period:	none
Method/Guideline and Test Condition Remarks:	Five Refinery streams were evaluated for developmental toxicity via a single oral dose of test material on gestation day 13 using the same protocol. The five petroleum substances tested were: • Coker Light Gas Oil (BCLGO)- CAS # 64741-82-8 • Heavy Vacuum Gas Oil (HVGO) - CAS # 64741-57-7 • Light Catalytically Cracked Naphtha (LCCN)- CAS #

64741-55-5

- Light Cycle Oil (LCO) - CAS # 64741-59-9
- Vacuum Tower Overheads (VTO) - CAS # 64741-49-7

This screening study design was developed to eliminate the confounding factor of moderate to severe maternal and fetal toxicity observed in previous oral repeated dose developmental toxicity studies on the same and similar substances. The high incidence of fetal death in the previous studies may have masked teratogenic outcomes.

Sprague Dawley rats were administered a single oral 2000 mg/kg-bw dose of test material on gestation day 13. At the start of the start of the dosing phase of the study, each group contained 12 presumed pregnant Sprague Dawley rats. Based on signs of overt toxicity observed in the first females exposed to the test material, Groups 4 (LCCN) and 5 (LCO were reduced to five and four females, respectively. The remaining unexposed females from those groups were removed from the study. The study design & final number of animals per test group is summarized in the table below.

Summary of Study Design

Group	Dose (mg/kg)	Test Material	No. Females Group
1	2000	Tap Water Control	12
2	2000	Coker Light Gas Oil	12
3	2000	Heavy Vacuum Gas Oil	12
4	2000	Light Catalytically Cracked Naphtha	5
5	2000	Light Cycle Oil	4
6	2000	Vacuum Tower Overheads	12

During gestation, dams were observed for appearance and clinical signs of toxicity. Body weight and body weight gains were measured on gestation days 0, 6, 13,14 and 20. On GD 20, pups were delivered by cesarean section and dams were evaluated grossly. Liver, thymus and intact gravid uteri were weighted. Numbers of corpora lutea per ovary, implantation sites, resorptions, numbers of live and dead fetuses were recorded. Each live fetus was gendered, weighed and grossly examined for external anomalies. After gross evaluation, fetuses in each litter were randomly distributed into two groups; one for soft tissue and the other for skeletal evaluation.

Data was analyzed by appropriate parametric and non-parametric methods. Due to the reduced number (N) of

	animals in the LCCN- and LCO-exposed groups, the designation of statistical significance, or lack thereof, relative to the control group may not accurately reflect the significance associated with a larger N.

Test Results

Concentration (LOAEL/LOAEC/NOAEL/NOAEC)

Type	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units
NOAEL	Female (maternal)	<	2000		Mg/kg - bw
NOAEL	fetal	>	2000		Mg/kg-bw

Results Remarks:

Although five substances were tested in this study, the test results provided in the Test Results table above and in the conclusion sections are for Light Catalytically Cracked Naphtha (LCCN), a member of the Gasoline Blending Steams Category. Interpretation of the LCCN results should take into account the small sample size (N=5) due to maternal toxicity at the time of dosing.

Results from all five test materials are provided in this section.

For both LCCN and LCO, oral administration resulted in extreme discomfort for the animals. Clinical signs revealed moderate to severe toxicity and, although the females did not die, it was determined that fetal viability may be compromised. Consequently, only 5 dams were dosed in the LCCN group, and 4 in the LCO group.

Clinical Observations: perineal staining and decreased stool were observed in all groups except HVGO. Red vaginal discharge was observed in BCLGO, LCO and VTO. Red vaginal discharge is generally indicative of fetal resorptions, however, in this study, such a relationship was not confirmed. Additional toxic signs which occurred on only a few animals included: soft stool (BCLGO, LCCN, LCO), animal cold to the touch (BCLOGO, LCO), no stool (BCLGO), oral discharge and staining (BCLGO, LCCN and LCO. Signs of toxicity and/or stress related particularly to LCCN administration were vocalization, circling, head tilting, salivation, and rales; the first three being noted during and immediately following dosing. Signs of toxicity related to LCO administration, only, were prostrate and hunched body positions, piloerection, and decreased activity.

Body Weights: Mean body weight changes and net body weight gain were adversely affected for all refinery streams except HVGO. The animals lost significant

	(p<0.01) amount of weight following exposure to the test materials, but the effect was transient and weight gain resumed throughout the rest of the study. The effects on net body weight gain for these four groups (BCLGO, LCCN, LCO, VTO) are not statistically significantly different from control values, but are considered to be biologically significant. Necropsy Findings: Liver weights were not adversely affected in any group. Both absolute and relative thymus weights were reduced in females exposed to LCO; this result is considered biologically significant. No other findings attributable to treatment were noted at the time of necropsy. Reproductive and Developmental Findings: No adverse effects on reproductive performance were observed. The high pre-implantation loss recorded for LCCN and VTO is due to one and two females, respectively, who had less than 10 implantation sites. This is no considered treatment-related since implantation preceded test material administration. Biologically significant decreased fetal weights were observed in the LCO group. A statistically significant increase (p<0.01)in malformations of the hindpaw digits was observed in fetuses from a dam exposed to BCLOGO. One fetus from a dam exposed to LCO exhibited digit anomalies in both hind- and forepaws. Two fetuses from dams exposed to VTO collectively exhibited micrognathia, cleft palate, and digit anomalies. Although these findings from LCO & VTO groups were not statistically significant, they are considered to be biologically significant. The fetal visceral evaluations showed no remarkable findings for all groups.
Conclusion:	LCCN was acutely toxic to presumed pregnant Sprague Dawley rats; so much so that acute dosing was discontinued after 5 rats, reducing the planned group size from 12 to 5. This small sample size should be taken into consideration in study interpretation. There was no evidence of teratogenicity. Under these study conditions, the maternal and developmental NOAELs were < 2000 mg/kg and > 2000 mg/kg, respectively
Reliability/Data Quality	
Reliability:	2 - valid with restrictions
Reliability Remarks:	This was a very well conducted and well reported study. A reliability of 2 was given due the small sample size, the unknown GLP status, and inability to determine if internal QA/QC was conducted.
Key Study Sponsor Indicator:	Not a key study
Reference	

Reference:	Stonybrook Laboratories, Inc., 1995. Teratogenicity study in rats exposed orally to a single dose of a refinery stream; Study No. 65371. Princeton, NJ.

High Production Volume Information System (HPVIS)

Developmental Toxicity/Teratogenicity	
Test Substance	
Category Chemical:	64741-55-5
Test Substance:	64741-55-5
Test Substance Purity/Composition and Other Test Substance Comments:	Light catalytically cracked naphtha (LCCN) - CAS # 64741-55-5 CRU No. 86045; Study No. 62781
Category Chemical Result Type:	measured
Method	
Route of Administration:	dermal
Type of Exposure:	Non-occluded
Species:	rat
Mammalian Strain:	Sprague Dawley
Gender:	female
Number of Animals per Dose:	10 or 5
Concentration:	0, 30, 125, 500 mg/kg/day ; residue group (5 animals) received 500 mg/kg LCCN + ^{14}C-octane + ^{3}H-Benzo(a)pyrene
Year Study Performed:	1988
Method/Guideline Followed:	none
GLP:	unknown
Exposure Period:	Main study - GD 0-19; Residue group - cold LCCN GD 0 -18, then radiolabeled LCCN on GD 19
Frequency of Treatment:	daily
Post-Exposure Period:	none
Method/Guideline and Test Condition Remarks:	Groups of pregnant 10 female Sprague Dawley rats were administered test material via dermal application. There were only 5 females in the residue group, group 6. Two control groups were included, one housed with treated animal, and one in a remote location to control for effects of inhalation of the volatile test material. The study design is summarized in the

table below.

Summary of Study Design

Group	Dose (mg/kg-bw/day)	Toxicity Group	Days of Treatment
1	0	Remote Control (sham)	0-19
2	0	Proximate Control (sham)	0-19
3	30	LCCN dermal	0-19
4	125	LCCN dermal	0-19
5	500	LCCN dermal	0-19
Residue Group:			
6	500	LCCN dermal	0-17
	500	LCCN dermal + ^{14}C-octane + ^{3}H-benzo(a)pyrene	18

^{14}C-octane and ^{3}H-benzo(a)pyrene were considered to be representative of non-aromatic and aromatic components of LCCN, respectively.

During gestation, dams were observed for appearance and clinical signs of toxicity. Body weight and food consumption were measured on gestation days 0,3,6,10,13,16 and 20. On GD 20, pups were delivered by cesarean section and dams were evaluated grossly. Numbers of corpora lutea per ovary, implantation sites, resorptions, numbers of live and dead fetuses were recorded. Clinical chemistry was evaluated at sacrifice. Each live fetus was gendered, weighed and grossly examined for external anomalies. After gross evaluation, fetuses were randomly distributed into two groups; one for soft tissue and the other for skeletal evaluation. Fetuses from control and high dose groups were evaluated.

In group six, maternal blood, placentas and fetuses were collected for residue analysis. Placental and fetal samples were homogenized before combustion in a biological oxidizer and blood was combusted directly. Radioactivity in combusted samples was determined by liquid scintillation counter.

Data was analyzed by appropriate parametric and non-parametric methods

Test Results

Concentration (LOAEL/LOAEC/NOAEL/NOAEC)

Type	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units
NOAEL	Female (maternal)	<	30		Mg/kg-bw-day
NOAEL	fetus	>	500		Mg/kg-bw-day

Results Remarks:

Daily application of LCCN on the skin of pregnant rats during gestation produced slight to moderate dermal irritation at the site of application at all dose levels. At theses dosages, LCCN produced erythema, edema, scabbing, flaking, and eschar. There was isolated one case of lesions. No other clinical signs attributable to LCCN exposure were observed.

Maternal parameters (body weight, food consumption, body weight gain) monitored throughout gestation were not adversely affected by LCCN. Serum chemistry was comparable to controls. There were no treatment related effects on reproductive (mean number of corpora lutea, implantation sites, and viable fetuses)or fetal parameters (body weight, crown-rump length). There was no evidence of teratogenicity

No greater than 0.12% of the ^{14}C radioactivity and 1.30% of the ^{3}H radioactivity in the LCCN dose were found in maternal blood, placentae or fetuses at study termination. The results clearly show that LCCN components and/or their metabolites in the maternal blood passed through the placental barrier into the fetuses. Even though LCCN passed the placental barrier, it was not teratogenic at any dose in this study

Conclusion:

Dermal administration of light catalytically cracked naphtha did not induce reproductive or developmental toxicity at doses up to 500 mg/kg-bw/day in Sprague Dawley under the described test conditions. It did induce moderate irritation at the sight of application at all doses. The NOAEL for maternal toxicity was < 30 mg/kg-bw/day, the lowest dose tested. The developmental NOAEL was > 500 mg/kg-bw/day, the highest dose tested.

As evaluated using radiolabeled tracers, LCCN was dermally absorbed and passed through the placental barrier into the fetuses.

Reliability/Data Quality

Reliability:	2 - valid with restrictions
Reliability Remarks:	This was a very well conducted and well reported study. A reliability of 2 had to be given due to the unknown GLP status, and inability to determine if internal QA/QC was conducted.
Key Study Sponsor Indicator:	Not a key study
Reference	
Reference:	Mobil Environmental and Health Science Laboratory, 1988. Developmental Toxicity screen in rats exposed dermally to light catalytically cracked naphtha (LCCN), Study No, 50341. Princeton, NJ. [Available from the American Petroleum Institute, Washington, DC]

High Production Volume Information System (HPVIS)

Developmental Toxicity/Teratogenicity

Test Substance	
Category Chemical:	86290-81-5
Test Substance:	86290-81-5
Test Substance Purity/Composition and Other Test Substance Comments:	API 94-02 Unleaded Gasoline Vapor Condensate. Derived from unleaded gasoline meeting 1990 industry average specification. Vapor condensate sample was 10.4% by volume of the starting gasoline and contained; 28.5% n-Paraffins, 79.5% Total paraffins, 2.3% Cycloparaffins, 14.1% Total olefins, 4.0% Total aromatics, 1.0% Benzene, and 2.0% Toluene.
Category Chemical Result Type:	Measured
Method	
Route of Administration:	Inhalation
Type of Exposure:	Vapor
Species:	Rat
Mammalian Strain:	Sprague Dawley derived (CD)[CD®BR]
Gender:	Female
Number of Animals per Dose:	21 to 24 pregnant rats
Concentration:	0(controls), 1000, 3000, or 9000 ppm, (0, 2653, 7960 or 23900 mg/m3). Highest dose is 75% of lower explosive limit for test material.
Year Study Performed:	1995
Method/Guideline Followed:	US EPA TSCA Test Guideline No. 798-4350: Inhalation Developmental Toxicity Study except that the exposure period was extended to day 19.
GLP:	Yes
Exposure Period:	Day 6 to 19 of gestation
Frequency of Treatment:	Daily, 6 hours/day
Post-Exposure Period:	None

Method/Guideline and Test Condition Remarks:	???

Test Results

Concentration (LOAEL/LOAEC/NOAEL/NOAEC)

Type	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units
NOAEL	Maternal	=	9000		ppm
NOAEL	Fetal	=	9000		ppm

Results Remarks:	No maternal toxicity was observed. Developmentally, there were no differences between treated and control groups in malformations, total variations, resorptions, fetal body weight, or viability.
Conclusion:	Under conditions of this study, unleaded gasoline vapors did not produce evidence of developmental toxicity.

Reliability/Data Quality

Reliability:	1
Reliability Remarks:	Valid without restrictions
Key Study Sponsor Indicator:	Not Key Study

Reference

Reference:	Developmental toxicity evaluation of unleaded gasoline vapor in the rat. L. Roberts, R. White, Q. Bui, W. Daughtrey, F. Koschier, S. Rodney, C. Schreiner, D. Steup, R. Breglia, R. Rhoden, R. Schroeder, P. Newton. Reproductive Toxicology 15 (2001) 487 - 494.

High Production Volume Information System (HPVIS)

Developmental Toxicity/Teratogenicity

Test Substance	
Category Chemical:	68513-02-0
Test Substance:	68513-02-0
Test Substance Purity/Composition and Other Test Substance Comments:	ARCO test article F-250, ATX-93-0024, Merox Feed
Category Chemical Result Type:	Measured
Method	
Route of Administration:	Dermal
Type of Exposure:	Dermal, without occlusion
Species:	rat
Mammalian Strain:	Sprague Dawley (CRL:CD®BR)
Gender:	feamle
Number of Animals per Dose:	15 in control group 12 in treated groups
Concentration:	0, 100, 500, 1000 mg/kg
Year Study Performed:	1994
Method/Guideline Followed:	none
GLP:	yes
Exposure Period:	Gestation days 0 - 20
Frequency of Treatment:	Once daily
Post-Exposure Period:	none

Method/Guideline and Test Condition Remarks:	Three groups, each with 12 presumed pregnant female rats, were administered F-250 topically at doses of 100, 500 or 1000 mg/kg/day once daily during Days 0 through 20 of gestation. A fourth group of 15 presumed pregnant female rats served as a sham control group. With the exception of test article application, these control animals underwent the same procedures as the 100, 500 and 1000 mg/kg dose groups. Each female was observed twice daily for viability and once daily for signs of toxicity. General Health Check observations were performed on Days 0, 4, 8, 12, 16 and 20 of gestation and on Days 0 and 4 of lactation. Dermal irritation at the test site was evaluated and recorded each day prior to test article application; on Gestation Day 25 for females that mated but did not deliver, and on Lactation Days 0 and 4 for females that did deliver. Body weights were recorded for each female within 48 hours of receipt, near the end of the quarantine period, on Days 0, 4, 8, 12, 16, and 20 of gestation, and on Days 0 and 4 of lactation. Food consumption was measured for Days 0 to 4, 4 to 8, 8 to 12, 12 to 16, and 16 to 20 of gestation; and Days 0 to 4 of lactation. On Day 4 of lactation or on Gestation Day 25 for females that did not deliver a litter, each female was sacrificed and subjected to a gross necropsy. The uterine horns of each female were examined to determine the number of implantation sites. On Days 0 and 4 of lactation, each pup was weighed and its sex was determined. Each pup was also examined for any gross abnormalities. On Days 1 - 3 of lactation, each litter was observed for determination of the number of dead or missing pups. On Day 4 of lactation, all surviving pups were sacrificed and discarded.

Test Results

Concentration (LOAEL/LOAEC/NOAEL/NOAEC)

Type	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units
NOAEL	Female (maternal)	<	100		mg/kg
NOAEL	Offspring (F1)	>	1000		mg/kg

Results Remarks:

Dermal irritation related to administration of the test article was noted for females dosed at 1000 mg/kg beginning gestation day 1 and continuing throughout the duration of the study. Slight to severe erythema, edema, eschar and dry skin were observed at the test site.

The gestation length for the 100 mg/kg dose group was statistically longer ($p<0.05$) than that of the sham treated controls. Since an increase in gestation length was not observed at the 500 or 1000 mg/kg dose levels, this is not considered to be treatment related.

Dermal irritation related to administration of the test article was noted for females dosed at 100 mg/kg beginning gestation day 1 and continuing throughout the duration of the study. Slight to moderate (primarily slight) erythema, edema, and eschar were observed at the test site. Slight dry skin was also observed at the test site.

Dermal irritation related to administration of the test article was noted for females dosed at 500 mg/kg beginning gestation day 1 and continuing throughout the duration of the study. Slight to severe (primarily moderate) erythema, edema, eschar were observed at the test site. Slight to moderate (primarily moderate) dry skin was also observed at the test site.

Body weights of pregnant females in the 100 mg/kg dose group were significantly lower than those of the control females on Gestation Days 4 ($p<0.05$), 8 ($p<0.01$), 12 ($p<0.05$), and 16 ($p<0.05$), as well as Lactation Days 0 and 4 ($p<0.05$). Body weight changes for pregnant females in the 100 mg/kg dose group were not significantly different than those of control females throughout the duration of the study.

Body weights of pregnant females in the 500 mg/kg dose group were significantly lower ($p<0.01$) than those of the control females throughout the duration of the study. Body weight changes for pregnant females in the 500 mg/kg dose group were not significantly different than those of control females throughout the duration of the study.

Body weights of pregnant females in the 1000 mg/kg dose group were significantly lower than those of the control females on Gestation Days 4 ($p<0.01$), 8 ($p<0.05$), 12 ($p<0.01$)., 16 ($p<0.01$).and 20 ($p<0.01$). Body weight changes for pregnant females in the 1000 mg/kg dose group were significantly lower ($p<0.01$) than those of control females between Gestation days 16 and 20.

The effects on mean body weight observed amongst the dose groups are not considered to be treatment related since they do not correspond to dose related decreases. In addition, as a result of the design of this study, strict randomization according to body weight is not performed. Animals are assigned randomly to dose groups as they demonstrate positive evidence of mating. As a result of this procedure, the mean body weight for the control animals was sufficiently higher than that of the treated dose groups. The significant decreases in body weight and the lack of a corresponding difference in body weight change in dose groups appear to be an inadvertent result of the experimental design rather than a treatment related effect.

There were no significant differences between treated and control groups in the following gestation and fetal parameters.

	F – 250 Dermal Dose (mg/kg)			
Endpoint	**0**	**100**	**500**	**1000**
Number (+) evidence of mating	15	12	12	12
Number pregnant	15	12	11	10
Gestation Length (days; mean S.D.)	21.9 ±1.3	22.3 ± 0.5	21.9 ± 0.3	21.9 ± 0.3
Number of implantation sites (mean ± S.D.)	16.9 ± 1.9	15.6 ± 2.4	15.9 ± 1.0	14.8 ± 2.9
Number litters with live pups	15	12	11	10
Mean number of live pups - Day 0 (mean ± S.D.) - Day 4 survival (%)	14.7 ± 2.7 97 %	14.4 ± 2.5 94 %	14.4 ± 1.1 97 %	13.3 ± 3.8 99 %
Proportion males (Adjusted) - Day 0 - Day 4	0.54 0.54	0.50 0.52	0.53 0.55	0.55 0.56
Mean weight (g) live pups - Day 0 - Day 4	6.59 ± 0.67 11.00 ± 1.13	6.61 ± 0.55 10.06 ± 1.35	6.55 ± 0.21 9.97 ± 0.92	6.68 ± 0.33 10.12 ± 0.95
* = significantly different from control at $p \leq 0.05$				

Conclusion:	Dermal application of F-250 resulted in maternal dermal irritation toxicity at all doses tested; 100, 500, and 1000 mg/kg. There was no developmental toxicity considered to be attributable to the test material. The maternal NOEL was less than 100 mg/kg considering dermal irritation, and 1000 mg/kg if dermal irritation is excluded. The NOEL for developmental toxicity was > 1000 mg/kg, which was the highest dose tested.
Reliability/Data Quality	
Reliability:	1 - valid without restriction
Reliability Remarks:	Although this was not a guideline study, it was a well conducted GLP teratogenicity study. , supplying enough information in
Key Study Sponsor Indicator:	Not a key study
Reference	
Reference:	ARCO, 1994. Developmental Toxicity Screen in Rats Administered Test Article F-250. ARCO study number ATX-93-0024 (Merox Feed). UBTL study number 66869.

Developmental Toxicity/Teratogenicity

Test Substance - Developmental Toxicity/Teratogenicity

Category Chemical: (64741-66-8) Naphtha, petroleum, light alkylate

Test Substance: *No CAS Number Provided*

Test Substance Purity/Composition and Other Test Substance Comments: Distillate of light alkylate naphtha (LAN-D)

Category Chemical Result Type: Measured

Method - Developmental Toxicity/Teratogenicity

Route of Administration: Inhalation

Type of Exposure:

Species: Rat

Mammalian Strain: Sprague-Dawley

Gender: Both M/F

Number of Animals per Dose:

Concentration: 5, 12.5 and 25 g/m³

Year Study Performed: 1995

Method/Guideline Followed: OECD 421

GLP: Yes

Exposure Period: 7 - 8 Weeks

Frequency of Treatment: 6 hr/day

Post-Exposure Period:

Method/Guideline and Test Condition Remarks: This study forms part of the fertility study described in section 5 8 1, where the method is also described. For the examination for developmental effects, the pups were sacrificed on day 4 or 5 post partum and were necropsied and examined grossly for any abnormalities.

This study has also been reported in the open literature (Bui et al, 1998) but the open literature publication does not contain as much information as the original laboratory report summarized here.

Test Results - Developmental Toxicity/Teratogenicity

Concentration (LOAEL/ LOAEC/ NOAEL/ NOAEC) :

LOAEL/ LOAEC/ NOAEL/ NOAEC	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units

Results Remarks:	At necropsy, the following incidence of observations (which were not dose related) was recorded: Dose group 0 5 12.5 25 N(%) N(%) N(%) N(%) Litters examined 8 8 9 8 Pups examined 113 114 122 123 Observations (Litter incidence) LIVER Pale left lateral lobe 0(0) 1(0.9) 0(0) 0(0) Patchy tan area both surfaces, all liver lobes 1(0.9) 0(0) 0(0) 0(0) LIMBS Broken rt hind limb 0(0) 0(0) 1(0.8) 0(0) THORACIC CAVITY Adhesion between apex of heart and diaphragm 0(0) 0(0) 0(0) 1(13) HEAD Red focus on rt. side of brain 0(0) 0(0) 0(0) 1(13) Red focus on meninges 0(0) 1(13) 0(0) 1(13) Depression on right ventricle 0(0) 1(0.9) 0(0) 0(0) Red focus (1mmx1mm) on top of brain 1(13) 1(13) 0(0) 0(0) TAIL Fleshy tab at tip of tail 1(13) 0(0) 0(0) 0(0) V ring (constriction) 0(0) 0(0) 0(0) 1(0.8) Necrotic tail tip 1(13) 1(13) 0(0) 0(0) TOTAL PUP NECROPSY OBSERVATIONS Pup 4(3.5) 6(5 3)1(0 8) 3(2.4) Litter 4(50) 3(38) 1(11) 2(25)
Conclusion:	

Reliability/Data Quality - Developmental Toxicity/Teratogenicity

Reliability:	2 - Valid With Restrictions
Reliability Remarks:	This developmental study did not include skeletal staining for an examination of structural abnormalities. Nevertheless the study did not demonstrate skeletal abnormalities by gross observation at necropsy.
Key Study Sponsor Indicator:	

Reference - Developmental Toxicity/Teratogenicity

Reference:	Bui, Q., Burnett, D. M., Breglia, R. J., Koschier, F J., Lapadula, E. S., Podhasky, P I., Schreiner, C. A. and White, R. D. (1998) Toxicity evaluation of petroleum blending streams: reproductive and developmental effects of a distillate from light alkylate naphtha J. Tox. Env. Health, Part A, Vol 53, pp 121-133 Stonybrook Laboratories Inc (1995) Reproductive/developmental toxicity screening test of light alkylate naphtha distillate in rats Study No. 65874 Stonybrook Laboratories Inc Princeton, NJ Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

Developmental Toxicity/Teratogenicity

Test Substance - Developmental Toxicity/Teratogenicity

Category Chemical: (68955-35-1) Naphtha, petroleum, catalytic reformed

Test Substance: *No CAS Number Provided*

Test Substance Purity/Composition and Other Test Substance Comments: Partially vaporized full range catalytic reformed naphtha

Category Chemical Result Type: Measured

Method - Developmental Toxicity/Teratogenicity

Route of Administration: Inhalation

Type of Exposure:

Species: Rat

Mammalian Strain: Sprague-Dawley

Gender: Both M/F

Number of Animals per Dose:

Concentration: Target concentrations: 2000 and 8000 ppm. Actual: 2160 and 7800 ppm

Year Study Performed: 1996

Method/Guideline Followed:

GLP: No Data

Exposure Period: 14 Days

Frequency of Treatment: 6 hours/ day

Post-Exposure Period:

Method/Guideline and Test Condition Remarks: Groups of 11 or 12 presumed pregnant female rats were exposed 6 hours each day from days 6-19 of gestation to whole body exposures of 2000 or 8000 ppm partially vaporized FRCRN. Two extra groups served as untreated and sham treated controls. All animals were observed daily and body weights were recorded on days 0, 6, 13 and 20 of gestation. On day 20 each female was sacrificed and blood samples removed for serum chemistry evaluations. Parameters measured were the same as those in the subchronic study by the same authors, and in addition included iron and lactic dehydrogenase All organs were examined grossly and liver and thymus weights were recorded In addition, the number of corporea lutea per ovary and the gravid uterine weights were recorded. Uterine contents were examined and the numbers of implantation sites, early and late resorptions and live and dead fetuses were recorded. Each fetus was gendered, weighed and grossly examined for external abnormalities. Half the fetuses were fixed in Bouin's fluid and examined subsequently for soft tissue abnormalities. Remaining fetuses were stained with Alizarin red and examined for skeletal anomalies.

Test Results - Developmental Toxicity/Teratogenicity

Concentration (LOAEL/ LOAEC/ NOAEL/ NOAEC) :

LOAEL/ LOAEC/ NOAEL/ NOAEC	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units

NOAEL	Female (Maternal)	=	7800		ppm
NOAEL	Fetal	=	7800		ppm

Results Remarks: There were no adverse effects on maternal body weight gain, liver weight or thymus weight. In the high dose group, maternal serum glucose levels were significantly decreased (1.5%) and potassium levels increased (1%) relative to the untreated controls. Reproductive performance during gestation and in-utero survival and development of concepti were unaffected by treatment. Furthermore, there were no treatment-related increases in gross abnormalities or anomalies of soft or skeletal tissues.

Conclusion:

Reliability/Data Quality - Developmental Toxicity/Teratogenicity

Reliability: 1 - Valid Without Restrictions

Reliability Remarks:

Key Study Sponsor Indicator:

Reference - Developmental Toxicity/Teratogenicity

Reference: Dalbey, W. and Feuston, M. (1996) Partially vaporized full range catalytic reformed naphtha: Subchronic and developmental toxicity studies in rats. Inhalation Toxicology. Vol 8 , pp 271-284

Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS. 10/28/2003

Developmental Toxicity/Teratogenicity

Test Substance - Developmental Toxicity/Teratogenicity

Category Chemical: (64741-55-5) Naphtha, petroleum, light catalytic cracked

Test Substance: (64741-55-5) Naphtha, petroleum, light catalytic cracked

Test Substance Purity/Composition and Other Test Substance Comments: A description of atmosphere generation is given in a publication by the same authors in section 5.4.
Actual concentrations in this study were: 2150 ±260 and 7660 ±570 mg/m³

Category Chemical Result Type: Measured

Method - Developmental Toxicity/Teratogenicity

Route of Administration: Inhalation

Type of Exposure:

Species: Rat

Mammalian Strain: Sprague-Dawley

Gender: Female

Number of Animals per Dose: 15

Concentration: Target: 2000 & 8000 mg/m³. Actual: 2150 & 7660 mg/m³

Year Study Performed: 1996

Method/Guideline Followed:

GLP: Yes

Exposure Period: 20 Days

Frequency of Treatment: 6 hr/day

Post-Exposure Period:

Method/Guideline and Test Condition Remarks: Control group: Yes

Four groups of 15 presumed-pregnant female rats were assigned to the following groups: Untreated controls, sham-treated controls, 2000 and 8000 mg/m³ test material. Exposures were for 6 hours each day on days 0 to 19 of gestation.
All animals were observed daily and body weights were recorded on days 0, 6, 13 and 20 of gestation. On day 20 each female was sacrificed and all organs were examined grossly. Serum samples were analyzed for a variety of parameters, including serum iron and lactic dehydrogenase.
The number of corporea lutea per ovary and the gravid uterine weights were recorded. Uterine contents were examined and the numbers of implantation sites, early resorptions and live and dead fetuses recorded Each fetus was identified for its sex, was weighed and the crown-rump distance was measured. Each fetus was examined for external anomalies. Half the fetuses were fixed in Bouin's solution and examined for visceral anomalies and the remaining fetuses were prepared for examination for skeletal anomalies.

Test Results - Developmental Toxicity/Teratogenicity

Concentration (LOAEL/ LOAEC/ NOAEL/ NOAEC) :

LOAEL/ LOAEC/ NOAEL/ NOAEC	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units

Results Remarks: There were no treatment-related clinical abnormalities or differences in body weight. Results of the reproductive parameters are listed below.

Parameter

15 15 15
Females pregnant

Corpora lutea
sites
12 14 8
Viable fetuses/litter

Resorptions
(%)
9 5 8 13 *b

*a Significant difference from untreated and sham treated controls
*b Significant difference from sham treated controls

It is clear that with the exception of resorptions, no other parameter was affected by exposure.
During the external examination of fetuses, a sham treated animal had gastroschisis and one fetus from the 2150 mg/m³ group had a tail that was short and filamentous.
Fetal body weights and crown-rump lengths were unaffected by treatment.
No visceral abnormalities were observed.
There was an increased number of skeletal variations in animals housed in the exposure chambers (exposed and sham treated controls) when compared to the untreated controls. The authors concluded that these alterations were not related to LCCN since they occurred at the same incidence in the sham treated controls as well. The findings are tabulated below.
The numbers of fetuses with the specific anomaly are shown. The numbers in parenthesis are the % of fetuses

Parameter

process 18(16) 42(40) 41(40) 45(39)
incompletely ossified

Sacral vertebrae
transverse process

incompletely ossified

Incompletely ossified
101(88)
sternebrae

	Control	2150 mg/m³	7660 mg/m³
	No treat	Sham treat	LCCN
Females mated	15	15	15
	14	13	14
	18	18	16
	16	16	14
	10	12	14
	8	15	14
	0.7	0.6	0.8
	4.6	3.9	4.7
	1.7 *a	10.4 *a	13 *b

	Control	2150 mg/m³	7660 mg/m³
	No treat	Sham treat	LCCN
Caudal vertebrae. transverse process	18(16)	42(40)	41(40)
	45(39)		
Sacral vertebrae transverse process	7(6)	23(22)	17(17)
	28(24)		
Incompletely ossified	83(75)	80(76)	91(89)
	101(88)		

Conclusion:

Reliability/Data Quality - Developmental Toxicity/Teratogenicity

Reliability: 1 - Valid Without Restrictions

Reliability Remarks:

Key Study Sponsor Indicator:

Reference - Developmental Toxicity/Teratogenicity

Reference: Dalbey, W. E., Feuston, M. H., Yang, J. J., Kommineni, C V and Roy, T. A (1996) Light Catalytically cracked naphtha: subchronic toxicity of vapors in rats and mice and developmental toxicity screen in rats. J. Toxicol and Env Health Vol 47, pp 77-91

Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

Developmental Toxicity/Teratogenicity

Test Substance - Developmental Toxicity/Teratogenicity

Category Chemical:	*No CAS Number Provided*
Test Substance:	*No CAS Number Provided*
Test Substance Purity/Composition and Other Test Substance Comments:	Unleaded gasoline
Category Chemical Result Type:	Measured

Method - Developmental Toxicity/Teratogenicity

Route of Administration:	Inhalation
Type of Exposure:	Vapor
Species:	Rat
Mammalian Strain:	Sprague-Dawley
Gender:	Female
Number of Animals per Dose:	25
Concentration:	0, 400 and 1600 ppm
Year Study Performed:	1978
Method/Guideline Followed:	
GLP:	No Data
Exposure Period:	10 Days
Frequency of Treatment:	6 hours each day
Post-Exposure Period:	
Method/Guideline and Test Condition Remarks:	Female rats were mated with sexually mature males of the same strain. The females were examined daily for evidence of a copulatory plug and when this was observed it was designated day 0 of gestation. The mated female rats were assigned sequentially into three groups of 25 animals for the 0, 400 and 1600 ppm dose groups and were caged individually. The animals were subjected to whole body exposure to gasoline vapors at the concentrations shown above for 6 ours each day from day 6 through day 15 of gestation. Mated females were eighed on days 0, 6, 15 and 20 of gestation. Food consumption was recorded daily during the periods 0-6, 6-15 and 15-20 days of gestation Observations were made daily for clinical signs. On day 20 of gestation the female rats were anesthetized and their visceral and thoracic organs were examined. The uterus was removed and opened and the number of implantation sites, their placement in the uterine horns, live and dead fetuses and resorption sites recorded. The fetuses were removed, examined externally for abnormalities and weighed. One third of the fetuses from each litter were fixed in Bouin's and examined later for changes in the soft tissues of the head, thoracic and visceral organs. The remaining fetuses in each litter were stained with Alizarin Red S and examined for skeletal abnormalities. The uterus and ovaries from the adult females were preserved for possible future examination.

Test Results - Developmental Toxicity/Teratogenicity

Concentration (LOAEL/ LOAEC/ NOAEL/ NOAEC) :

LOAEL/ LOAEC/ NOAEL/ NOAEC	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units
NOAEL	Female (Maternal)	=	1600		ppm
NOAEL	Fetal	=	1600		ppm

Results Remarks:

Chamber concentrations were found to be
Nominal ppm Actual ppm
0 0
 400 442 ± 42
 1600 1573 ± 80

There were no deaths during the study and all animals appeared normal throughout. There were no treatment-related effects on body weight or food consumption.
There were no treatment related effects on any of the reproductive parameters recorded. These data are summarized as follows:

 Historical 0 400 1600

 control ppm ppm ppm
Pregnancy ratio - 20/22 22/22 20/21
(pregnant/bred)
Live litters 99% 20 22 20
Implantation sites 46/54% 123/145 149/158 143/152
(left /right horn)
Resorptions
252 16 22 15
Litters with resorptions 50%
65% 41% 55%
Dead fetuses 1 0
0 0
Litters with 1 0 0
0
dead fetuses
Live fetuses/ 92% 95% 93%
95%
Implantation site
Mean live litter size 12.2
13 13 14
Average fetal wt. (g) 3.5 3.8
3.7 3.6

No treatment related effects were observed during the examination for soft tissue changes in the fetuses. Results of the skeletal examination of the stained fetuses are summarized below:

Dose Fetuses Fetuses Fetuses
with
(ppm) examined normal commonly Unusual

 encountered skeletal

 changes variations
only
0 177 (20)* 112 60 (18) 5 (5)

400 197** (22) 128 55 (16) 14 (4)
1600
196 (20) 131 47*** (14) 18*** (7)
* Average No of litters in parenthesis
** Two specimens of one litter lost on processing
*** p<0.05

The unusual changes were mainly related to retarded ossification and were not considered as malformations.

Statistical analysis of data on a pup basis revealed a significant difference between the 1600 and 0 ppm groups. However when analyzed on a litter basis no statistically significant differences were found.

Conclusion:

Exposure of pregnant rats to vapors of unleaded gasoline at concentrations of 400 or 1600 ppm did not cause effects on pregnant dams There was no evidence of variation in sex ratio, embryo toxicity, inhibition of fetal growth or development or teratogenic potential.

Reliability/Data Quality - Developmental Toxicity/Teratogenicity

Reliability:

1 - Valid Without Restrictions

Reliability Remarks:

Key Study Sponsor Indicator:

Reference - Developmental Toxicity/Teratogenicity

Reference:

American Petroleum Institute (1978) Teratology study in rats unleaded gasoline
Study conducted by Litton Bionetics Inc. API HESD Res. Publ 26-60014

Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

Mammalian Health Effects Other

High Production Volume Information System (HPVIS)

Skin Irritation
Gasoline Category

TEST SUBSTANCE

Category Chemical :	(68955-35-1) Naphtha, petroleum, catalytic reformed **Type in CAS # if not listed:**
Test Substance :	(68955-35-1) Naphtha, petroleum, catalytic reformed **Type in CAS # if not listed:**
Test Substance Purity/Composition and Other Test Substance Comments :	Gasoline Blending Streams Category CAS # 68955-35-1 Catalytically Reformed Naphtha API Test Material: API# 83-05 Compositional information can be found on this substance in the Analytical Data attachment for the Gasoline Blending Streams Category
Category Chemical Result Type :	Measured
Unable to Measure or Estimate Justification :	

METHOD

Species:	Rabbit
Other Species:	
Mammalian Strain:	Unknown
Other Strain:	
Type of Coverage:	occlusive
Preparation of Test Site:	intact & abraded
Gender:	Unknown
Number of Animals per Dose:	6
Concentration:	100%
Amount/Concentration Applied:	

Year Study Performed :	1985
Method/Guideline Followed:	Draize Test or OTHER
GLP:	Yes
Exposure Period:	24 hrs
Total Volume applied and Units:	0.5 ml
Control Group Type:	sham
Vehicle Used:	none
Vehicle Name:	
Other Vehicle Name:	
Vehicle Amount and Units:	
Post-Exposure Period:	14 days
Grading Scale:	Draize
Method/Guideline and Test Condition Remarks:	A group of 5 male and 5 female rats were exposed by whole body inhalation to API 83-05 at a nominal concentration of 5mg/l for 4 hours. After the 4 hour exposure the rats were observed twice daily for mortality. The animals were weighed prior to exposure and again on days 7 and 14 post exposure. On day 14 all surviving animals were killed by exsanguination following methoxyflurane anesthesia and were subjected to a full necropsy. For all animals, including those found dead during the study the lungs were removed, fixed and examined histologically. BOXES BELOW Grade = leave blank Primary Irritation Index - 3.1 Lesions = none Erythema - yes Edema = yes

TEST RESULTS

Grade:	
Primary Irritation Index:	3.1
Lesions:	none
Erythema:	yes
Edema:	yes

Results Remarks:

The scores for erythema and edema at each of the observation times were as follows:

	Erythema			Edema		
	Intact		Abraded	Intact		Abraded
24 h	1.2	1.5		1.5	1.8	
72 h	1.5	1.5		1.7	1.8	
5 days		1.0	1.3		1.5	1.7
7 days		0.8	1.0		1.0	1.0
14 days	0	0		0	0	

The Primary dermal Irritation index was 3.1

Growth rates were normal throughout the study and there were no clinical signs of systemic toxicity

BOXES BELOW:
Interpretation of Results = primary irritant

Interpretation of Results:

Conclusion: Test material was a primary irritant under the test conditions; Primary dermal irritation index was 3.1.

RELIABILITY/DATA QUALITY

Reliability: 1

Reliability Remarks:

Key Study Sponsor Indicator: not a key study

REFERENCE

Reference:

American Petroleum Institute (1985)
Acute oral toxicity study in rats, acute dermal toxicity study in rabbits, primary dermal irritation study in rabbits, primary eye irritation study in rabbits of API 83-05 full range catalytically reformed naphtha.

Study conducted by Hazleton Laboratories America, Inc. API Med research publication N0.32-31474, April 1985.

Skin Irritation

Test Substance - Skin Irritation

Category Chemical:	(64741-66-8) Naphtha, petroleum, light alkylate
Test Substance:	(64741-66-8) Naphtha, petroleum, light alkylate
Test Substance Purity/Composition and Other Test Substance Comments:	Sample API 83-19 is a Light Alkylate Naphtha (LAN)
Category Chemical Result Type:	Measured

Method - Skin Irritation

Species:	Rabbit
Mammalian Strain:	
Type of Coverage:	Occlusive
Preparation of Test Site:	Abraded
Gender:	
Number of Animals per Dose:	6
Amount/Concentration Applied:	0.5 ml
Year Study Performed:	1986
Method/Guideline Followed:	Other
GLP:	Yes
Exposure Period:	24 Hours
Total Volume applied and Units:	0.5 ml
Control Group Type:	
Vehicle Used:	
Vehicle Name:	
Vehicle Amount and Units:	
Post-Exposure Period:	
Grading Scale:	
Method/Guideline and Test Condition Remarks:	Method: Draize Test 0.5 ml of undiluted test material was applied to the shorn skin in two areas on each rabbit. One area was intact and the other abraded skin. The treated area was then covered with an occlusive dressing. After 24 hours the dressing was removed and the treated skin was wiped to remove any residue of test material. The degree of erythema and edema was recorded according to the Draize scale. A second reading of skin responses was made at 72 hours and again at 96 hours, 7 and 14 days. Results of the 24 and 72 hour readings were used to determine the Primary Irritation Index.

Test Results - Skin Irritation

Grade:	
Primary Irritation Index:	3.9

Lesions:

Erythema:

Edema:

Results Remarks: The scores for erythema and edema were marginally greater for intact skin than abraded skin, but the difference was not biologically significant Scores for intact skin at each of the observation intervals were:
 Time Erythema Edema Irritation score*
24 hours 2.0 1.7 3.5
72 hours 2.5 2.2 4.2
96 hours 2.7 2.8 4.9
7 days 2.5 2.3 4.5
14 days 0.8 1.0 1.2

* Irritation score calculated as the sum of irritation scores for each test site divided by the number of animals at each observation period. PII is the sum of the 24-and 72-hour total irritation scores divided by 2

Interpretation of Results: Moderately Irritating

Conclusion:

Reliability/Data Quality - Skin Irritation

Reliability: 1 - Valid Without Restrictions

Reliability Remarks:

Key Study Sponsor Indicator:

Reference - Skin Irritation

Reference: American Petroleum Institute (1986) Acute oral toxicity study in rats, acute dermal toxicity study in rabbits, primary dermal irritation study in rabbits, primary eye irritation study in rabbits, dermal sensitization study in guinea pigs on API 83-19, Light Alkylate Naphtha (CAS 64741-66-8) Study conducted by
Hazleton Laboratories. Health and Environmental Sciences Dept. Report 33-30594

Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS 10/28/2003

Skin Irritation

Test Substance - Skin Irritation

Category Chemical:	*No CAS Number Provided*
Test Substance:	*No CAS Number Provided*
Test Substance Purity/Composition and Other Test Substance Comments:	API PS-6
Category Chemical Result Type:	Measured

Method - Skin Irritation

Species:	Rabbit
Mammalian Strain:	
Type of Coverage:	Semi-Occlusive
Preparation of Test Site:	Abraded
Gender:	Both M/F
Number of Animals per Dose:	6
Amount/Concentration Applied:	0.5 ml
Year Study Performed:	1979
Method/Guideline Followed:	Other
GLP:	Yes
Exposure Period:	24 Hours
Total Volume applied and Units:	0.5 ml
Control Group Type:	
Vehicle Used:	
Vehicle Name:	
Vehicle Amount and Units:	
Post-Exposure Period:	
Grading Scale:	
Method/Guideline and Test Condition Remarks:	Method: Draize Test 0.5 ml of undiluted test material was applied to the shorn skin in two areas on each of 3 male and 3 female rabbits. One area was intact and the other abraded skin. The treated area was then covered with an occlusive dressing. After 24 hours the dressing was removed and the treated skin was wiped to remove any residue of test material. The degree of erythema and edema was recorded according to the Draize scale. A second reading of skin responses was made at 72 hours and again at 96 hours, 7 and 14 days. Results of the 24 and 72 hour readings were used to determine the Primary Irritation Index.

Test Results - Skin Irritation

Grade:	
Primary Irritation Index:	0.98

Lesions:

Erythema:

Edema:

Results Remarks: A summary of the dermal irritation scores is given below
 Exposure time Average value
 (hours) of all animals
Erythema
Intact skin 24 0
 72 0.92
Abraded skin 24 0
 72 1.0
Edema
Intact skin 24 0.5
 72 0 5
Abraded skin 24 0.5
 72 0 5
 3.92
Primary irritation score =Total/4= 0.98

Edema but no erythema was noted at 24 hours, although the test area was whiter than the surrounding skin. At 72 hours erythema and edema were observed By 7 days almost all erythema had cleared but some edema was still present and the test site was dry and flaky. By day 14 all edema and erythema had cleared but there was no hair growth at this time.

Interpretation of Results: Slightly Irritating

Conclusion:

Reliability/Data Quality - Skin Irritation

Reliability: 1 - Valid Without Restrictions

Reliability Remarks:

Key Study Sponsor Indicator:

Reference - Skin Irritation

Reference: American Petroleum Institute (1980) Acute toxicity tests, API #PS-s unleaded motor gasoline Study conducted by Elars Bioresearch Laboratories Inc. API Report No. 27-32130.

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Skin Irritation

Test Substance - Skin Irritation

Category Chemical:	(64741-55-5) Naphtha, petroleum, light catalytic cracked
Test Substance:	(64741-55-5) Naphtha, petroleum, light catalytic cracked
Test Substance Purity/Composition and Other Test Substance Comments:	
Category Chemical Result Type:	Measured

Method - Skin Irritation

Species:	Rabbit
Mammalian Strain:	
Type of Coverage:	Occlusive
Preparation of Test Site:	Abraded
Gender:	
Number of Animals per Dose:	6
Amount/Concentration Applied:	0.5 ml
Year Study Performed:	1986
Method/Guideline Followed:	
GLP:	Yes
Exposure Period:	24 Hours
Total Volume applied and Units:	0.5 ml
Control Group Type:	
Vehicle Used:	
Vehicle Name:	
Vehicle Amount and Units:	
Post-Exposure Period:	
Grading Scale:	
Method/Guideline and Test Condition Remarks:	0 5 ml of undiluted test material was applied to the shorn skin in two areas on each rabbit One area was intact and the other abraded skin. The treated area was then covered with an occlusive dressing. After 24 hours the dressing was removed and the treated skin was wiped to remove any residue of test material. The degree of erythema and edema was recorded according to the Draize scale. A second reading of skin responses was made at 72 hours and again at 96 hours, 7 and 14 days Results of the 24 and 72 hour readings were used to determine the Primary Irritation Index

Test Results - Skin Irritation

Grade:	
Primary Irritation Index:	3.7
Lesions:	

Erythema:

Edema:

Results Remarks:

The scores for erythema and edema were marginally greater for abraded skin than intact skin, but the difference was not biologically significant. Scores for abraded skin at each of the observation intervals were
Time Erythema Edema Irritation score*
24 hours 1.8 2.0 3 5
72 hours 2.3 1.7 3.8
96 hours 1.5 1.5 2.6
7 days 1.2 0.2 1.2
14 days 0.0 0.0 0.0
* Irritation score calculated as the sum of irritation scores for each test site divided by the number of animals at each observation period. PII is the sum of the 24- and 72-hour total irritation scores divided by 2

Interpretation of Results:

Conclusion:

Reliability/Data Quality - Skin Irritation

Reliability:

1 - Valid Without Restrictions

Reliability Remarks:

Key Study Sponsor Indicator:

Reference - Skin Irritation

Reference:

American Petroleum Institute (1986) Acute oral toxicity study in rats, acute dermal toxicity study in rabbits, primary dermal irritation study in rabbits, primary eye irritation study in rabbits, dermal sensitization study in guinea pigs. Study conducted by Hazleton Laboratories Inc. Health and Environmental Sciences Dept Publ No 33-32722

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Skin Irritation

Test Substance - Skin Irritation

Category Chemical:	(68955-35-1) Naphtha, petroleum, catalytic reformed
Test Substance:	(68955-35-1) Naphtha, petroleum, catalytic reformed
Test Substance Purity/Composition and Other Test Substance Comments:	API 83-05
Category Chemical Result Type:	Measured

Method - Skin Irritation

Species:	Rabbit
Mammalian Strain:	
Type of Coverage:	Occlusive
Preparation of Test Site:	Other
Gender:	
Number of Animals per Dose:	6
Amount/Concentration Applied:	0.5 ml
Year Study Performed:	1985
Method/Guideline Followed:	Other
GLP:	Yes
Exposure Period:	24 Hours
Total Volume applied and Units:	0.5 ml
Control Group Type:	
Vehicle Used:	
Vehicle Name:	
Vehicle Amount and Units:	
Post-Exposure Period:	
Grading Scale:	
Method/Guideline and Test Condition Remarks:	Method: Draize Test 0.5 ml of undiluted test material was applied to two areas on each rabbit. One area was intact and the other abraded skin. The treated area was then covered with an occlusive dressing After 24 hours the dressing was removed and the treated skin was wiped to remove any residue of test material. The degree of erythema and edema was recorded according to the Draize scale. A second reading of skin responses was made at 72 hours again at 5, 7 and 14 days. Results of the 24 and 72 hour readings were used to determine the Primary Irritation Index.

Test Results - Skin Irritation

Grade:	
Primary Irritation Index:	

Lesions:

Erythema:

Edema:

Results Remarks: The scores for erythema and edema at each of the observation times were as follows:
 Erythema Edema
 Intact Abraded Intact Abraded
24 h 1.2 1.5 1 5 1.8
72 h 1 5 1.5 1.7 1.8
5 days 1.0 1.3 1.5 1.7
7 days 0 8 1.0 1.0 1.0
14 days 0 0 0 0

Interpretation of Results: Slightly Irritating

Conclusion: The primary dermal irritation index was 3 1.

Growth rates were normal throughout the study and there were no clinical signs of systemic toxicity

Reliability/Data Quality - Skin Irritation

Reliability: 1 - Valid Without Restrictions

Reliability Remarks:

Key Study Sponsor Indicator:

Reference - Skin Irritation

Reference: American Petroleum Institute (1985)
Acute oral toxicity study in rats, acute dermal toxicity study in rabbits, primary dermal irritation study in rattis, primary eye irritation study in rabbits in API 83-05 full range catalytically reformed naphtha.
Study conducted by Hazleton Laboratories America, Inc
API Med research publication No 32-31474, April 1985.

Skin Irritation

Test Substance - Skin Irritation

Category Chemical:	(64741-87-3) Naphtha, petroleum, sweetened
Test Substance:	(64741-87-3) Naphtha, petroleum, sweetened
Test Substance Purity/Composition and Other Test Substance Comments:	API 81-08
Category Chemical Result Type:	Measured

Method - Skin Irritation

Species:	Rabbit
Mammalian Strain:	
Type of Coverage:	Occlusive
Preparation of Test Site:	Other
Gender:	
Number of Animals per Dose:	6
Amount/Concentration Applied:	0.5 ml
Year Study Performed:	1982
Method/Guideline Followed:	Other
GLP:	Yes
Exposure Period:	24 Hours
Total Volume applied and Units:	0.5 ml
Control Group Type:	
Vehicle Used:	
Vehicle Name:	
Vehicle Amount and Units:	
Post-Exposure Period:	
Grading Scale:	
Method/Guideline and Test Condition Remarks:	Method: Draize Test 0.5 ml of undiluted test material was applied to two areas on each rabbit. One area was intact and the other abraded skin. The treated area was then covered with an occlusive dressing. After 24 hours the dressing was removed and the treated skin was wiped to remove any residue of test material. The degree of erythema and edema was recorded according to the Draize scale. A second reading of skin responses was made at 72 hours again at 96 hours, 7 and 14 days. Results of the 24 and 72 hour readings were used to determine the Primary Irritation Index. Body weights were recorded just prior to application of the test material and weekly thereafter throughout the study. At study termination, all surviving animals were euthanized with an overexposure of carbon dioxide, subjected to a gross necropsy and abnormalities were recorded.

Test Results - Skin Irritation

Grade:	

Primary Irritation Index:	1.2
Lesions:	
Erythema:	
Edema:	
Results Remarks:	The scores for erythema and edema at each of the observation times were as follows. Erythema Edema Abraded Intact Abraded 24 h 0.7 0.7 1.0 0 7 72 h 1.0 0 7 0 0 96 h 0.5 0.2 0 0 7 days 0.3 0.3 0 0 14 days 0 0 0 0 The Primary dermal Irritation index was 1.2 Growth rates were normal throughout the study and there were no visible lesions at necropsy.
Interpretation of Results:	Slightly Irritating
Conclusion:	

Reliability/Data Quality - Skin Irritation

Reliability:	1 - Valid Without Restrictions
Reliability Remarks:	
Key Study Sponsor Indicator:	

Reference - Skin Irritation

Reference:	American Petroleum Institute (1982) Acute toxicity studies, sweetened naphtha Sample 81-08. Study conducted by Hazleton Raltech. API Medicine and biological science department Publication No. 30-31990, August 1982 Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

High Production Volume Information System (HPVIS)

Eye Irritation
Gasoline Category

TEST SUBSTANCE	
Category Chemical :	(68955-35-1) Naphtha, petroleum, catalytic reformed **Type in CAS # if not listed:**
Test Substance :	(68955-35-1) Naphtha, petroleum, catalytic reformed **Type in CAS # if not listed:**
Test Substance Purity/Composition and Other Test Substance Comments :	Gasoline Blending Streams Category Member CAS # 68955-35-1 Catalytically Reformed Naphtha Test Material API # 83-05. Compositional information on this test material can be found in the Analytical Composition Report attached to the Gasoline Blending Streams Category Test material was administered neat.
Category Chemical Result Type :	Measured
Unable to Measure or Estimate Justification :	

METHOD	
Species:	Rabbit
Other Species:	
Mammalian Strain:	No Data
Other Strain:	
Gender:	No Data
Number of Animals per Dose:	9
Concentration:	Undiluted
Amount/Concentration Applied:	0.1 ml
Year Study Performed :	1985

Method/Guideline Followed:	Other
GLP:	Yes
Exposure Period:	Single
Total Volume applied and Units:	0.1 ml
Control Group Type:	Negative
Vehicle Used:	No
Vehicle Name:	
Other Vehicle Name:	
Vehicle Amount and Units:	
Post-Exposure Period:	14 Days
Grading Scale:	
Tool :	Fluorescein
Method/Guideline and Test Condition Remarks:	The primary eye irritation of API # 83-05, Catalytically Reformed Naphtha, was evaluated in rabbits using the Draize Test. 0.1 ml of undiluted test material was dripped onto the corneal surface of one eye of each of 9 rabbits, the other eye was untreated and served as control. After 30 seconds the treated eyes of 3 rabbits were washed with lukewarm water for 1 minute. Eyes of the other 6 rabbits were not washed. Readings of ocular lesions for all animals were made at 1, 24, 48, 72 hours and 7 days after treatment. At the 72 hour and seven day readings, sodium fluorescein was used to aid in revealing possible corneal injury. Body weights were recorded just prior to treatment and one week afterwards. At termination of the study, the rabbits were euthanized by an overexposure of carbon dioxide and were subjected to a gross necropsy. Any abnormalities found were recorded.

TEST RESULTS

Overall Grading Score:	No data
Overall Irritation Score:	0 - 7.3
Primary Irritation Index:	No data
Lesions:	None

Cornea:	Iris:	Conjunctivae	Conjunctivae

Irritation:	**(Chemosis):** **(Redness):**
Results Remarks:	No signs of systemic toxicity were observed during the study. The primary eye irritation scores were as follows: Observation period — Primary eye irritation score Unwashed* / Washed** 1 hour: 7.2 / 7.3 24 hour: 5.5 / 2.7 48 hour: 4.3 / 2.0 72 hour: 3.0 / 2.0 7 day: 1.0 / 1.3 14 day: 0 / 0 * Mean of six rabbits ** Mean of three rabbits
Interpretation of Results:	Moderately Irritating
Conclusion:	The test material was moderately irritating, and the irritation was reversible by day 14.
RELIABILITY/DATA QUALITY	
Reliability:	1 - Valid Without Restrictions
Reliability Remarks:	
Key Study Sponsor Indicator:	Not Key
REFERENCE	
Reference:	American Petroleum Institute (1985) Acute oral toxicity study in rats, acute dermal toxicity study in rabbits, primary dermal irritation study in rabbits, primary eye irritation study in rabbits of API 83-05 full range catalytically reformed naphtha. Study conducted by Hazleton Laboratories America, Inc. API Med research publication N0.32-31474, April 1985.

Eye Irritation

Test Substance - Eye Irritation

Category Chemical:	(64741-55-5) Naphtha, petroleum, light catalytic cracked
Test Substance:	(64741-55-5) Naphtha, petroleum, light catalytic cracked
Test Substance Purity/Composition and Other Test Substance Comments:	
Category Chemical Result Type:	Measured

Method - Eye Irritation

Species:	Rabbit
Mammalian Strain:	
Gender:	
Number of Animals per Dose:	9
Amount/Concentration Applied:	0.1 ml
Year Study Performed:	1986
Method/Guideline Followed:	
GLP:	Yes
Exposure Period:	0.33 Minutes
Total Volume applied and Units:	0.1 ml
Control Group Type:	Negative
Vehicle Used:	
Vehicle Name:	
Vehicle Amount and Units:	
Post-Exposure Period:	
Grading Scale:	
Tool:	
Method/Guideline and Test Condition Remarks:	0.1 ml of undiluted test material was applied to the corneal surface of one eye of each of 9 rabbits, the other eye was untreated and served as control. After 20 to 30 seconds the treated eyes of 3 rabbits were washed with lukewarm water for 1 minute. Eyes of the other 6 rabbits were not washed. Readings of ocular lesions for all animals were made at 1, 24, 48, 72 hours and 7 days after treatment. Sodium fluorescein was used to aid in revealing possible corneal injury.

Test Results - Eye Irritation

Overall Grading Score:	
Overall Irritation Score:	
Primary Irritation Index:	
Lesions:	
Cornea:	

Iris:	
Conjunctivae (Chemosis):	
Conjunctivae (Redness):	
Results Remarks:	No pain response was elicited from any of the animals when the test material was applied to the corneal surface. The primary eye irritation score (=total eye irritation score for all animals divided by the number of animals) was 1.0 after 1 hour for those animals with unwashed eyes compared to 3.3 for those whose eyes had been washed. An irritation score of zero was recorded at all other times No iridial nor corneal irritation resulted from application of the test material
Interpretation of Results:	Not Irritating
Conclusion:	

Reliability/Data Quality - Eye Irritation

Reliability:	1 - Valid Without Restrictions
Reliability Remarks:	
Key Study Sponsor Indicator:	

Reference - Eye Irritation

Reference:	American Petroleum Institute (1986) Acute oral toxicity study in rats, acute dermal toxicity study in rabbits, primary dermal irritation study in rabbits, primary eye irritation study in rabbits, dermal sensitization study in guinea pigs. Study conducted by Hazleton Laboratories Inc. Health and Environmental Sciences Dept. Publ. No. 33-32722 Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

Eye Irritation

Test Substance - Eye Irritation

Category Chemical:	(64741-66-8) Naphtha, petroleum, light alkylate
Test Substance:	(64741-66-8) Naphtha, petroleum, light alkylate
Test Substance Purity/Composition and Other Test Substance Comments:	Sample API 83-19 is a Light Alkylate Naphtha (LAN)
Category Chemical Result Type:	Measured

Method - Eye Irritation

Species:	Rabbit
Mammalian Strain:	
Gender:	
Number of Animals per Dose:	9
Amount/Concentration Applied:	0.1 ml
Year Study Performed:	1986
Method/Guideline Followed:	
GLP:	Yes
Exposure Period:	0.33 Minutes
Total Volume applied and Units:	0.1 ml
Control Group Type:	
Vehicle Used:	
Vehicle Name:	
Vehicle Amount and Units:	
Post-Exposure Period:	
Grading Scale:	
Tool:	
Method/Guideline and Test Condition Remarks:	0.1 ml of undiluted test material was applied to the corneal surface of one eye of each of 9 rabbits, the other eye was untreated and served as control After 20 to 30 seconds the treated eyes of 3 rabbits were washed with lukewarm water for 1 minute. Eyes of the other 6 rabbits were not washed. Readings of ocular lesions for all animals were made at 1, 24, 48, 72 hours and 7 days after treatment Sodium fluorescein was used to aid in revealing possible corneal injury

Test Results - Eye Irritation

Overall Grading Score:	
Overall Irritation Score:	
Primary Irritation Index:	
Lesions:	
Cornea:	

Iris:	
Conjunctivae (Chemosis):	
Conjunctivae (Redness):	
Results Remarks:	No pain response was elicited on instillation of test material. No corneal or iridial irritation was seen during the study
Interpretation of Results:	Not Irritating
Conclusion:	

Reliability/Data Quality - Eye Irritation

Reliability:	1 - Valid Without Restrictions
Reliability Remarks:	
Key Study Sponsor Indicator:	

Reference - Eye Irritation

Reference:	American Petroleum Institute (1986) Acute oral toxicity study in rats, acute dermal toxicity study in rabbits, primary dermal irritation study in rabbits, primary eye irritation study in rabbits, dermal sensitization study in guinea pigs on API 83-19, Light Alkylate Naphtha (CAS 64741-66-8) Study conducted by Hazleton Laboratories. Health and Environmental Sciences Dept Report 33-30594 Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

Eye Irritation

Test Substance - Eye Irritation

Category Chemical:	*No CAS Number Provided*
Test Substance:	*No CAS Number Provided*
Test Substance Purity/Composition and Other Test Substance Comments:	API PS-6
Category Chemical Result Type:	Measured

Method - Eye Irritation

Species:	Rabbit
Mammalian Strain:	
Gender:	Both M/F
Number of Animals per Dose:	9
Amount/Concentration Applied:	0.1 ml
Year Study Performed:	1979
Method/Guideline Followed:	
GLP:	Yes
Exposure Period:	0.33 Minutes
Total Volume applied and Units:	0.1 ml
Control Group Type:	
Vehicle Used:	No
Vehicle Name:	
Vehicle Amount and Units:	
Post-Exposure Period:	7 Days
Grading Scale:	
Tool:	
Method/Guideline and Test Condition Remarks:	0.1 ml of undiluted test material was applied to the corneal surface of one eye of each of 9 rabbits (4 male, 5 female), the other eye was untreated and served as control. After 20 to 30 seconds the treated eyes of 3 rabbits were washed with lukewarm water for 1 minute. Eyes of the other 6 rabbits were not washed Readings of ocular lesions for all animals were made at 1, 24, 48, 72 hours and 7 days after treatment. Sodium fluorescein was used to aid in revealing possible corneal injury.

Test Results - Eye Irritation

Overall Grading Score:	
Overall Irritation Score:	
Primary Irritation Index:	
Lesions:	
Cornea:	

Iris:	
Conjunctivae (Chemosis):	
Conjunctivae (Redness):	
Results Remarks:	No irritation was observed in any animal at any of the three observation times. Animals whose eyes had been irrigated following instillation of test material were no different from those whose eyes had not been washed.
Interpretation of Results:	Not Irritating
Conclusion:	

Reliability/Data Quality - Eye Irritation

Reliability:	1 - Valid Without Restrictions
Reliability Remarks:	
Key Study Sponsor Indicator:	

Reference - Eye Irritation

Reference:	American Petroleum Institute (1980) Acute toxicity tests, API #PS-s unleaded motor gasoline. Study conducted by Elars Bioresearch Laboratories Inc. API Report No 27-32130 Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

Eye Irritation

Test Substance - Eye Irritation

Category Chemical:	(64741-87-3) Naphtha, petroleum, sweetened
Test Substance:	(64741-87-3) Naphtha, petroleum, sweetened
Test Substance Purity/Composition and Other Test Substance Comments:	API 81-08
Category Chemical Result Type:	Measured

Method - Eye Irritation

Species:	Rabbit
Mammalian Strain:	
Gender:	
Number of Animals per Dose:	9
Amount/Concentration Applied:	0 1 ml
Year Study Performed:	1982
Method/Guideline Followed:	Other
GLP:	Yes
Exposure Period:	0.5 Minutes
Total Volume applied and Units:	0.1 ml
Control Group Type:	Negative
Vehicle Used:	
Vehicle Name:	
Vehicle Amount and Units:	
Post-Exposure Period:	
Grading Scale:	
Tool:	
Method/Guideline and Test Condition Remarks:	Method: Draize Test 0.1 ml of undiluted test material was placed in the everted lower eyelid of one eye of each of 9 rabbits, the other eye was untreated and served as control. After 30 seconds the treated eyes of 3 rabbits were washed with lukewarm water for 1 minute. Eyes of the other 6 rabbits were not washed. Readings of ocular lesions for all animals were made at 1, 24, 48, 72 hours and 7 days after treatment. At the 72 hour and seven day readings, sodium fluorescein was used to aid in revealing possible corneal injury. Body weights were recorded just prior to treatment and one week afterwards At termination of the study, the rabbits were euthanized by an overexposure of carbon dioxide and were subjected to a gross necropsy. Any abnormalities found were recorded

Test Results - Eye Irritation

Overall Grading Score:	
Overall Irritation Score:	
Primary Irritation Index:	

Lesions:	
Cornea:	
Iris:	
Conjunctivae (Chemosis):	
Conjunctivae (Redness):	
Results Remarks:	One hour after application of the test material the average score for irritation was 2.0 and 0.7 for unwashed and washed eyes respectively and the 24 hour readings were 0.3 and 0 respectively. All other scores throughout the study were 0. Growth was normal throughout the study and there were no visible lesions at necropsy
Interpretation of Results:	Not Irritating
Conclusion:	

Reliability/Data Quality - Eye Irritation

Reliability:	1 - Valid Without Restrictions
Reliability Remarks:	
Key Study Sponsor Indicator:	

Reference - Eye Irritation

Reference:	American Petroleum Institute (1982) Acute toxicity studies, sweetened naphtha Sample 81-08. Study conducted by Hazleton Raltech. API Medicine and biological science department Publication No. 30-31990, August 1982. Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

Eye Irritation

Test Substance - Eye Irritation

Category Chemical:	(68955-35-1) Naphtha, petroleum, catalytic reformed
Test Substance:	(68955-35-1) Naphtha, petroleum, catalytic reformed
Test Substance Purity/Composition and Other Test Substance Comments:	API 81-05
Category Chemical Result Type:	Measured

Method - Eye Irritation

Species:	Rabbit
Mammalian Strain:	
Gender:	
Number of Animals per Dose:	9
Amount/Concentration Applied:	0.1 ml
Year Study Performed:	1985
Method/Guideline Followed:	Other
GLP:	Yes
Exposure Period:	0.5 Minutes
Total Volume applied and Units:	0.1 ml
Control Group Type:	Negative
Vehicle Used:	
Vehicle Name:	
Vehicle Amount and Units:	
Post-Exposure Period:	
Grading Scale:	
Tool:	
Method/Guideline and Test Condition Remarks:	Method: Draize Test 0.1 ml of undiluted test material was dripped onto the corneal surface of one eye of each of 9 rabbits, the other eye was untreated and served as control. After 30 seconds the treated eyes of 3 rabbits were washed with lukewarm water for 1 minute. Eyes of the other 6 rabbits were not washed. Readings of ocular lesions for all animals were made at 1, 24, 48, 72 hours and 7 days after treatment. At the 72 hour and seven day readings, sodium fluorescein was used to aid in revealing possible corneal injury. Body weights were recorded just prior to treatment and one week afterwards. At termination of the study, the rabbits were euthanized by an overexposure of carbon dioxide and were subjected to a gross necropsy. Any abnormalities found were recorded.

Test Results - Eye Irritation

Overall Grading Score:	
Overall Irritation Score:	

Primary Irritation Index:

Lesions:

Cornea:

Iris:

Conjunctivae (Chemosis):

Conjunctivae (Redness):

Results Remarks: No signs of systemic toxicity were observed during the study.
The primary eye irritation scores were as follows:
Observation period Primary eye irritation score
 Unwashed* Washed*"
1 hour 7.2 7.3
24 hour 5.5 2.7
48 hour 4.3 2 0
72 hour 3.0 2.0
7 day 1.0 1.3
14 day 0 0

* Mean of six rabbits
** Mean of three rabbits

In rabbits whose eyes had not been washed irridial irritation that had occurred had subsided by 24 hours and all corneal involvement had subsided by 48 hours. No corneal or irridial irritation was observed in the group whose eyes had been washed followed by application of test material.

Interpretation of Results:

Conclusion:

Reliability/Data Quality - Eye Irritation

Reliability: 1 - Valid Without Restrictions

Reliability Remarks:

Key Study Sponsor Indicator:

Reference - Eye Irritation

Reference: American Petroleum Institute (1985)
Acute oral toxicity study in rats, acute dermal toxicity study in rabbits, primary dermal irritation study in rattis, primary eye irritation study in rabbits in API 83-05 full range catalytically reformed naphtha.
Study conducted by Hazleton Laboratories America, Inc.
API Med research publication No. 32-31474, April 1985

High Production Volume Information System (HPVIS)

Skin Sensitization
Gasoline Category

TEST SUBSTANCE

Category Chemical :	(68955-35-1) Naphtha, petroleum, catalytic reformed **Type in CAS # if not listed:**
Test Substance :	(68955-35-1) Naphtha, petroleum, catalytic reformed **Type in CAS # if not listed:**
Test Substance Purity/Composition and Other Test Substance Comments :	Gasoline Blending Streams Category Member CAS # 68955-35-1 Catalytically Reformed Naphtha Test Material API # 83-05. Compositional information on this test material can be found in the Analytical Data Composition Report attached to the Gasoline Blending Streams Category
Category Chemical Result Type :	Measured
Unable to Measure or Estimate Justification :	

METHOD

Test Method:	In vivo
Study Type:	Beuhler test
Species:	Guinea pig
Other Species:	
Mammalian Strain:	Albino
Other Strain:	
Route of Induction:	Epicutaneous, occluded
Route of Challenge Exposure:	Epicutaneous, occluded
Gender:	Male
Number of Animals per Dose:	10
Concentration:	Induction: 50% occlusive epicutaneous Challenge: 25% occlusive epcutaneous

Concentration:	
Year Study Performed :	1986
Method/Guideline Followed:	Unknown
GLP:	Yes
Exposure Period:	6 hours
Induction Frequency of Treatment:	Once per week
Challenge Exposure Period:	6 hours
Challenge Frequency of Treatment:	Once
Total Volume applied and Units:	0.4 ml
Control Group Type:	Negative
Vehicle Used:	Yes
Vehicle Name:	Paraffin oil
Other Vehicle Name:	Kerosene
Vehicle Amount and Units:	0.4 ml
Positive Control Substance:	2,4-dinitrochlorobenzene
Negative Control Substance:	vehicle - paraffin oil
Post-Exposure Period:	None
Method/Guideline and Test Condition Remarks:	0.4 ml of a 50% mixture of test material and paraffin oil was applied under an occlusive dressing to the shorn skin of 10 male and 10 female animals. 6 hours after application, the dressings were removed and the skin wiped to remove residues of test material. The animals received one application each week for 3 weeks. The same application site was used each time. 2 weeks following the third application a challenge dose (0.4 ml of a 25% mixture in paraffin oil) was applied in the same manner as the sensitizing doses. A previously untreated site was used for the challenge application. The application sites for sensitizing and challenge doses were read for erythema and edema 24 and 48 hours after patch removal. To assist in the reading of the response to the final challenge dose, the test site was depilated 3 hours rior to reading by using a commercially available depilatory cream. Positive control (2,4-dinitrochlorobenzene), vehicle control nd naive control groups were included in this study and the procedure for these was the same as for the test groups. The

positive control was used at a concentration of 0.3% in 80% aqueous ethanol for the induction doses and at 0.1% w/v in acetone for the challenge dose.

TEST RESULTS

Measurement Period and Units:	Percent Sensitized Test Substance:	Percent Sensitized Positive Control:	Percent Sensitized Negative Control:	Sensitization Score:
24 & 48 hrs	0	20	0	n/a

Results Remarks:

There was no abnormal appearance in any of the animals exposed to the test material during the study.
The skin reactions to the challenge dose are summarized as follows:

- Test material
  - No dermal reactions by any animal
- Naive control
  - Very slight erythema in 2/20 animals
- Vehicle control
  - No dermal reactions by any animal
- Positive control
  - Very slight to moderate irritation by all 20 animals. The reactions of 16 of the animals exceeded the highest reaction observed in the naive positive control animals.
- Naive positive control
  - 10/20 animals exhibited very slight erythema

Interpretation of Results: Not sensitizing

Conclusion: The test material was not a skin sensitizer to male albino guinea pigs tested by the closed pathch technique.

RELIABILITY/DATA QUALITY

Reliability: 1 - Valid without restriction

Reliability Remarks:

Key Study Sponsor Indicator: Not key

REFERENCE

Reference:

American Petroleum Institute (1986)
Dermal sensitization study in guinea pigs, API 83-05, full range catalytically reformed naphtha.
Study conducted by Hazleton Laboratories America Inc.
API HESD Research Publication 33-30497, January 1986

Skin Sensitization

Test Substance - Skin Sensitization

Category Chemical:	*No CAS Number Provided*
Test Substance:	*No CAS Number Provided*
Test Substance Purity/Composition and Other Test Substance Comments:	API PS-6
Category Chemical Result Type:	Measured

Method - Skin Sensitization

Test Type:	
Study Type:	Buehler Test
Species:	Guinea pig
Mammalian Strain:	
Route of Induction:	Epicutaneous, Occlusive
Route of Challenage Exposure:	Epicutaneous, Occlusive
Gender:	Both M/F
Number of Animals per Dose:	20
Concentration:	0 5 ml
Year Study Performed:	1979
Method/Guideline Followed:	
GLP:	Yes
Exposure Period:	3 Weeks
Induction Frequency of Treatment:	6 hr/day, 3 day/week
Challenge Exposure Period:	3 Weeks
Challenge Frequency of Treatment:	6 hr/day, 3 day/week
Total Volume applied and Units:	0 5 ml
Control Group Type:	
Vehicle Used:	Yes
Vehicle Name:	Other
Other Vehicle Name:	Mineral oil
Vehicle Amount and Units:	

Positive Control Substance:	0.05% 2,4-dinitrochlorobenzene in ethanol
Negative Control Substance:	
Post-Exposure Period:	
Method/Guideline and Test Condition Remarks:	Concentration: 1st: Induction 50 % occlusive epicutaneous 2nd: Challenge 50 % occlusive epicutaneous 0.5 ml of undiluted test material was applied under an occlusive dressing to the shorn skin of 10 male and 10 female animals. 6 hours after application the dressings were removed and the skin wiped to remove residues of test material. After the first application, irritation was sufficiently severe that for further dosing a 50% dilution in mineral oil was used The animals received one application 3 times each week for 3 weeks. The same application site was used each time. 2 weeks following the third application a challenge dose (0 5 ml of a 50% dilution in mineral oil) was applied in the same manner as the sensitizing doses A previously untreated site was used for the challenge application. The application sites for sensitizing and challenge doses were read for erythema and edema 24 and 48 hours after patch removal. To assist in the reading of the response to the final challenge dose the test site was depilated 3 hours prior to reading by using a commercially available depilatory cream. Positive control (0.05% 2,4-dinitrochlorobenzene in ethanol), vehicle control and naive control groups were included in this study and the procedure for these was the same as for the test groups.

Test Results - Skin Sensitization

Measurement Period and Units:	
Percent Sensitized Test Substance:	
Percent Sensitized Positive Control:	
Percent Sensitized Negative Control:	
Sensitization Score:	
Results Remarks:	On a subjective basis, the challenge treatment did not appear to be more reactive than the sensitizing treatments. The average scores for erythema and edema following induction and challenge are summarized below. Average PS-6 gasoline Positive control scores Erythema Edema Erythema Edema Induction 0 9 0.3 1.3 0.3 Challenge 0 1 0 1.9 1 7 The authors concluded that the test material was not sensitizing.
Interpretation of Results:	Not Sensitizing
Conclusion:	

Reliability/Data Quality - Skin Sensitization

Reliability:	2 - Valid With Restrictions
Reliability Remarks:	Although the study was conducted to GLP, there was no vehicle control and the results from the positive control were not convincing
Key Study Sponsor Indicator:	

Reference - Skin Sensitization

Reference:	American Petroleum Institute (1980) Acute toxicity tests, API #PS-s unleaded motor gasoline. Study conducted by Elars Bioresearch Laboratories Inc. API Report No 27-32130. Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

Skin Sensitization

Test Substance - Skin Sensitization

Category Chemical:	(64741-55-5) Naphtha, petroleum, light catalytic cracked
Test Substance:	(64741-55-5) Naphtha, petroleum, light catalytic cracked
Test Substance Purity/Composition and Other Test Substance Comments:	
Category Chemical Result Type:	Measured

Method - Skin Sensitization

Test Type:	
Study Type:	Buehler Test
Species:	Guinea pig
Mammalian Strain:	
Route of Induction:	Epicutaneous, Occlusive
Route of Challenage Exposure:	Epicutaneous, Occlusive
Gender:	
Number of Animals per Dose:	10
Concentration:	0.4 ml
Year Study Performed:	1986
Method/Guideline Followed:	
GLP:	Yes
Exposure Period:	6 Hours
Induction Frequency of Treatment:	
Challenge Exposure Period:	6 Hours
Challenge Frequency of Treatment:	
Total Volume applied and Units:	0.4 ml
Control Group Type:	
Vehicle Used:	Yes
Vehicle Name:	Other
Other Vehicle Name:	Paraffin oil
Vehicle Amount and Units:	0.4 Other
Positive Control Substance:	2,4-dinitrochlorobenzene, as a 0.3% w/v solution in 80% aqueous ethanol

Negative Control Substance:	vehicle control (paraffin oil) and naive control groups
Post-Exposure Period:	48 Hours
Method/Guideline and Test Condition Remarks:	0.4 ml of undiluted test material was applied under an occlusive dressing to the shorn skin of 10 male and 10 female animals. 6 hours after application the dressings were removed and the skin wiped to remove residue of test material. The animals received one application each week for 3 weeks. The same application site was used each time. 2 weeks following the third application a challenge dose (0.4 ml of a 25% mixture in paraffin oil) was applied in the same manner as the sensitizing doses. A previously untreated site was used for the challenge application. The application sites for sensitizing and challenge doses were read for erythema and edema 24 and 48 hours after patch removal. To assist in the reading of the response to the final challenge dose the test site was depilated 3 hours prior to reading by using a commercially available depilatory cream. Positive control (2,4-dinitrochlorobenzene, as a 0.3% w/v solution in 80% aqueous ethanol), vehicle control (paraffin oil) and naive control groups were included in this study and the procedure for these was the same as for the test groups.

Test Results - Skin Sensitization

Measurement Period and Units:	
Percent Sensitized Test Substance:	
Percent Sensitized Positive Control:	
Percent Sensitized Negative Control:	
Sensitization Score:	
Results Remarks:	No skin reactions were observed following the application of the challenge dose in either the naive controls or the group that had been exposed to test material. Scores of 0.2, 0.3 and 0.5 for erythema were recorded for the paraffin oil controls. In contrast all positive control animals developed a skin response following the challenge procedure.
Interpretation of Results:	Not Sensitizing
Conclusion:	

Reliability/Data Quality - Skin Sensitization

Reliability:	1 - Valid Without Restrictions
Reliability Remarks:	
Key Study Sponsor Indicator:	

Reference - Skin Sensitization

Reference:	American Petroleum Institute (1986) Acute oral toxicity study in rats, acute dermal toxicity study in rabbits, primary dermal irritation study in rabbits, primary eye irritation study in rabbits, dermal sensitization study in guinea pigs. Study conducted by Hazleton Laboratories Inc. Health and Environmental Sciences Dept. Publ. No 33-32722 Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

Skin Sensitization

Test Substance - Skin Sensitization

Category Chemical:	(64741-66-8) Naphtha, petroleum, light alkylate
Test Substance:	(64741-66-8) Naphtha, petroleum, light alkylate
Test Substance Purity/Composition and Other Test Substance Comments:	Sample API 83-19 is a Light Alkylate Naphtha (LAN)
Category Chemical Result Type:	Measured

Method - Skin Sensitization

Test Type:	
Study Type:	Buehler Test
Species:	Guinea pig
Mammalian Strain:	
Route of Induction:	Epicutaneous, Occlusive
Route of Challenage Exposure:	Epicutaneous, Occlusive
Gender:	Both M/F
Number of Animals per Dose:	20
Concentration:	1st: Induction 50 % occlusive epicutaneous 2nd Challenge 25 % occlusive epicutaneous
Year Study Performed:	1986
Method/Guideline Followed:	
GLP:	Yes
Exposure Period:	6 Hours
Induction Frequency of Treatment:	
Challenge Exposure Period:	6 Hours
Challenge Frequency of Treatment:	
Total Volume applied and Units:	
Control Group Type:	
Vehicle Used:	
Vehicle Name:	
Vehicle Amount and Units:	
Positive Control Substance:	2,4-dinitrochlorobenzene
Post-Exposure Period:	

Negative Control Substance:	Paraffin oil
Method/Guideline and Test Condition Remarks:	0.4 ml of a 50% mixture of test material and paraffin oil was applied under an occlusive dressing to the shorn skin of 10 male and 10 female animals. 6 hours after application the dressings were removed and the skin wiped to remove residues of test material. The animals received one application each week for 3 weeks. The same application site was used each time 2 weeks following the third application a challenge dose (0.4 ml of a 25% mixture in paraffin oil) was applied in the same manner as the sensitizing doses. A previously untreated site was used for the challenge application. The application sites for sensitizing and challenge doses were read for erythema and edema 24 and 48 hours after patch removal. To assist in the reading of the response to the final challenge dose the test site was depilated 3 hours prior to reading by using a commercially available depilatory cream Positive control (2,4-dinitrochlorobenzene), vehicle control and naive control groups were included in this study and the procedure for these was the same as for the test groups.

Test Results - Skin Sensitization

Measurement Period and Units:	
Percent Sensitized Test Substance:	
Percent Sensitized Positive Control:	
Percent Sensitized Negative Control:	
Sensitization Score:	
Results Remarks:	At challenge, a very slight erythema was exhibited by one animal The other 9 animals had no response. In contrast all 20 of the positive controls responded with reactions ranging from slight to severe irritation. Only one naive control exhibited a very slight erythema upon challenge.
Interpretation of Results:	Not Sensitizing
Conclusion:	

Reliability/Data Quality - Skin Sensitization

Reliability:	1 - Valid Without Restrictions
Reliability Remarks:	
Key Study Sponsor Indicator:	

Reference - Skin Sensitization

Reference:	American Petroleum Institute (1986) Acute oral toxicity study in rats, acute dermal toxicity study in rabbits, primary dermal irritation study in rabbits, primary eye irritation study in rabbits, dermal sensitization study in guinea pigs on API 83-19, Light Alkylate Naphtha (CAS 64741-66-8) Study conducted by Hazleton Laboratories. Health and Environmental Sciences Dept. Report 33-30594 Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS· 10/28/2003

Skin Sensitization

Test Substance - Skin Sensitization

Category Chemical:	(68955-35-1) Naphtha, petroleum, catalytic reformed
Test Substance:	(68955-35-1) Naphtha, petroleum, catalytic reformed
Test Substance Purity/Composition and Other Test Substance Comments:	API 83-05
Category Chemical Result Type:	Measured

Method - Skin Sensitization

Test Type:	
Study Type:	Buehler Test
Species:	Guinea pig
Mammalian Strain:	
Route of Induction:	Epicutaneous, Occlusive
Route of Challenage Exposure:	Epicutaneous, Occlusive
Gender:	
Number of Animals per Dose:	10
Concentration:	0.4 ml
Year Study Performed:	1986
Method/Guideline Followed:	
GLP:	Yes
Exposure Period:	6 Hours
Induction Frequency of Treatment:	
Challenge Exposure Period:	6 Hours
Challenge Frequency of Treatment:	
Total Volume applied and Units:	0 4 ml
Control Group Type:	
Vehicle Used:	Yes
Vehicle Name:	Other
Other Vehicle Name:	Paraffin oil
Vehicle Amount and Units:	0.4 Other
Positive Control Substance:	2,4-dinitrochlorobenzene, as a 0.3% w/v solution in 80% aqueous ethanol

Negative Control Substance:	vehicle control (paraffin oil) and naive control groups
Post-Exposure Period:	48 Hours
Method/Guideline and Test Condition Remarks:	0.4 ml of a 50% mixture of test material and paraffin oil was applied under an occlusive dressing to the shorn skin of 10 male and 10 female animals. 6 hours after application, the dressings were removed and the skin wiped to remove residues of test material The animals received one application each week for 3 weeks. The same application site was used each time. 2 weeks following the third application a challenge dose (0.4 ml of a 25% mixture in paraffin oil) was applied in the same manner as the sensitizing doses. A previously untreated site was used for the challenge application. The application sites for sensitizing and challenge doses were read for erythema and edema 24 and 48 hours after patch removal. To assist in the reading of the response to the final challenge dose, the test site was depilated 3 hours prior to reading by using a commercially available depilatory cream. Positive control (2,4-dinitrochlorobenzene), vehicle control and naive control groups were included in this study and the procedure for these was the same as for the test groups The positive control was used at a concentration of 0.3% in 80% aqueous ethanol for the induction doses and at 0.1% w/v in acetone for the challenge dose.

Test Results - Skin Sensitization

Measurement Period and Units:	
Percent Sensitized Test Substance:	
Percent Sensitized Positive Control:	
Percent Sensitized Negative Control:	
Sensitization Score:	
Results Remarks:	There was no abnormal appearance in any of the animals exposed to the test material during the study. The skin reactions to the challenge dose are summarized as follows: Test material No dermal reactions by any animal Naive control Very slight erythema in 2/20 animals Vehicle control No dermal reactions by any animal Positive control Very slight to moderate irritation by all 20 animals. The reactions of 16 of the animals exceeded the highest reaction observed in the naive positive control animals Naive positive control 10/20 animals exhibited very slight erythema
Interpretation of Results:	
Conclusion:	

Reliability/Data Quality - Skin Sensitization

Reliability:	1 - Valid Without Restrictions
Reliability Remarks:	
Key Study Sponsor Indicator:	

Reference - Skin Sensitization

Reference:	American Petroleum Institute (1986) Dermal sensitization study in guinea pigs, API 83-05, full range catalytically reformed naphtha. Study conducted by Hazleton Laboratories America Inc. API HESD Research Publication 33-30497, January 1986

Carcinogenicity

Test Substance - Carcinogenicity

Category Chemical:	(64741-87-3) Naphtha, petroleum, sweetened
Test Substance:	(64741-87-3) Naphtha, petroleum, sweetened
Test Substance Purity/Composition and Other Test Substance Comments:	API 81-08 was applied undiluted. The solvent control group was treated with toluene. Benzo(a)pyrene was applied at concentrations of 0.01 and 0.05% in toluene.
Category Chemical Result Type:	Measured

Method - Carcinogenicity

Route of Administration:	Dermal
Type of Exposure:	
Species:	Mouse
Mammalian Strain:	C3H
Gender:	Male
Number of Animals per Dose:	
Dose:	50 µl/application
Year Study Performed:	1989
Method/Guideline Followed:	
GLP:	Yes
Exposure Period:	Other
Frequency of Treatment:	twice weekly
Animals at Interim Sacrifice:	
Interim Sacrifice Time:	
Animals at Final Sacrifice:	
Final Sacrifice Time:	
Control Group Type:	Other
Method/Guideline and Test Condition Remarks:	Exposure period: lifetime Control group. Untreated, solvent and positive controls The study summarized here was designed to evaluate the carcinogenicity of 12 different petroleum refinery streams. Only the information relating to the control groups and the group exposed to API 81-08 is included in this summary. 50 µl of undiluted test material was applied twice weekly to the shorn dorsal skin to a group of 47 male mice for 139 weeks. An untreated group of 50 male mice served as untreated controls. A further 50 male mice used as solvent controls received 50 µl of toluene twice weekly for 2 years and BaP at concentrations of 0.01% and 0.05% in toluene was applied twice weekly to a further two groups of 50 male mice. Body weights of the mice were recorded prior to study initiation, weekly for the first 13 weeks of the study and every 4 weeks until termination at 139 weeks. Observations were made daily for morbidity and mortality and any clinical signs of toxicity. All tumors that developed were

recorded and their progression noted.
A gross necropsy was performed on all animals dying during the study or killed at termination Special attention was paid to any dermal and subcutaneous masses. Liver, kidneys, lungs and gonads were weighed for each animal at necropsy and group mean organ weight and organ/body weight ratios were calculated.
The test skin site (including dermal and subcutaneous tumors) and control skin site were examined histopathologically as were any suspected dermal and systemic neoplasms.

Test Results - Carcinogenicity

MTD Indicator:

Neoplastic Effect:

Male Survival Rate:

Female Survival Rate:

Total Survival Rate:

Clinical Observations:

***Carcinogenic* Effect:**

Results Remarks: The body weights of the mice treated with 81-08 did not differ from those of controls throughout the study. No clinical signs of systemic toxicity were observed in animals treated with 81-08. Observations of preputial gland swelling
and penile prolapse increased in all groups with age Penile prolapse occurred in virtually all mice by 2 years

Virtually no dermal lesions were observed in the untreated control group However mice treated with toluene had an average of 100% incidence of mild or moderate desquamation and an average of 10 to 20% incidence of mild irritation and scabbing. The incidence of scabbing increased u to 40% in older mice.

Dermal lesions in mice treated with 0.01% BaP were similar to the toluene controls Although they initially had less irritation than the animals treated with toluene, the incidence of mild irritation increased to approximately 50% after 2 years
To begin with, the mice treated with 0 05% BaP had similar lesions to the toluene controls. However, the incidence of irritation increased to 50 to 100% from weeks 60 to 78.

Dermal lesions in mice treated with 81-08 were very similar to the toluene controls, but with slightly less irritation and scabbing.

Survival of the mice treated with 81-08 was better than that for any of the control groups as shown in the following table
Group Survival % at month
 6 12 18 24 30
Untreated 90 90 86 62 18
Toluene 96 94 76 52 10
BaP 0.01% 100 98 84 38 0
BaP 0.05% 100 86 2 0 0
81-08 98 98 89 56 19

A variety of non-neoplastic lesions other than those at the treated skin site were observed at histopathological examination but these occurred in all groups and were not considered to be treatment related Lesions at the treated skin site are summarized as follows.
Lesion Group
 Solvent Toluene BaP BaP 81-08
 control control 0.01% 0 05%
Dermal inflammation
% affected 0 36 20 24 6
Severity 1.7 1.6 1 6 1.3
Hyperkeratosis
% affected 0 96 90 92 94
Severity 2 2 2 2
Acanthosis
% affected 0 76 80 78 87
Severity 1.8 1.7 1.7 1.9
Epidermal crusting
% affected 2 84 82 86 75
Severity 1 1.8 1.7 2.1 1.9
Dermal pigmentation
% affected 0 78 12 2 87
Severity 1 6 1 1 1 9
Dermal fibrosis
% affected 0 68 54 36 96
Severity 1.6 1.4 1.4 2
Ulceration
% affected 0 18 12 6 0
Severity 1.6 1.7 1 7
Dermal neoplasms
% affected *** 0 8 64 98 6

*
% mice affected
**
Severity on a scale
1 = minimal
2 = mild
3 = moderate
4 = severe
*** % mice with neoplasms

The percent of mice with systemic neoplasms in the control and 81-08 animals was as follows:
Neoplasm Group
 Solvent Toluene BaP BaP 81-08
 control control 0.01% 0.05%
Primary liver neoplasm
Benign 4 2 6 0 4
Malignant 32 20 30 4 23
Primary lung neoplasm
Benign

2 4 2 2 0
Malignant0 0 0 0
0 0
Other neoplasms*
Benign 0 2 0
0 2
Malignant 2 0 0 0 4
Total
neoplasms
 40 28 38 6 33
Group mean
longevity**
 103 100 96 61 108
*Includes
malignant lymphomas that were observed in multiple sites, including treated
skin
** Longevity shown in weeks

The data on dermal neoplasms that
developed during the study are summarized in the following table
Solvent Toluene BaP BaP 81-08
 control control 0.01%
0.05%
% mice developing benign dermal neoplasm
 0
0 0 4 4
% mice developing malignant dermal
neoplasm
 0 8 56 98 2
% mice with multiple
tumors
 0 0 28 60 0
Average
tumors/mouse
 0 08 1 1 82 06
No mice with
metastases
 0 0 6 12 0
Mean latency
(weeks)
 111 86 49 113
Tumorigenic activity

FEN * 43 49 47 46
% **
9 65 100 7
* FEN = No. of animals alive at the time of
appearance of the median tumor plus any mice that died from tumor before that
time OR when median latency is over 60 weeks.
FEN = No of animals alive at
60 weeks plus any mice that died with tumor *before* 60 weeks.
** % of mice
developing tumors = No. developing tumors divided by FENx100

The tumor
data of the 81-08 group were compared using a Chi square test with the data
from the untreated and solvent controls and no significant differences were
found.

Conclusion:

Reliability/Data Quality - Carcinogenicity

Reliability:

Reliability Remarks:

Key Study Sponsor Indicator:

Reference - Carcinogenicity

Reference: American Petroleum Institute (1989) Lifetime dermal carcinogenesis bioassay of refinery streams in C3H/HEJ mice (A)-135R) Study conducted by Primate Research Institute. API HESD Publ No. 36-31364

Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS. 10/28/2003

Carcinogenicity

Test Substance - Carcinogenicity

Category Chemical:	*No CAS Number Provided*
Test Substance:	*No CAS Number Provided*
Test Substance Purity/Composition and Other Test Substance Comments:	API PS-6 gasoline
Category Chemical Result Type:	Measured

Method - Carcinogenicity

Route of Administration:	Inhalation
Type of Exposure:	Vapor
Species:	Rat
Mammalian Strain:	Fischer 344
Gender:	Both M/F
Number of Animals per Dose:	200
Concentration:	50, 275 & 1500 ppm nominal concentration
Year Study Performed:	1984
Method/Guideline Followed:	
GLP:	Yes
Exposure Period:	113 Weeks
Frequency of Treatment:	6 hours/day, 5 days/week
Animals at Interim Sacrifice:	
Interim Sacrifice Time:	
Animals at Final Sacrifice:	
Final Sacrifice Time:	
Control Group Type:	Other
Method/Guideline and Test Condition Remarks:	Method: Similar to NCI guidelines Groups of 100 rats of each sex and 100 mice of each sex were exposed to wholly vaporized gasoline at nominal concentrations of 50, 275 and 1500 ppm. 100 mice and 100 rats of each sex were exposed to air only and served as controls. Whole body exposures were in 16 m3 glass and stainless steel chambers Exposures were for 6 hours a day, 5 days each week for up to 113 weeks. All animals were individually housed and were allowed free access to food and water except during the exposure periods. Any animals that died during the first 10 days of exposure were replaced but thereafter no replacements were made. All animals were observed twice daily, once before and once after the exposure period Animals found moribund were removed from the study and sacrificed. All animals were examined once per month for clinical signs and palpable tissue masses. Body weights were recorded monthly for the first 17 months and bi-weekly thereafter. After approximately 18 and 24 months exposure 7 male and 7 female rats from each dose group were selected and hematological and clinical evaluations were conducted on these. After 3, 6, 12 and 18 months exposure 10 rats and 10 mice of each sex from each dose group were sacrificed and underwent complete post mortem

examinations.
At study termination all surviving animals were sacrificed.
Body weight were recorded and after gross examination a wide range of organs/tissues were removed, weighed and fixed for subsequent histopathological examination.

Test Results - Carcinogenicity

MTD Indicator:

Neoplastic Effect:

Male Survival Rate:

Female Survival Rate:

Total Survival Rate:

Clinical Observations:

Carcinogenic Effect:

Results Remarks: Monitoring of the exposure chamber concentrations established that actual concentrations for the study were. 0, 67, 292 and 2056 ppm.

Results of study in rats
There were very few pharmacotoxic signs that occurred in only a few animals and insufficiently frequently to be considered treatment-related. Mortality rates were also unaffected by exposure to gasoline vapor.
Male rats in the highest dose group had lower body weights than controls from week 5 throughout the study. The difference amounted to 33 g at week 44 and this remained throughout. Females at the highest dose also weighed less than controls. A difference of 30 g had occurred by week 66 and this remained throughout the study.
The few differences in hematological data between controls and several treatment groups were within the normal range for rats of similar age and not considered to be treatment-related.

Similarly, small changes in a few clinical chemical parameters were not considered to be treatment-related.

At gross necropsy at the 3, 6 12 and 18 month sacrifice the only significant macroscopic findings were in the kidneys of the high dose group male rats and these consisted of tan color, foci, mottling, discolored and granular surface. Although the incidence was small it was considered significant in the light of the histopathology findings. Additionally, masses or nodules were observed in mid (3 masses/nodules) and high (5 masses/nodules) dose male kidneys that died between 18 months and study termination. There were no other gross findings.

Microscopic pathology examination revealed an increase in the incidence of renal disease with tubular degeneration and regeneration or cystic dilatation in the mid and high dose males from 3 months onwards At 24 months primary renal neoplasms were observed in the following incidence.

Dose group Neoplasm Males Females
0 ppm
0 0
50 ppm renal carcinoma 1 0
275 ppm renal adenoma
2 0
 renal carcinoma 2 0
 renal sarcoma
1 1
2056 ppm renal carcinoma 6 0
 renal adenoma
1*

* Occured at 18 months
With the exception of one renal sarcoma all other tumors occurred in males.

Results of study in mice
There were no consistent signs of toxicty attributable to treatment and mortality rates were considered to be unaffected by treatment. Growth rates were similar for treated and control groups up until approximately week 70 after which the highest dose group males and females had lower body weights than controls. The difference amounted to approximately 2.3 to 4.4g on a body weight of 35g for males and 2 to 3g on a weight of 33g for females. The investigators considered this reduced body weight to be attributable to treatment. Organ weights were unaffected by treatment
There was an increased incidence of liver nodules and masses in treated females in the high dose group that died on the study from 18 months to termination and which were terminally sacrificed. The incidence is tabulated as follows:
Dose group (ppm)
0 67 292 2056
MALES
Dead on study
plus 18mth group 3/5 2/7 3/14 4/8
Terminal sacrifice
14/46 12/35 13/30 21/46
Total 17/51 14/42 16/44 25/54
FEMALES
Dead on study
plus 18mth group 4/16 4/19 7/20 8/14
Terminal sacrifice 5/41 6/33 8/37 18/42
Total 9/57 10/52 15/57 26/56

There was a possible reduction in the incidence of cystic or enlarged uteri for female mice. The incidences were
0 ppm 38/41
67ppm 26/33
292ppm 19/37
2056ppm 12/42
There were no other treatment-related findings at necropsy.

Microscopic examination of the tissues of animals up to and including the 18 month sacrifice did not reveal any compound-related effects

At 24 months, however, there was an increased incidence of hepatocellular tumors in the high dose group females when compared to controls. The actual incidence of liver tumors is shown in the following table

Dose group (ppm)
 0 67 292 2056
Number examined 57 52 57 56
Hepatocellular adenoma 1 4 4 8
Hepatocellular csarcinoma 7 6 9 20
Animals with hepatocellular
tumors* 8 10 12 27

* Some animals had more than 1 tumor.
No other compound-related lesion were observed

Conclusion:

Reliability/Data Quality - Carcinogenicity

Reliability:

Reliability Remarks:

Key Study Sponsor Indicator:

Reference - Carcinogenicity

Reference:

IRDC (1984) Motor fuel chronic inhalation study. Unleaded gasoline. Amendment to the final report Study sponsored by API IRDC 418-003

Kitchen, D (1984) Neoplastic renal effects of unleaded gasoline in Fischer 344
rats. In: Advances in Modern Environmental Toxicology Volume VII: Renal effects of petroleum hydrocarbons, pages 65-71 Princeton NJ

MacFarland, H. N. (1984) Xenobiotic induced kidney lesions: Hydrocarbons The 90-day and 2-year gasoline studies. In: Advances in Modern Environmental Toxicology Volume VII: Renal effects of petroleum hydrocarbons, pages 51-57
Princeton NJ.

Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS. 10/28/2003

Carcinogenicity

Test Substance - Carcinogenicity

Category Chemical:	*No CAS Number Provided*
Test Substance:	*No CAS Number Provided*
Test Substance Purity/Composition and Other Test Substance Comments:	API PS-6 gasoline
Category Chemical Result Type:	Measured

Method - Carcinogenicity

Route of Administration:	Inhalation
Type of Exposure:	Vapor
Species:	Mouse
Mammalian Strain:	B6C3F1
Gender:	Both M/F
Number of Animals per Dose:	200
Concentration:	50, 275 & 1500 ppm nominal concentration
Year Study Performed:	1984
Method/Guideline Followed:	
GLP:	Yes
Exposure Period:	113 Weeks
Frequency of Treatment:	6 hours/day, 5 days/week
Animals at Interim Sacrifice:	
Interim Sacrifice Time:	
Animals at Final Sacrifice:	
Final Sacrifice Time:	
Control Group Type:	Other
Method/Guideline and Test Condition Remarks:	Method. Similar to NCI guidelines Groups of 100 rats of each sex and 100 mice of each sex were exposed to wholly vaporized gasoline at nominal concentrations of 50, 275 and 1500 ppm. 100 mice and 100 rats of each sex were exposed to air only and served as controls. Whole body exposures were in 16 m3 glass and stainless steel chambers. Exposures were for 6 hours a day, 5 days each week for up to 113 weeks All animals were individually housed and were allowed free access to food and water except during the exposure periods. Any animals that died during the first 10 days of exposure were replaced but thereafter no replacements were made. All animals were observed twice daily, once before and once after the exposure period. Animals found moribund were removed from the study and sacrificed. All animals were examined once per month for clinical signs and palpable tissue masses. Body weights were recorded monthly for the first 17 months and bi-weekly thereafter. After approximately 18 and 24 months exposure 7 male and 7 female rats from each dose group were selected and hematological and clinical evaluations were conducted on these. After 3, 6, 12 and 18 months exposure 10 rats and 10 mice of each sex from each dose group were sacrificed and underwent complete post mortem

examinations
At study termination all surviving animals were sacrificed.
Body weight were recorded and after gross examination a wide range of organs/tissues were removed, weighed and fixed for subsequent histopathological examination

Test Results - Carcinogenicity

MTD Indicator:

Neoplastic Effect:

Male Survival Rate:

Female Survival Rate:

Total Survival Rate:

Clinical Observations:

Carcinogenic Effect:

Results Remarks: Monitoring of the exposure chamber concentrations established that actual concentrations for the study were: 0, 67, 292 and 2056 ppm

Results of study in rats
There were very few pharmacotoxic signs that occurred in only a few animals and insufficiently frequently to be considered treatment-related. Mortality rates were also unaffected by exposure to gasoline vapor. Male rats in the highest dose group had lower body weights than controls from week 5 throughout the study The difference amounted to 33 g at week 44 and this remained throughout Females at the highest dose also weighed less than controls. A difference of 30 g had occurred by week 66 and this remained throughout the study The few differences in hematological data between controls and several treatment groups were within the normal range for rats of similar age and not considered to be treatment-related.

Similarly, small changes in a few clinical chemical parameters were not considered to be treatment-related

At gross necropsy at the 3, 6 12 and 18 month sacrifice the only significant macroscopic findings were in the kidneys of the high dose group male rats and these consisted of tan color, foci, mottling, discolored and granular surface Although the incidence was small it was considered significant in the light of the histopathology findings. Additionally, masses or nodules were observed in mid (3 masses/nodules) and high (5 masses/nodules) dose male kidneys that died between 18 months and study termination. There were no other gross findings.

Microscopic pathology examination revealed an increase in the incidence of renal disease with tubular degeneration and regeneration or cystic dilatation in the mid and high dose males from 3 months onwards. At 24 months primary renal neoplasms were observed in the following incidence:

Dose group Neoplasm Males Females
0 ppm
0 0
50 ppm renal carcinoma 1 0
275 ppm renal adenoma
2 0
 renal carcinoma 2 0
 renal sarcoma
1 1
2056 ppm renal carcinoma 6 0
 renal adenoma
1*

* Occured at 18 months
With the exception of one renal sarcoma all other tumors occurred in males.

Results of study in mice
There were no consistent signs of toxicty attributable to treatment and mortality rates were considered to be unaffected by treatment. Growth rates were similar for treated and control groups up until approximately week 70 after which the highest dose group males and females had lower body weights than controls The difference amounted to approximately 2.3 to 4.4g on a body weight of 35g for males and 2 to 3g on a weight of 33g for females. The investigators considered this reduced body weight to be attributable to treatment Organ weights were unaffected by treatment. There was an increased incidence of liver nodules and masses in treated females in the high dose group that died on the study from 18 months to termination and which were terminally sacrificed. The incidence is tabulated as follows:
Dose group (ppm)
 0 67 292 2056
MALES
Dead on study
plus 18mth group 3/5 2/7 3/14 4/8
Terminal sacrifice
14/46 12/35 13/30 21/46
Total 17/51 14/42 16/44 25/54
FEMALES
Dead on study
plus 18mth group 4/16 4/19 7/20 8/14
Terminal sacrifice 5/41 6/33 8/37 18/42
Total 9/57 10/52 15/57 26/56

There was a possible reduction in the incidence of cystic or enlarged uteri for female mice. The incidences were
0 ppm 38/41
67ppm 26/33
292ppm 19/37
2056ppm 12/42
There were no other treatment-related findings at necropsy.

Microscopic examination of the tissues of animals up to and including the 18 month sacrifice did not reveal any compound-related effects.
At 24 months, however, there was an increased incidence of hepatocellular tumors in the high dose group females when compared to controls The actual incidence of liver tumors is shown in the following table.

Dose group (ppm)
 0 67 292 2056
Number examined 57 52 57 56
Hepatocellular adenoma
1 4 4 8
Hepatocellular csarcinoma 7 6 9 20
Animals with hepatocellular
tumors* 8 10 12 27

* Some animals had more than 1 tumor
No other compound-related lesion were observed

Conclusion:

Reliability/Data Quality - Carcinogenicity

Reliability:

Reliability Remarks:

Key Study Sponsor Indicator:

Reference - Carcinogenicity

Reference: IRDC (1984) Motor fuel chronic inhalation study. Unleaded gasoline. Amendment to the final report Study sponsored by API IRDC 418-003.

Kitchen, D (1984) Neoplastic renal effects of unleaded gasoline in Fischer 344
rats In: Advances in Modern Environmental Toxicology Volume VII: Renal effects of petroleum hydrocarbons, pages 65-71 Princeton NJ

MacFarland, H. N. (1984) Xenobiotic induced kidney lesions. Hydrocarbons. The 90-day and 2-year gasoline studies. In. Advances in Modern Environmental Toxicology Volume VII: Renal effects of petroleum hydrocarbons, pages 51-57
Princeton NJ.

Posting dates of documents from HPV Challenge web site from which data have been entered into the HPVIS: 10/28/2003

High Production Volume Information System (HPVIS)

Carcinogenicity/Chronic Toxicity: Skin Painting -	
Test Substance – Skin Painting	
Category Chemical:	None
Test Substance:	None
Test Substance Purity/Composition and Other Test Substance Comments:	Unleaded PS-6 gasoline (API 81-24) API gravity 60.6; Analysis by ASTM D1319; 65.5% Saturates, 8.4% olefins, 26.1% aromatics, benzene content 1.7%
Category Chemical Result Type:	measured
Method – Skin Painting	
Route of Administration:	Dermal
Type of Exposure:	Skin of clipped intrascapular region of back
Species:	Mouse
Mammalian Strain:	C_3H/HeJ
Gender:	Males
Number of Animals per Dose:	50
Dose:	50ul/application
Year Study Performed:	1989
Method/Guideline Followed:	None; standard skin painting procedure
GLP:	yes
Exposure Period:	Lifetime
Frequency of Treatment:	Twice weekly
Post-Exposure Period:	none
Method/Guideline and Test Condition Remarks:	The study summarized here was designed to evaluate the carcinogenicity of 12 different petroleum refinery streams administered for the lifetimes of male mice. Only the information relating to the control groups and the group exposed to API 81-24 is included in this summary. Undiluted test material (50 µl) was applied twice weekly to the skin of clipped intrascapular region of the back of a group of 50 male mice for 131 weeks. A

	group of 50 male mice served as untreated controls. A further 50 male mice used as solvent controls received 50 µl of toluene twice weekly for 2 years and BaP at concentrations of 0.01% and 0.05% in toluene was applied twice weekly to an additional two groups of 50 male mice. Body weights were recorded prior to study initiation, weekly for the first 13 weeks of the study and every 4 weeks until termination at 139 weeks. Observations were made daily for morbidity and mortality and any clinical signs of toxicity. Detailed clinical observations and tumor incidence and progression data were recorded weekly. A gross necropsy was performed on all animals dying during the study or killed when sacrificed moribund. No mice in any treatment group survived past 139 weeks. Special attention was paid to any dermal and subcutaneous masses. Liver, kidneys, lungs and gonads were weighed for each animal at necropsy and group mean organ weight and organ/body weight ratios were calculated. The test skin site (including dermal and subcutaneous tumors) and control skin site were examined histopathologically as were any suspected dermal and systemic neoplasms.

Test Results – Skin Painting

Concentration (LOAEL/LOAEC/ NOAEL/NOAEC):	LOAEL/LOAEC/ NOAEL/NOAEC	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units
	NOAEL	male	=	50		µl

Results Remarks:	The body weights of the mice treated with 81-24 did not differ from those of controls throughout the study. No clinical signs of systemic toxicity were observed in animals treated with 81-24. Observations of preputial gland swelling and penile prolapse increased in all groups with age. Penile prolapse occurred in virtually all mice by 2 years. Dermatotoxicity at the dosing site was observed in all groups of mice except untreated controls. The lesions were characterized primarily by dryness and flaking of the epidermis associated with some inflammation in more severe cases. Mice treated with toluene had an average of 100% incidence of mild or moderate desquamation and an average of 10 to 20% incidence of mild irritation and scabbing. The incidence of scabbing increased up to 40% in older mice. Dermatotoxicity in mice treated with 0.01% BaP were similar to the toluene controls. Although they initially had less irritation than the animals treated with toluene, the incidence of mild irritation increased to approximately 50% after 2 years. Mice treated with 0.05% BaP initially had similar lesions to the toluene controls. However, the incidence of

irritation increased to 50 to 100% from weeks 60 to 78. Mice treated with 81-24 were slightly less severely affected than toluene controls> Less scabbing and irritation were seen. Survival of mice treated with 81-24 was less than untreated controls at 30 weeks as shown in the following table. Only 2 mice survived to week 131. However group mean longevity was 104 weeks compared to 103 weeks in untreated controls.

Group	**Survival % at month**				
	6	**12**	**18**	**24**	**30**
Untreated	90	90	86	62	18
Toluene	96	94	76	52	10
BaP 0.01%	100	98	84	38	0
BaP 0.05%	100	86	2	0	0
81-24	**96**	**96**	**88**	**56**	**6**

A variety of non-neoplastic lesions other than those at the treated skin site were observed at histo-pathological examination but these occurred in all groups and were not considered to be treatment related.
Dermal histopathology findings at the treated skin site are summarized below.

Lesion	**Test Group**				
	Untreated control	**Toluene control**	**BaP 0.01%**	**BaP 0.05%**	**81-24**
Dermal inflammation					
% affected*	0	36	20	24	4
Severity**		1.7	1.6	1.6	2.5
Hyperkeratosis					
% affected	0	96	90	92	96
Severity		2	2	2	1.8
Acanthosis					
% affected	0	76	80	78	100
Severity		1.8	1.7	1.7	2.0
Epidermal crusting					
% affected	2	84	82	86	80
Severity	1	1.8	1.7	2.1	2.1
Dermal pigmentation					
% affected	0	78	12	2	86
Severity		1.6	1	1	2.6
Dermal fibrosis					
% affected	0	68	54	36	100
Severity		1.6	1.4	1.4	2.9
Ulceration					
% affected	0	18	12	6	6
Severity		1.6	1.7	1.7	2.0
Dermal neoplasms					
% affected	0	8	64	98	4

* % mice affected
** Severity on a scale: 1 = minimal; 2 = mild
3 = moderate; 4 = severe

API 81-24 induced skin lesions comparable to toluene and B(a)P controls but the incidence of neoplasms was very low, less than that seen with toluene solvent control.

The percent of mice with systemic neoplasms in the control and 81-24 animals was as follows:

Neoplasm	Test Group				
	Solvent control	Toluene control	BaP 0.01%	BaP 0.05%	81-24
Primary liver					
Benign	4	2	6	0	2
Malignant	32	20	30	4	36
Primary lung					
Benign	2	4	2	2	2
Malignant	0	0	0	0	0
Other neoplasms*					
Benign	0	2	0	0	2
Malignant	2	0	0	0	4
Total neoplasms*	40	28	38	6	46
Group mean longevity**	103	100	96	61	104

* Includes malignant lymphomas that were observed in multiple sites, including treated skin
**Longevity shown in weeks

Malignant liver tumors were seen in all mice with a fairly high incidence in untreated controls [>30%] and appeared related to longevity. The incidence of other malignancies was low in all groups.

The data on dermal neoplasms observed for control groups and 81-24 are shown below:

	Solvent control	Toluene control	BaP 0.01%	BaP 0.05%	81-24
% mice developing benign dermal neoplasm	0	0	0	4	0
% mice developing malignant dermal neoplasm	0	8	56	98	4
% mice with multiple tumors	0	0	28	60	0
Average tumors/mouse[a]	0	.08	1.0	1.82	0.04
No. mice with metastases	0	0	6	12	0
Mean latency (weeks) [b]	0	111	86	49	123
Tumorigenic activity					
FEN [c]	0	43	49	47	48
% [d]	0	9	65	100	4

	a- Total number of tumors in group divided by total number of mice in group. b- Time in weeks from initiation of dosing to appearance of first tumor. Includes only mice developing tumors. c-FEN = No. of animals alive at the time of appearance of the median tumor plus any mice that died from tumor before that time [applies to 0.05% B(a)P] OR when median latency is over 60 weeks [applies to toluene, 0.01% B(a)P and 81-03], the FEN = No. of animals alive at 60 weeks plus any mice that died with tumor before 60 weeks. d- Number of mice developing tumors divided by FEN x100 Benign tumors included papillomas, fibromas, and hemangeomas. The most commonly observed metastatic skin neoplasms in toluene controls and all treated groups were squamous cell carcinomas and fibrosarcomas. The skin tumor data of the 81-24 group were compared using the Chi square test with data from untreated and toluene solvent controls. API 81-24 administered undiluted, did not induce a significant incidence of skin tumors.
Conclusion:	API 81-24 is not a dermal carcinogen.
Reliability/Data Quality - Skin Painting	
Reliability:	1 - valid without restrictions
Reliability Remarks:	
Key Study Sponsor Indicator:	Not a key study
Reference - Skin Painting	
Reference:	American Petroleum Institute (1989). Lifetime dermal carcinogenesis/chronic toxicity screening bioassay of refinery streams in C_3H/HeJ mice (AP-135R). Primate Research Institute, New Mexico State University, Holloman AFB, NM. API HESD Publ. No. 36-31364.

High Production Volume Information System (HPVIS)

Carcinogenicity/Chronic Toxicity: Skin Painting -	
Test Substance – Skin Painting	
Category Chemical:	CAS # 64741-83-9
Test Substance:	CAS # 64741-83-9
Test Substance Purity/Composition and Other Test Substance Comments:	Heavy Thermal Cracked Naphtha (API 84-02) API gravity 46.7; 53% Saturates, 27.0% olefins, 20.0% aromatics
Category Chemical Result Type:	measured
Method – Skin Painting	
Route of Administration:	Dermal
Type of Exposure:	Skin of clipped intrascapular region of back
Species:	Mouse
Mammalian Strain:	C_3H/HeJ
Gender:	Males
Number of Animals per Dose:	50
Dose:	50ul/application
Year Study Performed:	1989
Method/Guideline Followed:	None; standard skin painting procedure
GLP:	yes
Exposure Period:	104 weeks
Frequency of Treatment:	Twice weekly
Post-Exposure Period:	none
Method/Guideline and Test Condition Remarks:	The study summarized here was designed to evaluate the carcinogenicity of 11 different petroleum refinery streams administered for 104 week to male mice. Only the information relating to the control groups and the group exposed to API 84-02 is included in this summary. Undiluted test material (50 µl) was applied twice weekly to the skin of clipped intrascapular region of the backs of a group of 50 male mice for 104 weeks. A group of 50 male mice served as untreated controls. A

	further 50 male mice used as solvent controls received 50 µl of toluene twice weekly for 2 years and BaP at concentrations of 0.01% and 0.05% in toluene was applied twice weekly to an additional two groups of 50 male mice. Body weights were recorded prior to study initiation, weekly for the first 13 weeks of the study and every 4 weeks until termination at 104 weeks. Observations were made daily for morbidity and mortality and any clinical signs of toxicity. Detailed clinical observations and tumor incidence and progression data were recorded weekly. A gross necropsy was performed on all animals dying during the study, sacrificed moribund or killed at study termination at 104 weeks. Special attention was paid to any dermal and subcutaneous masses. Liver, kidneys, lungs and gonads were weighed for each animal at necropsy and group mean organ weight and organ/body weight ratios were calculated. The test skin site (including dermal and subcutaneous tumors) and control skin site were examined histopathologically as were any suspected dermal and systemic neoplasms.

Test Results – Skin Painting

Concentration (LOAEL/LOAEC/ NOAEL/NOAEC):	LOAEL/LOAEC/ NOAEL/NOAEC	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units
	LOAEL	male	=	50		µl

Results Remarks:	The body weights of the mice treated with 84-02 did not differ from those of controls throughout the study. No clinical signs of systemic toxicity were observed in animals treated with 84-02. Observations of preputial gland swelling and penile prolapse increased in all groups with age. Penile prolapse occurred in virtually all mice by 2 years. Dermatotoxicity at the dosing site was observed in all groups of mice except untreated controls. The lesions were characterized primarily by mild to moderate desquamation, alopecia or irritation and mild scabbing. Mice treated with toluene had an average of 80- 100% incidence of mild desquamation. Alopecia, irritation and scabbing were sporatic and of low incidence [2-20%]. Dermatotoxicity in mice treated with 0.01% BaP were similar to the toluene controls. Abdominal distention and head tilt was observed in 5-30% of these mice from weeks 85 to 104 but was not observed in mice treated with 0.05% BaP. Mice treated with 0.05% BaP initially had similar lesions to the toluene controls. However, the incidence of irritation increased to 75 to 100% from weeks 62 to 85. No systemic toxicity was seen. Mice treated with 84-02 were more severely affected than toluene controls. Incidence of desquamation increased to 100%, irritation to 50% and

alopecia to 75% between weeks 30 and 104. By 18 months on test, all groups had decreased survivability compared to untreated controls. Survival of mice treated with 84-02 was less than negative controls at 18 and 24 months as shown in the following table. Twelve mice survived to week 104. However group mean longevity was 84 weeks compared to 97 weeks in untreated controls and 87 weeks in toluene controls.

Group	**Survival % at month**			
	6	**12**	**18**	**24**
Untreated	100	100	96	52
Toluene	96	94	80	30
BaP 0.01%	92	92	78	14
BaP 0.05%	96	66	6	0
84-02	**94**	**94**	**70**	**24**

A variety of non-neoplastic lesions other than those at the treated skin site were observed at histo-pathological examination but these occurred in all groups and were not considered to be treatment related.
Dermal histopathology findings at the treated skin site are summarized below.

Lesion	**Test Group**				
	Untreated control	**Toluene control**	**BaP 0.01%**	**BaP 0.05%**	**84-02**
Dermal inflammation					
% affected*	2	24	18	16	56
Severity**	2.0	1.3	1.7	1.2	1.3
Hyperkeratosis					
% affected	2	98	100	100	82
Severity	1.0	1.8	1.9	1.8	1.8
Acanthosis					
% affected	-	92	96	82	100
Severity		1.3	1.6	1.8	2.0
Epidermal crusting					
% affected	-	94	96	94	98
Severity		1.9	1.8	1.7	2.2
Dermal pigmentation					
% affected	-	50	12	-	84
Severity		1.5	1.2		2.0
Dermal fibrosis					
% affected	-	84	82	78	92
Severity		1.7	1.6	1.5	1.8
Ulceration					
% affected	-	-	-	-	10
Severity					2.2
Dermal neoplasms					
% affected	0	0	52	100	12

* % mice affected
** Severity on a scale: 1 = minimal; 2 = mild
3 = moderate; 4 = severe

API 84-02 induced skin lesions more severe than toluene and BaP controls but the incidence of neoplasms was low.

The percent of mice with systemic neoplasms in the control and 84-02 animals was as follows:

Neoplasm	Test Group				
	Solvent control	Toluene control	BaP 0.01%	BaP 0.05%	84-02
Primary liver					
Benign	8	8	14	2	0
Malignant	24	20	12	2	12
Primary lung					
Benign	2	0	0	2	0
Malignant	0	0	0	0	0
Other neoplasms[a]					
Benign	0	0	0	0	0
Malignant	4	6	2	0	0
Total neoplasms	38	34	28	6	12
Group mean longevity[b]	97	87	84	57	84

a Includes malignant lymphomas that were observed in multiple sites, including treated skin
b Longevity shown in weeks

Malignant liver tumors were seen in all mice with a fairly high incidence in untreated controls [24%] and appeared related to longevity. The incidence of other malignancies was low in all groups.

The data on dermal neoplasms observed for control groups and 84-02 are shown below:

	Solvent control	Toluene control	BaP 0.01%	BaP 0.05%	84-02
% mice developing benign dermal neoplasm	0	0	24	6	6
% mice developing malignant dermal neoplasm	0	0	28	94	6
% mice with multiple tumors	0	0	-	-	0
Average tumors/mouse[a]	0	0	-	-	0.12
No. mice with metastases	0	0	-	-	0
Mean latency (weeks) [b]	0	0	-	-	88
Tumorigenic activity					
FEN [c]	0	0	-	-	45
% [d]	0	0	-	100	13.3

a- Total number of tumors in group divided by total number

	of mice in group. b- Time in weeks from initiation of dosing to appearance of first tumor. Includes only mice developing tumors. c-FEN = No. of animals alive at the time of appearance of the median tumor plus any mice that died from tumor before that time OR when median latency is over 60 weeks, the FEN = No. of animals alive at 60 weeks plus any mice that died with a tumor before 60 weeks. d- Number of mice developing tumors divided by FEN x100 Benign tumors included papillomas, fibromas, and hemangeomas. The most commonly observed metastatic skin neoplasms in toluene controls and all treated groups were squamous cell carcinomas and fibrosarcomas. The skin tumor data of the 84-02 group were compared using the Chi square test with data from untreated and toluene solvent controls. API 84-02 administered undiluted, was identified as a weak dermal carcinogen under conditions of this study.
Conclusion:	API 84-02 is a weak dermal carcinogen.
Reliability/Data Quality - Skin Painting	
Reliability:	**2.** - valid with restrictions.
Reliability Remarks:	Incorrect Table 6. Dermal Neoplasms: Summary. Available test data and report text are accurate; Some neoplasm summary data above from other sources.
Key Study Sponsor Indicator:	Not a key study
Reference - Skin Painting	
Reference:	American Petroleum Institute (1989). Twenty-four month dermal carcinogenesis/chronic toxicity screening bioassay of refinery streams in C_3H/HeJ mice (API-190r). Primate Research Institute, New Mexico State University, Holloman AFB, NM. API HESD Publ. No. 36-36-33220.

High Production Volume Information System (HPVIS)

Carcinogenicity/Chronic Toxicity: Skin Painting -	
Test Substance – Skin Painting	
Category Chemical:	CAS #64741-55-5
Test Substance:	CAS #64741-55-5
Test Substance Purity/Composition and Other Test Substance Comments:	Light Catalytic cracked naphtha (API81-03) API gravity 69.8; 43.8% paraffins, 39.7% olefins, 10.0% naphthenes, 6.5% aromatics
Category Chemical Result Type:	measured
Method – Skin Painting	
Route of Administration:	Dermal
Type of Exposure:	Skin of clipped intrascapular region of back
Species:	Mouse
Mammalian Strain:	C_3H/HeJ
Gender:	Males
Number of Animals per Dose:	50
Dose:	50ul/application
Year Study Performed:	1989
Method/Guideline Followed:	None; standard skin painting procedure
GLP:	yes
Exposure Period:	Lifetime
Frequency of Treatment:	Twice weekly
Post-Exposure Period:	none
Method/Guideline and Test Condition Remarks:	The study summarized here was designed to evaluate the carcinogenicity of 12 different petroleum refinery streams administered for the lifetimes of male mice. Only the information relating to the control groups and the group exposed to API 81-03 is included in this summary. Undiluted test material (50 µl) was applied twice weekly to skin of the clipped intrascapular region of the back of a group of 50 male mice for 139 weeks. A

	group of 50 male mice served as untreated controls. A further 50 male mice used as solvent controls received 50 µl of toluene twice weekly for 2 years and BaP at concentrations of 0.01% and 0.05% in toluene was applied twice weekly to a additional two groups of 50 male mice. Body weights were recorded prior to study initiation, weekly for the first 13 weeks of the study and every 4 weeks until termination at 139 weeks. Observations were made daily for morbidity and mortality and any clinical signs of toxicity. Detailed clinical observations and tumor incidence and progression data were recorded weekly. A gross necropsy was performed on all animals dying during the study or killed when moribund. No mice in any group survived past 139 weeks. Special attention was paid to any dermal and subcutaneous masses. Liver, kidneys, lungs and gonads were weighed for each animal at necropsy and group mean organ weight and organ/body weight ratios were calculated. The test skin site (including dermal and subcutaneous tumors) and control skin site were examined histopathologically as were any suspected dermal and systemic neoplasms.

Test Results – Skin Painting

Concentration (LOAEL/LOAEC/ NOAEL/NOAEC):	LOAEL/LOAEC/ NOAEL/NOAEC	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units
	LOAEL	male	=	50		µl
	NOAEL	male	=	none		

Results Remarks:	The body weights of the mice treated with 81-03 did not differ from those of controls throughout the study. No clinical signs of systemic toxicity were observed in animals treated with 81-03. Observations of preputial gland swelling and penile prolapse increased in all groups with age. Penile prolapse occurred in virtually all mice by 2 years. Dermatotoxicity at the dosing site was observed in all groups of mice except untreated controls. The lesions were characterized primarily by dryness and flaking of the epidermis associated with some inflammation in more severe cases. Mice treated with toluene had an average of 100% incidence of mild or moderate desquamation and an average of 10 to 20% incidence of mild irritation and scabbing. The incidence of scabbing increased up to 40% in older mice. Dermatotoxicity in mice treated with 0.01% BaP were similar to the toluene controls. Although they initially had less irritation than the animals treated with toluene, the incidence of mild irritation increased to approximately 50% after 2 years. Mice treated with 0.05% BaP initially had similar lesions to the toluene controls. However, the incidence of irritation increased to 50 to 100% from weeks 60 to

78. Dermal lesions in mice treated with 81-03 were very similar to the toluene controls, but with slightly less irritation and scabbing. Survival of mice treated with 81-03 was comparable to untreated controls at 30 weeks as shown in the following table. One mouse survived to the end of the study at 139 weeks. Group mean longevity was 107 weeks compared to 103 weeks in untreated controls.

Group	**Survival % at month**				
	6	**12**	**18**	**24**	**30**
Untreated	90	90	86	62	18
Toluene	96	94	76	52	10
BaP 0.01%	100	98	84	38	0
BaP 0.05%	100	86	2	0	0
81-03	**98**	**94**	**88**	**62**	**18**

A variety of non-neoplastic lesions other than those at the treated skin site were observed at histopathological examination but these occurred in all groups and were not considered to be treatment related.
Dermal histopathology findings at the treated skin site are summarized below.

Lesion	**Test Group**				
	Untreated control	**Toluene control**	**BaP 0.01%**	**BaP 0.05%**	**81-03**
Dermal inflammation					
% affected*	0	36	20	24	12
Severity**		1.7	1.6	1.6	1.8
Hyperkeratosis					
% affected	0	96	90	92	96
Severity		2	2	2	1.9
Acanthosis					
% affected	0	76	80	78	96
Severity		1.8	1.7	1.7	1.9
Epidermal crusting					
% affected	2	84	82	86	92
Severity	1	1.8	1.7	2.1	1.9
Dermal pigmentation					
% affected	0	78	12	2	86
Severity		1.6	1	1	2.2
Dermal fibrosis					
% affected	0	68	54	36	96
Severity		1.6	1.4	1.4	2.0
Ulceration					
% affected	0	18	12	6	6
Severity		1.6	1.7	1.7	2.3
Dermal neoplasms					
% affected	0	8	64	98	14

* % mice affected
** Severity on a scale: 1 = minimal; 2 = mild
3 = moderate; 4 = severe

The percent of mice with systemic neoplasms in the control and 81-08 animals was as follows:

Neoplasm	Test Group				
	Solvent control	Toluene control	BaP 0.01%	BaP 0.05%	81-03
Primary liver					
Benign	4	2	6	0	4
Malignant	32	20	30	4	16
Primary lung					
Benign	2	4	2	2	4
Malignant	0	0	0	0	0
Other neoplasms*					
Benign	0	2	0	0	4
Malignant	2	0	0	0	2
Total neoplasms*	40	28	38	6	30
Group mean longevity**	103	100	96	61	107

* Includes malignant lymphomas that were observed in multiple sites, including treated skin
**Longevity shown in weeks

Malignant liver tumors were seen in all mice with a fairly high incidence in untreated controls [>30%] and appeared related to longevity. The incidence of other malignancies was low in all groups.

The data on dermal neoplasms observed for control groups and 81-03 are shown below:

	Solvent control	Toluene control	BaP 0.01%	BaP 0.05%	81-03
% mice developing benign dermal neoplasm	0	0	0	4	4
% mice developing malignant dermal neoplasm	0	8	56	98	10
% mice with multiple tumors	0	0	28	60	2
Average tumors/mouse[a]	0	.08	1.0	1.82	0.16
No. mice with metastases	0	0	6	12	0
Mean latency (weeks)[b]	0	111	86	49	118
Tumorigenic activity					
FEN [c]	0	43	49	47	47
% [d]	0	9	65	100	15

a- Total number of tumors in group divided by total number of mice in group.
b- Time in weeks from initiation of dosing to appearance of first tumor. Includes only mice developing tumors.

	c-FEN = No. of animals alive at the time of appearance of the median tumor plus any mice that died from tumor before that time [applies to 0.05% B(a)P] OR when median latency is over 60 weeks [applies to toluene, 0.01% B(a)P and 81-03], the FEN = No. of animals alive at 60 weeks plus any mice that died with tumor before 60 weeks. d- Number of mice developing tumors divided by FEN x100 Benign tumors included papillomas, fibromas, and hemangeomas. The most commonly observed metastatic skin neoplasms in toluene controls and all treated groups were squamous cell carcinomas and fibrosarcomas. The skin tumor data of the 81-03 group were compared using the Chi square test with data from untreated and toluene solvent controls. API 81-03 administered undiluted, was a weak dermal carcinogen compared to untreated controls but was not statistically significantly different from toluene. The long latency period [118 weeks] compared to latencies of 49 to 86 weeks for different doses of B(a)P, a known complete carcinogen suggests that light catalytic cracked naphtha may act as a promoter of dermal carcinogenesis rather than as a complete carcinogen.
Conclusion:	API 81 has been identified as a weak dermal carcinogen.
Reliability/Data Quality - Skin Painting	
Reliability:	1 - valid without restrictions
Reliability Remarks:	
Key Study Sponsor Indicator:	Not a key study
Reference - Skin Painting	
Reference:	American Petroleum Institute (1989). Lifetime dermal carcinogenesis/chronic toxicity screening bioassay of refinery streams in C_3H/HeJ mice (API-135r). Primate Research Institute, New Mexico State University, Holloman AFB, NM. API HESD Publ. No. 36-31364.

High Production Volume Information System (HPVIS)

Carcinogenicity/Chronic Toxicity: Skin Painting -	
Test Substance – Skin Painting	
Category Chemical:	CAS # 64741-68-0
Test Substance:	CAS # 64741-68-0
Test Substance Purity/Composition and Other Test Substance Comments:	Heavy Catalytic Reformed Naphtha (API 83-06) API gravity 34.3; 8.7% paraffins, 91.3% aromatics
Category Chemical Result Type:	measured
Method – Skin Painting	
Route of Administration:	Dermal
Type of Exposure:	Skin of clipped intrascapular region of back
Species:	Mouse
Mammalian Strain:	C_3H/HeJ
Gender:	Males
Number of Animals per Dose:	50
Dose:	50ul/application
Year Study Performed:	1989
Method/Guideline Followed:	None; standard skin painting procedure
GLP:	yes
Exposure Period:	104 weeks
Frequency of Treatment:	Twice weekly
Post-Exposure Period:	none
Method/Guideline and Test Condition Remarks:	The study summarized here was designed to evaluate the carcinogenicity of 11 different petroleum refinery streams administered for 104 week to male mice. Only the information relating to the control groups and the group exposed to API 83-06 is included in this summary. Undiluted test material (50 µl) was applied twice weekly to the skin of clipped intrascapular region of the backs of a group of 50 male mice for 104 weeks. A

	group of 50 male mice served as untreated controls. A further 50 male mice used as solvent controls received 50 µl of toluene twice weekly for 2 years and BaP at concentrations of 0.01% and 0.05% in toluene was applied twice weekly to an additional two groups of 50 male mice. Body weights were recorded prior to study initiation, weekly for the first 13 weeks of the study and every 4 weeks until termination at 104 weeks. Observations were made daily for morbidity and mortality and any clinical signs of toxicity. Detailed clinical observations and tumor incidence and progression data were recorded weekly. A gross necropsy was performed on all animals dying during the study, sacrificed moribund or killed at study termination at 104 weeks. Special attention was paid to any dermal and subcutaneous masses. Liver, kidneys, lungs and gonads were weighed for each animal at necropsy and group mean organ weight and organ/body weight ratios were calculated. The test skin site (including dermal and subcutaneous tumors) and control skin site were examined histopathologically as were any suspected dermal and systemic neoplasms.

Test Results – Skin Painting

Concentration (LOAEL/LOAEC/ NOAEL/NOAEC):	LOAEL/LOAEC/ NOAEL/NOAEC	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units
	NOAEL	male	=	50		µl

Results Remarks:	The body weights of the mice treated with 83-06 did not differ from those of controls throughout the study. No clinical signs of systemic toxicity were observed in animals treated with 83-06. Observations of preputial gland swelling and penile prolapse increased in all groups with age. Penile prolapse occurred in virtually all mice by 2 years. Dermatotoxicity at the dosing site was observed in all groups of mice except untreated controls. The lesions were characterized primarily by mild to moderate desquamation, alopecia or irritation and mild scabbing. Mice treated with toluene had an average of 80- 100% incidence of mild desquamation. Alopecia, irritation and scabbing were sporatic and of low incidence [2-20%]. Dermatotoxicity in mice treated with 0.01% BaP were similar to the toluene controls. Abdominal distention and head tilt was observed in 5-30% of these mice from weeks 85 to 104 but was not observed in mice treated with 0.05% BaP. Mice treated with 0.05% BaP initially had similar lesions to the toluene controls. However, the incidence of irritation increased to 75 to 100% from weeks 62 to 85. No systemic toxicity was seen. Mice treated with 83-06 were slightly more severely affected than toluene

controls. Incidence of desquamation increased to 100%, and alopecia to 75% between weeks 30 and 104. Incidence of irritation and scabbing were less prominent [5-15%]. By 18 months on test, all groups had decreased survivability compared to untreated controls. Survival of mice treated with 83-06 was less than negative controls at 18 and 24 months but greater than toluene controls as shown in the following table. Eighteen mice survived to week 104. Group mean longevity was 90 weeks compared to 97 weeks in untreated controls and 87 weeks in toluene controls.

Group	**Survival % at month**			
	6	**12**	**18**	**24**
Untreated	100	100	96	52
Toluene	96	94	80	30
BaP 0.01%	92	92	78	14
BaP 0.05%	96	66	6	0
83-06	**100**	**94**	**86**	**36**

A variety of non-neoplastic lesions other than those at the treated skin site were observed at histo-pathological examination but these occurred in all groups and were not considered to be treatment related.
Dermal histopathology findings at the treated skin site are summarized below.

Lesion	**Test Group**				
	Untreated control	**Toluene control**	**BaP 0.01%**	**BaP 0.05%**	**83-06**
Dermal inflammation					
% affected*	2	24	18	16	24
Severity**	2.0	1.3	1.7	1.2	1.2
Hyperkeratosis					
% affected	2	98	100	100	92
Severity	1.0	1.8	1.9	1.8	1.3
Acanthosis					
% affected	-	92	96	82	100
Severity		1.3	1.6	1.8	1.7
Epidermal crusting					
% affected	-	94	96	94	94
Severity		1.9	1.8	1.7	2.0
Dermal pigmentation					
% affected	-	50	12	-	80
Severity		1.5	1.2		1.3
Dermal fibrosis					
% affected	-	84	82	78	100
Severity		1.7	1.6	1.5	2.0
Ulceration					
% affected	-	-	-	-	2

Severity					2.0
Dermal Neoplasms					
% affected	0	0	64	98	0

* % mice affected
** Severity on a scale: 1 = minimal; 2 = mild
3 = moderate; 4 = severe

The percent of mice with systemic neoplasms in the control and 83-06 animals was as follows:

Neoplasm	Test Group				
	Solvent control	Toluene control	BaP 0.01%	BaP 0.05%	83-06
Primary liver					
Benign	8	8	14	2	8
Malignant	24	20	12	2	12
Primary lung					
Benign	2	0	0	2	0
Malignant	0	0	0	0	0
Other neoplasms[a]					
Benign	0	0	0	0	0
Malignant	4	6	2	0	2
Total neoplasms	38	34	28	6	22
Group mean longevity[b]	97	87	84	57	90

a Includes malignant lymphomas that were observed in multiple sites, including treated skin
b Longevity shown in weeks

Malignant liver tumors were seen in all mice with a fairly high incidence in untreated controls [24%] and appeared related to longevity. The incidence of other malignancies was low in all groups.

The data on dermal neoplasms observed hispathologically for control groups and 83-06 are shown below:

	Solvent control	Toluene control	BaP 0.01%	BaP 0.05%	83-06
% mice developing benign dermal neoplasm	0	0	24	6	0
% mice developing malignant dermal neoplasm	0	0	6	94	0
% mice with multiple tumors	0	0	-	-	0
Average tumors/mouse[a]	0	0	-	-	0
No. mice with metastases	0	0	-	-	0
Mean latency (weeks) [b]	0	0	-	-	0
Tumorigenic activity					
FEN [c]	0	0	-	-	-
% [d]	0	0	-	100	0

	a- Total number of tumors in group divided by total number of mice in group. b- Time in weeks from initiation of dosing to appearance of first tumor. Includes only mice developing tumors. c-FEN = No. of animals alive at the time of appearance of the median tumor plus any mice that died from tumor before that time OR when median latency is over 60 weeks, the FEN = No. of animals alive at 60 weeks plus any mice that died with a tumor before 60 weeks. d- Number of mice developing tumors divided by FEN x 100 Benign tumors included papillomas, fibromas, and hemangeomas. The most commonly observed metastatic skin neoplasms in toluene controls and all treated groups were squamous cell carcinomas and fibrosarcomas. API 83-06 administered undiluted, is not a dermal carcinogen under conditions of this study.
Conclusion:	API 83-06 is not a dermal carcinogen.
Reliability/Data Quality - Skin Painting	
Reliability:	2. - valid with restrictions
Reliability Remarks:	Incorrect Table 6. Dermal Neoplasms: Summary. Available test data and report text are accurate; Some neoplasm summary data above from other sources.
Key Study Sponsor Indicator:	Not a key study
Reference - Skin Painting	
Reference:	American Petroleum Institute (1989). Twenty-four month dermal carcinogenesis/chronic toxicity screening bioassay of refinery streams in C_3H/HeJ mice (API-190r). Primate Research Institute, New Mexico State University, Holloman AFB, NM. API HESD Publ. No. 36-33220.

High Production Volume Information System (HPVIS)

Carcinogenicity/Chronic Toxicity: Skin Painting -	
Test Substance – Skin Painting	
Category Chemical:	CAS # 64741-54-4
Test Substance:	CAS # 64741-54-4
Test Substance Purity/Composition and Other Test Substance Comments:	Heavy Catalytic Cracked Naphtha (API 83-18) API gravity 36.0; 22.8% paraffins, 9.8% olefins, 10.6% naphthenes, 56.6% aromatics
Category Chemical Result Type:	measured
Method – Skin Painting	
Route of Administration:	Dermal
Type of Exposure:	Skin of clipped intrascapular region of back
Species:	Mouse
Mammalian Strain:	C_3H/HeJ
Gender:	Males
Number of Animals per Dose:	50
Dose:	50ul/application
Year Study Performed:	1989
Method/Guideline Followed:	None; standard skin painting procedure
GLP:	yes
Exposure Period:	104 weeks
Frequency of Treatment:	Twice weekly
Post-Exposure Period:	none
Method/Guideline and Test Condition Remarks:	The study summarized here was designed to evaluate the carcinogenicity of 11 different petroleum refinery streams administered for 104 week to male mice. Only the information relating to the control groups and the group exposed to API 83-18 is included in this summary. Undiluted test material (50 µl) was applied twice weekly to the skin of clipped intrascapular region of the backs of a group of 50 male mice for 104 weeks. A

	group of 50 male mice served as untreated controls. A further 50 male mice used as solvent controls received 50 µl of toluene twice weekly for 2 years and BaP at concentrations of 0.01% and 0.05% in toluene was applied twice weekly to an additional two groups of 50 male mice. Body weights were recorded prior to study initiation, weekly for the first 13 weeks of the study and every 4 weeks until termination at 104 weeks. Observations were made daily for morbidity and mortality and any clinical signs of toxicity. Detailed clinical observations and tumor incidence and progression data were recorded weekly. A gross necropsy was performed on all animals dying during the study, sacrificed moribund or killed at study termination at 104 weeks. Special attention was paid to any dermal and subcutaneous masses. Liver, kidneys, lungs and gonads were weighed for each animal at necropsy and group mean organ weight and organ/body weight ratios were calculated. The test skin site (including dermal and subcutaneous tumors) and control skin site were examined histopathologically as were any suspected dermal and systemic neoplasms.

Test Results – Skin Painting

Concentration (LOAEL/LOAEC/ NOAEL/NOAEC):	LOAEL/LOAEC/ NOAEL/NOAEC	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units
	LOAEL	male	=	50		µl

Results Remarks:	The body weights of the mice treated with 83-18 did not differ from those of controls throughout the study. No clinical signs of systemic toxicity were observed in animals treated with 83-18. Observations of preputial gland swelling and penile prolapse increased in all groups with age. Penile prolapse occurred in virtually all mice by 2 years. Dermatotoxicity at the dosing site was observed in all groups of mice except untreated controls. The lesions were characterized primarily by mild to moderate desquamation, alopecia or irritation and mild scabbing. Mice treated with toluene had an average of 80- 100% incidence of mild desquamation. Alopecia, irritation and scabbing were sporatic and of low incidence [2-20%]. Dermatotoxicity in mice treated with 0.01% BaP were similar to the toluene controls. Abdominal distention and head tilt was observed in 5-30% of these mice from weeks 85 to 104 but was not observed in mice treated with 0.05% BaP. Mice treated with 0.05% BaP initially had similar lesions to the toluene controls. However, the incidence of irritation increased to 75 to 100% from weeks 62 to 85. No systemic toxicity was seen. Dermal lesions in mice treated with 83-18 were more severe than toluene

controls. Incidence of mild to moderate desquamation was virtually 100% after week 1. Observations of mild alopecia (90% after week 60), mild irritation (50% after week 60) and mild scabbing (approx. 20% after week 8) were common. By 18 months on test, all groups had decreased survivability compared to untreated controls. Survival of mice treated with 83-18 was less than negative controls at 12, 18 and 24 months but similar to toluene controls as shown in the following table. Seventeen mice survived to week 104. Group mean longevity was 89 weeks compared to 97 weeks in untreated controls and 87 weeks in toluene controls.

Group	**Survival % at month**			
	6	**12**	**18**	**24**
Untreated	100	100	96	52
Toluene	96	94	80	30
BaP 0.01%	92	92	78	14
BaP 0.05%	96	66	6	0
83-18	**98**	**92**	**78**	**34**

A variety of non-neoplastic lesions other than those at the treated skin site were observed at histo-pathological examination but these occurred in all groups and were not considered to be treatment related.
Dermal histopathology findings at the treated skin site are summarized below.

Lesion	**Test Group**				
	Untreated control	**Toluene control**	**BaP 0.01%**	**BaP 0.05%**	**83-18**
Dermal inflammation					
% affected*	2	24	18	16	68
Severity**	2.0	1.3	1.7	1.2	1.4
Hyperkeratosis					
% affected	2	98	100	100	10
Severity	1.0	1.8	1.9	1.8	1.6
Acanthosis					
% affected	-	92	96	82	98
Severity		1.3	1.6	1.8	2.3
Epidermal crusting					
% affected	-	94	96	94	90
Severity		1.9	1.8	1.7	2.0
Dermal pigmentation					
% affected	-	50	12	-	94
Severity		1.5	1.2		1.8
Dermal fibrosis					
% affected	-	84	82	78	98
Severity		1.7	1.6	1.5	2.2
Ulceration					

% affected	-	-	-	-	8
Severity					2.2
Dermal Neoplasms					
% affected	0	0	64	98	12

* % mice affected
** Severity on a scale: 1 = minimal; 2 = mild
3 = moderate; 4 = severe

The percent of mice with systemic neoplasms in the control and 83-18 animals was as follows:

Neoplasm	**Test Group**				
	Solvent control	**Toluene control**	**BaP 0.01%**	**BaP 0.05%**	**83-18**
Primary liver					
Benign	8	8	14	2	4
Malignant	24	20	12	2	12
Primary lung					
Benign	2	0	0	2	4
Malignant	0	0	0	0	0
Other neoplasms[a]					
Benign	0	0	0	0	2
Malignant	4	6	2	0	0
Total neoplasms	38	34	28	6	22
Group mean longevity[b]	97	87	84	57	89

a Includes malignant lymphomas that were observed in multiple sites, including treated skin
b Longevity shown in weeks

Malignant liver tumors were seen in all mice with a fairly high incidence in untreated controls [24%] and appeared related to longevity. The incidence of other malignancies was low in all groups.

The data on dermal neoplasms observed for control groups and 83-18 are shown below:

Solvent control	**Toluene control**	**BaP 0.01%**	**BaP 0.05%**	**83-18**
% mice developing benign dermal neoplasm				
0	0	24	6	2
% mice developing malignant dermal neoplasm				
0	8	28	94	10
% mice with multiple tumors				
0	0	-	-	0
Average tumors/mouse[a]				
0	0	-	-	0.12
No. mice with metastases				
0	0	-	-	0
Mean latency (weeks) [b]				
0	0	-	-	72
Tumorigenic activity				
FEN [c] 0	0	-	-	46

	% [d] 0 0 - 100 13.0 a- Total number of tumors in group divided by total number of mice in group. b- Time in weeks from initiation of dosing to appearance of first tumor. Includes only mice developing tumors. c-FEN = No. of animals alive at the time of appearance of the median tumor plus any mice that died from tumor before that time OR when median latency is over 60 weeks, the FEN = No. of animals alive at 60 weeks plus any mice that died with a tumor before 60 weeks. d- Number of mice developing tumors divided by FEN x 100 Benign tumors included papillomas, fibromas, and hemangeomas. The most commonly observed metastatic skin neoplasms in toluene controls and all treated groups were squamous cell carcinomas and fibrosarcomas. The skin tumor data of the 83-18 group were compared using the Chi square test with data from untreated and toluene solvent controls. API 83-18 administered undiluted, was identified as a weak dermal carcinogen under conditions of this study.
Conclusion:	API 83-18 is a weak dermal carcinogen.
Reliability/Data Quality - Skin Painting	
Reliability:	2. - valid with restrictions
Reliability Remarks:	Incorrect Table 6. Dermal Neoplasms: Summary. Available test data and report text are accurate; Some neoplasm summary data above from other sources.
Key Study Sponsor Indicator:	Not a key study
Reference - Skin Painting	
Reference:	American Petroleum Institute (1989). Twenty-four month dermal carcinogenesis/chronic toxicity screening bioassay of refinery streams in C_3H/HeJ mice (API-190r). Primate Research Institute, New Mexico State University, Holloman AFB, NM. API HESD Publ. No. 36-33220.

High Production Volume Information System (HPVIS)

Carcinogenicity/Chronic Toxicity: Skin Painting -	
Test Substance – Skin Painting	
Category Chemical:	CAS # 64741-66-8
Test Substance:	CAS # 64741-66-8
Test Substance Purity/Composition and Other Test Substance Comments:	Light alkylate naphtha (API 83-19) API gravity 71.7; 99.5% paraffins, 0.0% olefins, 0.4% naphthenes, 0.1% aromatics
Category Chemical Result Type:	measured
Method – Skin Painting	
Route of Administration:	Dermal
Type of Exposure:	Skin of clipped intrascapular region of back
Species:	Mouse
Mammalian Strain:	C_3H/HeJ
Gender:	Males
Number of Animals per Dose:	50
Dose:	50ul/application
Year Study Performed:	1989
Method/Guideline Followed:	None; standard skin painting procedure
GLP:	yes
Exposure Period:	104 weeks
Frequency of Treatment:	Twice weekly
Post-Exposure Period:	none
Method/Guideline and Test Condition Remarks:	The study summarized here was designed to evaluate the carcinogenicity of 11 different petroleum refinery streams administered for 104 week to male mice. Only the information relating to the control groups and the group exposed to API 83-19 is included in this summary. Undiluted test material (50 µl) was applied twice weekly to the skin of clipped intrascapular region of the backs of a group of 50 male mice for 104 weeks. A

	group of 50 male mice served as untreated controls. A further 50 male mice used as solvent controls received 50 µl of toluene twice weekly for 2 years and BaP at concentrations of 0.01% and 0.05% in toluene was applied twice weekly to an additional two groups of 50 male mice. Body weights were recorded prior to study initiation, weekly for the first 13 weeks of the study and every 4 weeks until termination at 104 weeks. Observations were made daily for morbidity and mortality and any clinical signs of toxicity. Detailed clinical observations and tumor incidence and progression data were recorded weekly. A gross necropsy was performed on all animals dying during the study, sacrificed moribund or killed at study termination at 104 weeks. Special attention was paid to any dermal and subcutaneous masses. Liver, kidneys, lungs and gonads were weighed for each animal at necropsy and group mean organ weight and organ/body weight ratios were calculated. The test skin site (including dermal and subcutaneous tumors) and control skin site were examined histopathologically as were any suspected dermal and systemic neoplasms.

Test Results – Skin Painting

Concentration (LOAEL/LOAEC/ NOAEL/NOAEC):	LOAEL/LOAEC/ NOAEL/NOAEC	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units
	NOAEL	skin tumors	=	50		µl
	LOAEL	Body wt	=	50		µl

Results Remarks:	The body weights of the mice treated with 83-19 were decreased compared to controls, prominently from weeks 84-104. No clinical signs of systemic toxicity were observed in animals treated with 83-19. Observations of preputial gland swelling and penile prolapse increased in all groups with age. Penile prolapse occurred in virtually all mice by 2 years. Dermatotoxicity at the dosing site was observed in all groups of mice except untreated controls. The lesions were characterized primarily by mild to moderate desquamation, alopecia or irritation and mild scabbing. Mice treated with toluene had an average of 80- 100% incidence of mild desquamation. Alopecia, irritation and scabbing were sporatic and of low incidence [2-20%]. Dermatotoxicity in mice treated with 0.01% BaP were similar to the toluene controls. Abdominal distention and head tilt was observed in 5-30% of these mice from weeks 85 to 104 but was not observed in mice treated with 0.05% BaP. Mice treated with 0.05% BaP initially had similar lesions to the toluene controls. However, the incidence of irritation increased to 75 to 100% from weeks 62 to 85. No systemic toxicity was seen. Dermal lesions in mice treated with 83-19 were comparable to toluene

controls. Most animals had mild desquamation and approx. 20% developed mild irritation; few other significant observations were made. By 18 months on test, all groups had decreased survivability compared to untreated controls. Survival of mice treated with 83-19 was less than untreated and toluene controls at 18 and 24 months as shown in the following table. Twelve mice survived to week 104. Group mean longevity was 84 weeks compared to 97 weeks in untreated controls and 87 weeks in toluene controls.

Group	**Survival % at month**			
	6	**12**	**18**	**24**
Untreated	100	100	96	52
Toluene	96	94	80	30
BaP 0.01%	92	92	78	14
BaP 0.05%	96	66	6	0
83-19	**100**	**94**	**56**	**24**

A variety of non-neoplastic lesions other than those at the treated skin site were observed at histo-pathological examination but these occurred in all groups and were not considered to be treatment related.
Dermal histopathology findings at the treated skin site are summarized below.

Lesion	**Test Group**				
	Untreated control	**Toluene control**	**BaP 0.01%**	**BaP 0.05%**	**83-19**
Dermal inflammation					
% affected*	2	24	18	16	64
Severity**	2.0	1.3	1.7	1.2	1.3
Hyperkeratosis					
% affected	2	98	100	100	18
Severity	1.0	1.8	1.9	1.8	1.4
Acanthosis					
% affected	-	92	96	82	96
Severity		1.3	1.6	1.8	1.7
Epidermal crusting					
% affected	-	94	96	94	90
Severity		1.9	1.8	1.7	1.8
Dermal pigmentation					
% affected	-	50	12	-	92
Severity		1.5	1.2		1.7
Dermal fibrosis					
% affected	-	84	82	78	98
Severity		1.7	1.6	1.5	1.9
Ulceration					
% affected	-	-	-	-	4
Severity					3.0

Dermal Neoplasms					
% affected	0	0	52	100	2

* % mice affected
** Severity on a scale: 1 = minimal; 2 = mild
3 = moderate; 4 = severe

The percent of mice with systemic neoplasms in the control and 83-19 animals was as follows:

Neoplasm	Test Group				
	Solvent control	**Toluene control**	**BaP 0.01%**	**BaP 0.05%**	**83-19**
Primary liver					
Benign	8	8	14	2	6
Malignant	24	20	12	2	12
Primary lung					
Benign	2	0	0	2	0
Malignant	0	0	0	0	0
Other neoplasms[a]					
Benign	0	0	0	0	2
Malignant	4	6	2	0	0
Total neoplasms	38	34	28	6	20
Group mean longevity[b]	97	87	84	57	84

a Includes malignant lymphomas that were observed in multiple sites, including treated skin
b Longevity shown in weeks

Malignant liver tumors were seen in all mice with a fairly high incidence in untreated controls [24%] and appeared related to longevity. The incidence of other malignancies was low in all groups.

The data on dermal neoplasms observed for control groups and 83-19 are shown below:

	Solvent control	**Toluene control**	**BaP 0.01%**	**BaP 0.05%**	**83-19**
% mice developing benign dermal neoplasm	0	0	24	6	0
% mice developing malignant dermal neoplasm	0	8	28	94	1
% mice with multiple tumors	0	0	-	-	0
Average tumors/mouse[a]	0	0	-	-	0.02
No. mice with metastases	0	0	-	-	0
Mean latency (weeks) [b]	0	0	-	-	104
Tumorigenic activity					
FEN [c]	0	0	-	-	46
% [d]	0	0	-	100	2.2

a- Total number of tumors in group divided by total number

	of mice in group. b- Time in weeks from initiation of dosing to appearance of first tumor. Includes only mice developing tumors. c-FEN = No. of animals alive at the time of appearance of the median tumor plus any mice that died from tumor before that time OR when median latency is over 60 weeks, the FEN = No. of animals alive at 60 weeks plus any mice that died with a tumor before 60 weeks. d- Number of mice developing tumors divided by FEN x 100 Benign tumors included papillomas, fibromas, and hemangeomas. The most commonly observed metastatic skin neoplasms in toluene controls and all treated groups were squamous cell carcinomas and fibrosarcomas. The skin tumor data of the 83-19 group were compared using the Chi square test with data from untreated and toluene solvent controls. API 83-19 administered undiluted, did not induce a tumor incidence statistically significantly different from untreated controls.
Conclusion:	API 83-19 is not a dermal carcinogen.
Reliability/Data Quality - Skin Painting	
Reliability:	2. - valid with restrictions
Reliability Remarks:	Incorrect Table 6. Dermal Neoplasms: Summary. Available test data and report text are accurate; Some neoplasm summary data above from other sources.
Key Study Sponsor Indicator:	Not a key study
Reference - Skin Painting	
Reference:	American Petroleum Institute (1989). Twenty-four month dermal carcinogenesis/chronic toxicity screening bioassay of refinery streams in C_3H/HeJ mice (API-190r). Primate Research Institute, New Mexico State University, Holloman AFB, NM. API HESD Publ. No. 36-33220.

High Production Volume Information System (HPVIS)

Carcinogenicity: Dermal Initiation/Promotion -	
Test Substance – Dermal Initiation/Promotion	
Category Chemical:	CAS # 64741-87-3
Test Substance:	CAS # 64741-87-3
Test Substance Purity/Composition and Other Test Substance Comments:	Sweetened Naphtha (API 81-08) API gravity 76.6; 78.5% paraffins, 1.0% olefins, 16.5% naphthenes, 4.0% aromatics
Category Chemical Result Type:	measured
Method – Dermal Initiation/Promotion	
Route of Administration:	Dermal
Type of Exposure:	Application to 3 cm^2 clipped dorsal skin - both sides of midline including lumbar and sacral regions
Species:	Mouse
Mammalian Strain:	CD-1
Gender:	Males
Number of Animals per Dose:	30/group in initiation and promotion studies, respectively
Dose:	50µl/application
Year Study Performed:	1989
Method/Guideline Followed:	None; standard dermal initiation/promotion procedure
GLP:	yes
Exposure Period:	Initiation: 5 daily applications, 2 week rest, 25 weeks promotion with PMA. Approx. 28 weeks duration Promotion: 1 application of DMBA as initiator, 2 week rest, 25 week, twice weekly applications of 81-08 as possible promoter. Approx. 27 weeks duration
Frequency of Treatment:	Initiation: 5 daily applications Promotion: 50 applications (twice weekly for 25 weeks).
Post-Exposure Period:	none

Method/Guideline and Test Condition Remarks:	The study summarized here was designed to evaluate dermal initiation/promotion tumorigenic activity of 9 petroleum hydrocarbons in male mice. Only the information relating to the control groups and the group exposed to API 81-08 is included in this summary. In the initiation assay, 50µl of test material, acetone or toluene was applied to the backs of 30 male mice, once daily for 5 consecutive days. An additional group of 30 mice received a single application of 50µl of a 1.0mg/ml solution of 9, 10-dimethyl-1,2-benzanthracene (DMBA) in acetone. After 2 week rest period, all mice were treated twice weekly for 25 weeks with 50µl (0.1mg/ml) of phorbol-12-myristate-13-acetate (PMA) in acetone as the promoter. In the promotion assay, 21 groups of 30 mice each were treated once with either 50µl DMBA or acetone. Following a 2 week rest period, mice in each of the acetone or DMBA-initiated group were treated with 50µl 81-08 twice weekly for 25 weeks (50 applications). A remaining group of DMBA-initiated mice received only sham handling during the promotion phase and served as an assay control group to demonstrate that DMBA was applied at a subthreshold dose. Mice were observed twice daily for mortality and morbidity; physical examinations including observation of masses were performed weekly. Mice were weighed prior to randomization into groups but body weights were not recorded during the study. All mice that died, were sacrificed moribund or terminated at the end of the study were examined grossly externally and internally. Application sites were collected, fixed in formalin and processed for microscopic examination. Statistical methods included the Kaplan Meir test, a product-limit survival analysis for time to first tumor (latency) comparisons, and the Fisher's exact test to analyze the number of animals with observed and confirmed tumors. Total tumor yield was not statistically analyzed.

Test Results – Dermal Initiation/Promotion

Concentration (LOAEL/LOAEC/ NOAEL/NOAEC):

LOAEL/LOAEC/ NOAEL/NOAEC	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units
NOAEL	male	≥	50		µl

Results Remarks:	Dead and moribund animals were found at a low incidence in many groups but the incidence rates were not high enough to affect results. One mouse died in each of the 81-08 initiation and promotion test groups compared with 1 dead mouse in the sham control promotion group and 1 dead mouse in initiation, 2 dead mice in the promotion groups of toluene control. In both initiation and promotion assays, clinical observations other than masses at application skin sites included sores, dry scaly skin, raised and smooth pink patches, and red pinpoint foci. Other miscellaneous observations were not considered treatment related. Histopathologic evaluation of skin from the initiation assay promoted for 25 weeks with PMA demonstrated non-neoplastic

lesions with relatively uniform incidence in all study groups. Epidermal hyperplasia was the most prevalent finding, 63% in the acetone-initiated group and ≥83% in all other groups with similar levels of severity. A low incidence of acute inflammation of the epidermis (all hydrocarbon treated groups), parakeratosis and acute folliculitis and skin ulcers (all groups including controls) was also reported. In the promotion study, skin from groups of mice initiated with either acetone or DMBA and promoted with 81-08 were largely free of non-neoplastic changes as was the DMBA/sham control group.

Summary of Initiating Activity [PMA promotion]

Test article	No. of mice	No. mice with confirmed tumors	Latency (weeks)
Actone control	30	3	18.5
Toluene	29	8	23.7
DMBA	30	30	10.6
81-08	29	3	23.0

API 81-08 did not induce a tumor incidence greater than that observed in the acetone controls and is not considered a tumor initiator.

Summary of Promoting Activity [DMBA initiation]

Test article	No. of mice	No. mice with confirmed tumors	Latency (weeks)
Toluene			
Acetone	30	0	0
DMBA	30	2	26
81-08			
Acetone	30	0	0
DMBA	30	0	0

Toluene promotion at a DMBA initiated site produced 2 mice with histologically confirmed tumors. API 81-08 applied as a possible promotor at a DMBA initiated site did not result in any tumors. API 81-08 did not act as a tumor promoter in this assay system.

Conclusion:	API 81-08 is not an initiator or promoter of skin tumors in this test system.
Reliability/Data Quality - Dermal Initiation/Promotion	
Reliability:	1. - valid without restrictions.
Reliability Remarks:	
Key Study Sponsor Indicator:	Not a key study
Reference - Dermal Initiation/Promotion	
Reference:	American Petroleum Institute (1989). Short-term Dermal Tumorigenesis Study of Selected Petroleum Hydrocarbons in Male CD-1 Mice Initiation and Promotion Phases. IIT Research Institute, Life Sciences Research, Chicago, IL. American Petroleum Institute Rpt 36-32643. Washington DC

High Production Volume Information System (HPVIS)

Immunotoxicity

Test Substance – Immunotoxicity

Category Chemical:	No CAS number
Test Substance:	No CAS number
Test Substance Purity/Composition and Other Test Substance Comments:	Unleaded baseline gasoline API 99-01 Vapor Condensate Test material is a complex mixture of volatile hydrocarbons. The purity of mixture is 100% and stable based on analysis of chamber atmospheres.

Representative Components [98.8%] monitored in Study

Component	Area %
Isobutane	2.70
n-butane	12.78
3-methyl-1-butene	0.41
Isopentane	36.50
n-pentane	9.36
Trans-2-pentene	3.60
2,3-dimethylbutane	1.75
2-methylpentane	7.25
3-methylpentane	4.27
n-hexane	3.62
Methylcyclopentane	1.87
2,4-dimethylpentane	1.36
Benzene	2.75
2-methylhexane	1.73
2,3-dimethylpentane	1.52
3-methylhexane	1.73
Isooctane	1.92
Toluene	3.91

Category Chemical Result Type:	Measured

Method – Immunotoxicity

Route of Administration:	Inhalation
Type of Exposure:	Whole body
Species:	Rat
Mammalian Strain:	Sprague Dawley [Crl: CD IGS BR]
Gender:	Female
Number of Animals per Dose:	10 females/group
Dose:	Target: 0, 2000, 10,000, and 20,000mg/m^3 Actual: 0, 2050, 10,153, and 20,324 mg/m^3

Year Study Performed:	2005
Method/Guideline Followed:	Other Not specified [Modified hemolytic plaque assay]
GLP:	Yes
Exposure Period:	4 weeks, [20 exposures]
Frequency of Treatment:	6 hours/day, 5 days/week
Post-Exposure Period:	None
Method/Guideline and Test Condition Remarks:	This study was conducted as a satellite study of the 13 week inhalation toxicity study reported in the Repeated Dose section. Baseline Gasoline Vapor Condensate was administered via whole-body exposures to female Sprague Dawley rats at target concentrations of 2000, 10000 and 20000 mg/m^3 for 6 hours/day, 5 days/week for 4 weeks. An Air Control group received nitrogen-enriched air only while in chamber. A separate positive control group was treated by intraperitoneal injection with 50mg/kg cyclophosphamide daily for 4 days prior to sacrifice, the last 4 days of exposure for inhalation females. Four days prior to sacrifice, rats were sensitized by intravenous [tail vein] administration of sheep erythrocytes. Day 4 after antigen sensitization is the peak day for the sRBC [sheep red blood cell] IgM antibody-forming cell [AFC] cell response in rats. On the day after the last exposure blood was collected from the orbital sinus, serum was frozen (-70^{0}C) for possible future use [serum was discarded at end of the study], and animals were sacrificed. The thymus of each animal was removed, weighed and preserved in 10% neutral buffered formalin for possible histopathology [No subsequent histopathology was performed]. The spleen of each rat was aseptically removed, weighed and shipped intact in HEPES/EBSS/Gentamicin solution on wet ice for overnight delivery to ImmunoTox Inc, Richmond, VA. Single-cell suspensions were prepared from each spleen, and viability of splenocytes was determined. A 0.1 ml aliquot of spleen cells from each suspension was added to separate test tubes containing 25µl guinea pig complement, 25µl sRBC and 0.5ml warm agar. Each mixture was plated onto a separate petri disk, covered with a microcope cover slip and incubated at 36-38^{0}C for 3 hours. The spleen weight, cells/spleen, AFC/10^6 spleen cells and AFC/spleen were determined. The developed plaques were counted using a Bellco Plaque viewer. Each plaque is generated from a singe IgM antibody-producing B cell, permitting the number of AFC present in the whole spleen to be calculated. A significant modulation of the IgM AFC response to the T-dependant antigen (sRBC) compared to vehicle controls indicates that a test agent is capable of modifying the humoral immune response in the whole animal. Statistical analysis: Data were first tested for homogeneity of variances using the Bartlett's Chi Square Test. Homogeneous data were evaluated by a parametric

	one-way analysis of variance. When significant differences occur, exposed groups were compared to the vehicle control group using Dunnett's t test. Non-homogeneous data were evaluated using a non-parametric analysis of variance (Kruskall & Wallis). When significant differences occur, exposed groups were compared to vehicle control group using the Gehan-Wilcoxon Test when appropriate. The Jonckheere's Test was used to test for exposure level-related trends across the vehicle and exposed groups. The positive control was compared to the vehicle control using the Student t Test.

Test Results – Immunotoxicity

Concentration (LOAEL/LOAEC/ NOAEL/NOAEC):

LOAEL/LOAEC/ NOAEL/NOAEC	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units
NOAEL	Female	=	20000		mg/m^3

Results Remarks:	No adverse effect was observed on absolute or relative spleen or thymus weight of treated animals weighed at sacrifice. The viabilities of all splenocyte cultures were >95%. Spleen weights of treated animals were not significantly different to the vehicle control group, and there was no significant difference in the spleen cell number. For test substance treated animals, there was no statistical difference in the IgM antibody-forming cell response as compared to the vehicle control group when evaluated as either specific activity ($AFC/10^6$ spleen cells) or as total spleen activity (AFC/spleen). Cyclophosphamide (the positive control) as expected produced a significant decrease on both relative and absolute weights of both spleen and thymus compared to vehicle control. Spleen cell numbers were decreased when compared to the vehicle control. The positive control produced a significant decrease in specific activity (100%) and total spleen cell activity (100%) when compared to the vehicle control Baseline gasoline vapor condensate did not adversely affect the humoral immune response of female SD rats in this assay system. The NOAEL = $20000 mg/m^3$.
Conclusion:	Baseline Gasoline Vapor Condensate administered by inhalation to female rats for 4 weeks did not result in alterations of the humoral immune response as evaluated in the IgM anti-body forming cell response to the T-dependent antigen sheep erythrocytes. There was no statistically significant effect on spleen weight, spleen cell number or IgM antibody production evaluated as specific activity or as total spleen activity.

Reliability/Data Quality – Immunotoxicity	
Reliability:	1. Reliable without restriction
Reliability Remarks:	HPV Supporting study from Section 211(b) Testing Consortium, Fuels and Fuel Additives Health Effects Testing Regulation, administered by API, Washington DC
Key Study Sponsor Indicator:	Not a Key Study
Reference – Immunotoxicity	
Reference:	Baseline Gasoline Vapor Condensate: A 13-Week Whole Body Inhalation Toxicity Study in Rats with Neurotoxicity Assessments and 4-Week In Vivo Genotoxicity and Immunotoxicity Assessments. HLS Study No. 00-6125: Vol IV, Appendix Z. Immunological Evaluation of Baseline Gasoline Vapor Condensate Using the Plaque Forming Assay. Kimber White, Principal Investigator, ImmunoTox Inc Study Designation ITI-900. 2005. Huntingdon Life Sciences Laboratories, East Millstone, NJ and ImmunoTox Inc., Richmond, VA

High Production Volume Information System (HPVIS)

Neurotoxicity: Glial Fibrillary Acidic Protein (GFAP)

Test Substance – Neurotoxicity (GFAP)

Category Chemical:	No CAS number
Test Substance:	No CAS number
Test Substance Purity/Composition and Other Test Substance Comments:	Unleaded baseline gasoline API 99-01 Vapor Condensate Test material is a complex mixture of volatile hydrocarbons. The purity of mixture is 100% and stable based on analysis of chamber atmospheres.

Representative Components [98.44%] monitored in Study

Component	Area %
Isobutane	2.14
n-butane	10.89
3-methyl-1-butene	0.41
Isopentane	35.13
n-pentane	10.44
Trans-2-pentene	2.71
2,3-dimethylbutane	2.26
2-methylpentane	7.82
3-methylpentane	4.62
n-hexane	4.14
Methylcyclopentane	2.05
2,4-dimethylpentane	1.42
Benzene	2.89
2-methylhexane	1.71
2,3-dimethylpentane	1.74
3-methylhexane	1.93
Isooctane	2.15
Toluene	4.03

Category Chemical Result Type:	Measured

Method – Neurotoxicity (GFAP)

Route of Administration:	Inhalation
Type of Exposure:	Whole body
Species:	Rat
Mammalian Strain:	Sprague Dawley [Crl: CD IGS BR]
Gender:	Male and female
Number of Animals per Dose:	5 males,5 females/group of F1 generation
Dose:	Target: 0, 2000, 10,000, and 20,000mg/m^3 Actual: 0, 2014, 10,139, and 20,004 mg/m^3

	to parental animals only
Year Study Performed:	2006
Method/Guideline Followed:	Other: EPA CFR 59, No. 122, 79.67, 1994
GLP:	Yes
Exposure Period:	F1 pups were not directly exposed to BGVC. Exposure was possible only *in utero* or through maternal milk.
Frequency of Treatment:	6 hours/day, 7 days/week to parental animals
Post-Exposure Period:	None
Method/Guideline and Test Condition Remarks:	This study was a substudy of the 2-generation reproduction toxicity study reported in the Reproduction section where all exposure details are available. Toxicant-induced injury of the adult or developing central nervous system of the rat results in hypertrophy of astrocytes at the site of injury. The hallmark of this response is the enhanced expression of the major intermediate filament protein of astrocytes, GFAP. This study was performed with rats of the F1 generation to determine if exposure to BGVC *in utero* or through maternal milk would enhance the expression of glial fibrillary acidic protein (GFAP). Baseline Gasoline Vapor Condensate was administered via whole-body exposures to parental [P0] Sprague Dawley rats at target concentrations of 2000, 10000 and 20000 mg/m^3 for 6 hours/day, 7 days/week. In addition, an Air Control group received nitrogen-enriched air only while in chamber. P0 rats were exposed for 10 weeks before mating, 2 weeks during mating, 3 weeks of gestation and 4 weeks of lactation prior to weaning at postpartum day 28. Pregnant females were not exposed from GD 19 prior to delivery of F1 generation; exposure was resumed on postpartum day 5. At weaning one pup/sex/group was selected for mating to produce the F2 generation. F1 pups [5/sex/group] not selected for F1 mating were evaluated for the GFAP study [40 CFR79.67] on postpartum day 28 Pups were randomly selected by computer from available litters, sacrificed, brains removed, weighed and processed for shipping on dry ice to US Center for Disease Control Health Effects Laboratories, Morgantown, WV. Upon receipt, nine brain regions were dissected - Straitum, Hippocampus, Cortex, Olfactory bulb, Thalamus, Hypocampus, Cerebellum, Pituitary and rest of the brain. The dissected regions were weighed and homogenized by sonification in hot (85-95^{0}C) 1%(w/v) SDS [sodium dodeyl phosphate]. Samples were stored frozen prior to Elisa sandwich assay. Total protein in the SDS-homogenates was determined by the Bicinchoninic acid method available in kit form [BCA Protein Kit, Pierce #23223]. Homogenate samples were thawed and diluted in phosphate buffered saline [PBS] with 0.5% Triton X-100 to concentrations of approx. 10µg total protein/ 100µl. Samples high in GFAP (e.g. Cerebellum) may need dilution to 5µg/100µl and those

	with lower GFAP content (e.g. Stiatium) dilution only to 20µg/100µl, determined empirically. 96-well plates were prepared with rabbit anti-GFAP, and immunoglobulin protein and incubated at 37^{0}C for 1 hr. Excess material was emptied for the plate, and plate was washed 4 times with PBS. Plate was blocked for 1 hr with 5% non-fat powdered milk in PBS, emptied to remove excess liquid and wells were loaded with samples at 100µl per well and incubated 1 hour. After 1 hour, plates were washed 4 times with PBS + 0.5% Triton X-100 and incubated with monoclonal anti-GFAP + alkaline phosphatase conjugated anti-mouse IgG for 1 hour. Plates were washed again and P-nitrophenyl-phosphate substrate was added. After a 20 minute incubation, reaction was stopped with 0.4N NaOH. GFAP concentrations were calculated by comparing optical density values to those obtained from a GFAP standard curve. Data were expressed as µg GFAP/mg total protein. Statistical analysis: Data were analyzed by separate one-way Analysis of Variance for each of the nine brain regions from male and females followed by The Least Significant-Difference test (Keppel, 1973) to ensure detection of between group treatment effects.

Test Results – Reproductive Toxicity

Concentration (LOAEL/LOAEC/ NOAEL/NOAEC):

LOAEL/LOAEC/ NOAEL/NOAEC	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units
NOAEL	F1 both sexes	=	20000		mg/m^3
					mg/m^3
					mg/m^3

Results Remarks:	Control levels of GFAP varied markedly according to brain region, consistent with known levels for GFAP across different brain regions. The majority of pituitary data were below levels of detection and were not used in the final assessment. The 13 week exposure of parental animals to the test substance did not elevate GFAP levels in any assessed brain region in either males or females of the 1st generation rat pups in a two generation reproduction toxicity study. These data suggest that under the exposure conditions employed, damage-induced gliosis did not occur in the brain regions examined. A significant decrease in GFAP levels was observed in the thalamus of the Group IV males. This isolated effect likely is due to the difficulty of obtaining reliable dissections of this region. Regardless of its statistical significance no adverse biological significance can be assigned to a GFAP decrease at the present time.
Conclusion:	Under the conditions of the study, the test substance did not result in gliosis in any representative brain regions in males or females of 1st generation rat pups in a two-generation reproduction toxicity study

Reliability/Data Quality – Reproductive Toxicity	
Reliability:	**1**. Reliable without restriction
Reliability Remarks:	HPV Supporting study from Section 211(b) Testing Consortium, Fuels and Fuel Additives Health Effects Testing Regulation, administered by API, Washington DC
Key Study Sponsor Indicator:	Not a Key Study
Reference – Reproductive Toxicity	
Reference:	Baseline Gasoline Vapor Condensate: A Two-Generation Whole Body Inhalation Reproductive Study in Rats. HLS Study No. 00-4207: GFAP Levels in Specific Rat Brain Areas In F1 generation animals, J. O'Callaghan, Principal Investigator. 2006. Huntingdon Life Sciences Laboratories, East Millstone, NJ and CDC Health Effects Laboratories, Morgantown, WV.

High Production Volume Information System (HPVIS)

Neurotoxicity: Glial Fibrillary Acidic Protein (GFAP)

Test Substance – Neurotoxicity (GFAP)

Category Chemical:	No CAS number
Test Substance:	No CAS number
Test Substance Purity/Composition and Other Test Substance Comments:	Unleaded baseline gasoline API 99-01 Vapor Condensate Test material is a complex mixture of volatile hydrocarbons. The purity of mixture is 100% and stable based on analysis of chamber atmospheres.

Representative Components [98.8%] monitored in Study

Component	Area %
Isobutane	2.70
n-butane	12.78
3-methyl-1-butene	0.41
Isopentane	36.50
n-pentane	9.36
Trans-2-pentene	3.60
2,3-dimethylbutane	1.75
2-methylpentane	7.25
3-methylpentane	4.27
n-hexane	3.62
Methylcyclopentane	1.87
2,4-dimethylpentane	1.36
Benzene	2.75
2-methylhexane	1.73
2,3-dimethylpentane	1.52
3-methylhexane	1.73
Isooctane	1.92
Toluene	3.91

Category Chemical Result Type:	Measured

Method – Neurotoxicity (GFAP)

Route of Administration:	Inhalation
Type of Exposure:	Whole body
Species:	Rat
Mammalian Strain:	Sprague Dawley [Crl: CD IGS BR]
Gender:	Male and Female
Number of Animals per Dose:	5 males, 5 females/group
Dose:	Target: 0, 2000, 10,000, and 20,000mg/m^3 Actual: 0, 2050, 10,153, and 20,324 mg/m^3

Year Study Performed:	2005
Method/Guideline Followed:	Other EPA CFR 59, No. 122, 79.67, 1994. GFAP Sandwich ELISA assay
GLP:	Yes
Exposure Period:	13 weeks, [65 exposures]
Frequency of Treatment:	6 hours/day, 5 days/week
Post-Exposure Period:	None
Method/Guideline and Test Condition Remarks:	This study was conducted as a satellite study of the 13 week inhalation toxicity study reported in the Repeated Dose section. Toxicant-induced injury of the adult or developing central nervous system results in hypertrophy of astrocytes at the site of injury. The hallmark of this response is the enhanced expression of the major intermediate filament protein of astrocytes, GFAP. Baseline Gasoline Vapor Condensate was administered via whole-body exposures to Sprague Dawley rats (5/sex/group) at target concentrations of 2000, 10000 and 20000 mg/m^3 for 6 hours/day, 5 days/week for 13 weeks. An Air Control group received nitrogen-enriched air only while in chamber. At terminal sacrifice brains were removed, weighed and refrigerated. Samples were shipped overnight on dry ice to the CDC Health Effects Laboratory, Morgantown, WV. Upon receipt, nine brain regions were dissected - Straitum, Hippocampus, Cortex, Olfactory bulb, Thalamus, Hypocampus, Cerebellum, Pituitary and rest of the brain. The dissected regions were weighed and homogenized by sonification in hot (85-95^{0}C) 1%(w/v) SDS. Samples were stored frozen prior to Elisa sandwich assay. Total protein in the SDS-homogenates was determined by the Bicinchoninic acid method available in kit form [BCA Protein Kit, Pierce #23223]. Homogenate samples were thawed and diluted in phosphate buffered saline [PBS] with 0.5% Triton X-100 to concentrations of approximately 10µg total protein/ 100µl. Samples high in GFAP (e.g. Cerebellum) may need dilution to 5µg/100µl and those with lower GFAP content (e.g. Stiatium) dilution only to 20µg/100µl, determined empirically. 96-well plates were prepared with rabbit anti-GFAP, and immunoglobulin protein and incubated at 37^{0}C for 1 hr. Excess material was emptied for the plate, and plate was washed 4 times with PBS. Plate was blocked for 1 hr with 5% non-fat powdered milk in PBS, emptied to remove excess liquid and wells were loaded with samples at 100µl per well and incubated 1 hour. After 1 hour, plates were washed 4 times with PBS + 0.5% Triton X-100 and incubated with monoclonal anti-GFAP + alkaline phosphatase conjugated anti-mouse IgG for 1 hour. Plates were washed again and P-nitrophenyl-phosphate substrate was added. After a 20 minute incubation, reaction was stopped with 0.4N NaOH. GFAP concentrations were calculated by comparing optical density values to those obtained from a GFAP standard

	curve. Data were expressed as µg GFAP/mg total protein. Statistical analysis: Data were analyzed by separate one-way Analysis of Variance for each of the nine brain regions from male and females followed by The Least Significant-Difference test (Keppel, 1973) to ensure detection of between group treatment effects.

Test Results – Neurotoxicity GFAP

Concentration (LOAEL/LOAEC/ NOAEL/NOAEC):

LOAEL/LOAEC/ NOAEL/NOAEC	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units
NOAEL	Both sexes	=	20000		mg/m^3

Results Remarks:	Control levels of GFAP varied markedly according to brain region, consistent with known levels for GFAP across different brain regions. The animals exposed to baseline gasoline vapor condensate showed no effect on GFAP levels in any brain region in either males or females. These data suggest that under the conditions explored, damage-induced gliosis, a common feature of underlying brain damage does not occur in the brain regions examined.
Conclusion:	Baseline gasoline vapor condensate did not act as a neurotoxicant by inducing gliosis expressed as increased GFAP levels in any of 9 brain region examined in male or female SD rats in this assay system. NOAEL = 20000mg/m^3

Reliability/Data Quality – Neurotoxicity GFAP

Reliability:	**1**. Reliable without restriction
Reliability Remarks:	HPV Supporting study from Section 211(b) Testing Consortium, Fuels and Fuel Additives Health Effects Testing Regulation, administered by API, Washington DC
Key Study Sponsor Indicator:	Not a Key Study

Reference – Neurotoxicity GFAP

Reference:	Baseline Gasoline Vapor Condensate: A 13-Week Whole Body Inhalation Toxicity Study in Rats with Neurotoxicity Assessments and 4-Week In Vivo Genotoxicity and Immunotoxicity Assessments. HLS Study No. 00-6125, Vol IV, Appendix AA: GFAP Levels in Specific Rat Brain Areas following a 13-Week Whole Body Inhalation Exposure to Baseline Gasoline Vapor Condensate, J. O'Callaghan, Principal Investigator. 2005. Huntingdon Life Sciences Laboratories, East Millstone, NJ and CDC Health Effects Laboratory, Morgantown, WV.

High Production Volume Information System (HPVIS)

Neurotoxicity: Glial Fibrillary Acidic Protein (GFAP)

Test Substance – Neurotoxicity (GFAP)

Category Chemical:	No CAS number
Test Substance:	No CAS number
Test Substance Purity/Composition and Other Test Substance Comments:	Unleaded baseline gasoline API 99-01 Vapor Condensate Test material is a complex mixture of volatile hydrocarbons. The purity of mixture is 100% and stable based on analysis of chamber atmospheres.

Representative Components [98.44%] monitored in Study

Component	Area %
Isobutane	2.14
n-butane	10.89
3-methyl-1-butene	0.41
Isopentane	35.13
n-pentane	10.44
Trans-2-pentene	2.71
2,3-dimethylbutane	2.26
2-methylpentane	7.82
3-methylpentane	4.62
n-hexane	4.14
Methylcyclopentane	2.05
2,4-dimethylpentane	1.42
Benzene	2.89
2-methylhexane	1.71
2,3-dimethylpentane	1.74
3-methylhexane	1.93
Isooctane	2.15
Toluene	4.03

Category Chemical Result Type:	Measured

Method – Neurotoxicity (GFAP)

Route of Administration:	Inhalation
Type of Exposure:	Whole body
Species:	Rat
Mammalian Strain:	Sprague Dawley [Crl: CD IGS BR]
Gender:	Male and female
Number of Animals per Dose:	5 males, 5 females/group of F1 generation
Dose:	Target: 0, 2000, 10,000, and 20,000mg/m^3 Actual: 0, 2014, 10,139, and 20,004mg/m^3

	to parental animals only
Year Study Performed:	2006
Method/Guideline Followed:	Other: EPA CFR 59, No. 122, 79.67, 1994
GLP:	Yes
Exposure Period:	F1 pups were not directly exposed to BGVC. Exposure was possible only *in utero* or through maternal milk.
Frequency of Treatment:	6 hours/day, 7 days/week to parental animals
Post-Exposure Period:	None
Method/Guideline and Test Condition Remarks:	This study was a substudy of the 2-generation reproduction toxicity study reported in the Reproduction section where all exposure details are available. Toxicant-induced injury of the adult or developing central nervous system of the rat results in hypertrophy of astrocytes at the site of injury. The hallmark of this response is the enhanced expression of the major intermediate filament protein of astrocytes, GFAP. This study was performed with rats of the F1 generation to determine if exposure to BGVC *in utero* or through maternal milk would enhance the expression of glial fibrillary acidic protein (GFAP). Baseline Gasoline Vapor Condensate was administered via whole-body exposures to parental [P0] Sprague Dawley rats at target concentrations of 2000, 10000 and 20000mg/m^3 for 6 hours/day, 7 days/week. In addition, an Air Control group received nitrogen-enriched air only while in chamber. P0 rats were exposed for 10 weeks before mating, 2 weeks during mating, 3 weeks of gestation and 4 weeks of lactation prior to weaning at postpartum day 28. Pregnant females were not exposed from GD 19 prior to delivery of F1 generation; exposure was resumed for dams on postpartum day 5. At weaning one pup/sex/group was selected for mating to produce the F2 generation. F1 pups [5/sex/group] not selected for F1 mating were evaluated for the GFAP study [40 CFR79.67] on postpartum day 28 Pups were randomly selected by computer from available litters, sacrificed, brains removed, weighed and processed for shipping on dry ice to US Center for Disease Control Health Effects Laboratories, Morgantown, WV. Upon receipt, nine brain regions were dissected - straitum, hippocampus, cortex, olfactory bulb, thalamus, hypocampus, cerebellum, pituitary and rest of the brain. The dissected regions were weighed and homogenized by sonification in hot (85-95^{0}C) 1%(w/v) SDS [sodium dodeyl phosphate]. Samples were stored frozen prior to Elisa sandwich assay. Total protein in the SDS-homogenates was determined by the Bicinchoninic acid method available in kit form [BCA Protein Kit, Pierce #23223]. Homogenate samples were thawed and diluted in phosphate buffered saline [PBS] with 0.5% Triton X-100 to concentrations of approx. 10µg total protein/ 100µl. Samples high in GFAP (e.g. cerebellum) may need dilution to 5µg/100µl and those

	with lower GFAP content (e.g. stiatium) dilution only to 20µg/100µl, determined empirically. 96-well plates were prepared with rabbit anti-GFAP, and immunoglobulin protein and incubated at 37°C for 1 hr. Excess material was emptied for the plate, and plate was washed 4 times with PBS. Plate was blocked for 1 hr with 5% non-fat powdered milk in PBS, emptied to remove excess liquid and wells were loaded with samples at 100µl per well and incubated 1 hour. After 1 hour, plates were washed 4 times with PBS + 0.5% Triton X-100 and incubated with monoclonal anti-GFAP + alkaline phosphatase conjugated anti-mouse IgG for 1 hour. Plates were washed again and P-nitrophenyl-phosphate substrate was added. After a 20 minute incubation, reaction was stopped with 0.4N NaOH. GFAP concentrations were calculated by comparing optical density values to those obtained from a GFAP standard curve. Data were expressed as µg GFAP/mg total protein. Statistical analysis: Data were analyzed by separate one-way Analysis of Variance for each of the nine brain regions from male and females followed by The Least Significant-Difference test (Keppel, 1973) to ensure detection of between group treatment effects.

Test Results – Reproductive Toxicity

Concentration (LOAEL/LOAEC/ NOAEL/NOAEC):

LOAEL/LOAEC/ NOAEL/NOAEC	Population	Value Description	Value/Lower Concentration	Upper Concentration	Units
NOAEL	F1 both sexes	=	20000		mg/m^3
					mg/m^3
					mg/m^3

Results Remarks:	Control levels of GFAP varied markedly according to brain region, consistent with known levels for GFAP across different brain regions. The majority of pituitary data was below levels of detection and was not used in the final assessment. The 13-week exposure of parental animals to baseline gasoline vapor condensate did not elevate GFAP levels in any assessed brain region in either males or females of weanling 1st generation rat pups in a two generation reproduction toxicity study. These data suggest that under the exposure conditions employed, damage-induced gliosis did not occur in the brain regions examined. A significant decrease in GFAP levels was observed in the thalamus of the Group IV males. This isolated effect likely is due to the difficulty of obtaining reliable dissections of this region. Regardless of its statistical significance no adverse biological significance can be assigned to a GFAP decrease at the present time.
Conclusion:	Under the conditions of the study, baseline gasoline vapor condensate did not result in gliosis in any representative brain regions in males or females of 1st generation rat pups in a two-generation reproduction

	toxicity study
Reliability/Data Quality – Reproductive Toxicity	
Reliability:	1. Reliable without restriction
Reliability Remarks:	HPV Supporting study from Section 211(b) Testing Consortium, Fuels and Fuel Additives Health Effects Testing Regulation, administered by API, Washington DC
Key Study Sponsor Indicator:	Not a Key Study
Reference – Reproductive Toxicity	
Reference:	Baseline Gasoline Vapor Condensate: A Two-Generation Whole Body Inhalation Reproductive Study in Rats. HLS Study No. 00-4207: GFAP Levels in Specific Rat Brain Areas In F1 generation animals, J. O'Callaghan, Principal Investigator. 2006. Huntingdon Life Sciences Laboratories, East Millstone, NJ and CDC Health Effects Laboratories, Morgantown, WV.

Neurotoxicity

Test Substance - Neurotoxicity

Category Chemical: (64741-55-5) Naphtha, petroleum, light catalytic cracked

Test Substance: (64741-55-5) Naphtha, petroleum, light catalytic cracked

Test Substance Purity/Composition and Other Test Substance Comments:

Category Chemical Result Type: Derived from Other Endpoint Data

Method - Neurotoxicity

Species:

Mammalian Strain:

Gender:

Number of Animals per Dose:

Dose:

Year Study Performed:

Method/Guideline Followed:

GLP:

Vehicle Used:

Vehicle Name:

Vehicle Amount and Units:

Method/Guideline and Test Condition Remarks:

Test Results - Neurotoxicity

Effect Level :

Effect Type	Population	Value Description	Effect Level	Effect Level Upper Value	Units
NOAEL	Male	>	23400		mg/m3 air (analytical)
NOAEL	Female	>	23400		mg/m3 air (analytical)

Results Remarks: See repeated-dose RSS for complete description of study; CAS # 64741-55-5

Conclusion:

Reliability/Data Quality - Neurotoxicity

Reliability:

Reliability Remarks:

Key Study Sponsor Indicator:

Reference - Neurotoxicity

Reference:

Lapin, C., Bui, Q., Breglia, R., Burnett, D., Koschier, F., Roth, R , Schreiner, C., White,R , Mandella, R. and Hoffman, G. (2001) Toxicity evaluation of petroleum blending streams: Inhalation subchronic toxicity/neurotoxicity study of a light catalytic cracked naphtha distillate in rats. Int. J. Toxicol. Vol 20, pp 307-319

Neurotoxicity

Test Substance - Neurotoxicity

Category Chemical:	*No CAS Number Provided*
Test Substance:	*No CAS Number Provided*
Test Substance Purity/Composition and Other Test Substance Comments:	Unleaded baseline gasoline API 99-01 Vapor Condensate Test material is a complex mixture of volatile hydrocarbons. The purity of mixture is 100% and stable based on analysis of chamber atmospheres. Representative Components [98.44%] monitored in Study Component Area % Isobutane 2 14 n-butane 10.89 3-methyl-1-butene 0.41 Isopentane 35.13 n-pentane 10.44 Trans-2-pentene 2.71 2,3-dimethylbutane 2.26 2-methylpentane 7.82 3-methylpentane 4.62 n-hexane 4.14 Methylcyclopentane 2.05 2,4-dimethylpentane 1.42 Benzene 2 89 2-methylhexane 1.71 2,3-dimethylpentane 1.74 3-methylhexane 1.93 Isooctane 2.15 Toluene 4.03
Category Chemical Result Type:	Measured

Method - Neurotoxicity

Species:	Rat
Mammalian Strain:	Sprague-Dawley
Gender:	Both M/F
Number of Animals per Dose:	5
Dose:	Target: 0, 2000, 10,000, and 20,000mg/m3 Actual: 0, 2014, 10,139, and 20,004 mg/m3 to parental animals only
Year Study Performed:	2006
Method/Guideline Followed:	Other
GLP:	Yes
Vehicle Used:	
Vehicle Name:	
Vehicle Amount and Units:	
Method/Guideline and Test Condition Remarks:	This study was a substudy of the 2-generation reproduction toxicity study reported in the Reproduction section where all exposure details are available. Toxicant-induced injury of the adult or developing central nervous system of the rat results in hypertrophy of astrocytes at the site of injury. The hallmark of this response is the enhanced expression of the major intermediate filament protein of astrocytes, GFAP. This study was performed with rats of the F1 generation to determine if exposure to BGVC in utero or through maternal milk would enhance the expression of glial fibrillary acidic protein (GFAP) Baseline Gasoline Vapor Condensate was administered via whole-body exposures to parental [P0] Sprague Dawley rats at target concentrations of 2000, 10000 and 20000 mg/m3 for 6 hours/day, 7 days/week. In addition, an Air Control group received nitrogen-enriched air only while in chamber. P0 rats were exposed for 10 weeks before mating, 2 weeks during mating, 3 weeks of gestation and 4 weeks of lactation prior to weaning at postpartum day 28 Pregnant females were not exposed from GD 19 prior to delivery of F1 generation; exposure was resumed on postpartum day 5. At weaning one pup/sex/group was selected for mating to produce the F2 generation. F1 pups [5/sex/group] not selected for F1 mating were evaluated for the GFAP study [40 CFR79.67] on postpartum day 28 Pups were randomly selected by computer from available litters, sacrificed, brains removed, weighed and processed for shipping on dry ice to US Center for Disease Control Health Effects Laboratories, Morgantown, WV. Upon receipt, nine brain regions were dissected - Straitum, Hippocampus, Cortex, Olfactory bulb, Thalamus,

Hypocampus, Cerebellum, Pituitary and rest of the brain The dissected regions were weighed and homogenized by sonification in hot (85-95OC) 1%(w/v) SDS [sodium dodeyl phosphate]. Samples were stored frozen prior to Elisa sandwich assay. Total protein in the SDS-homogenates was determined by the Bicinchoninic acid method available in kit form [BCA Protein Kit, Pierce #23223]. Homogenate samples were thawed and diluted in phosphate buffered saline [PBS] with 0.5% Triton X-100 to concentrations of approx 10µg total protein/ 100µl. Samples high in GFAP (e.g. Cerebellum) may need dilution to 5µg/100µl and those with lower GFAP content (e.g. Striatium) dilution only to 20µg/100µl, determined empirically. 96-well plates were prepared with rabbit anti-GFAP, and immunoglobulin protein and incubated at 370C for 1 hr Excess material was emptied for the plate, and plate was washed 4 times with PBS. Plate was blocked for 1 hr with 5% non-fat powdered milk in PBS, emptied to remove excess liquid and wells were loaded with samples at 100µl per well and incubated 1 hour. After 1 hour, plates were washed 4 times with PBS + 0 5% Triton X-100 and incubated with monoclonal anti-GFAP + alkaline phosphatase conjugated anti-mouse IgG for 1 hour Plates were washed again and P-nitrophenyl-phosphate substrate was added. After a 20 minute incubation, reaction was stopped with 0.4N NaOH. GFAP concentrations were calculated by comparing optical density values to those obtained from a GFAP standard curve. Data were expressed as µg GFAP/mg total protein
Statistical analysis. Data were analyzed by separate one-way Analysis of Variance for each of the nine brain regions from male and females followed by The Least Significant-Difference test (Keppel, 1973) to ensure detection of between group treatment effects.

Test Results - Neurotoxicity

Effect Level :

Effect Type	Population	Value Description	Effect Level	Effect Level Upper Value	Units
NOAEL	Offspring (F1)	=	20000		mg/m3 air

Results Remarks: Control levels of GFAP varied markedly according to brain region, consistent with known levels for GFAP across different brain regions The majority of pituitary data were below levels of detection and were not used in the final assessment. The 13 week exposure of parental animals to the test substance did not elevate GFAP levels in any assessed brain region in either males or females of the 1st generation rat pups in a two generation reproduction toxicity study. These data suggest that under the exposure conditions employed, damage-induced gliosis did not occur in the brain regions examined.
A significant decrease in GFAP levels was observed in the thalamus of the Group IV males. This isolated effect likely is due to the difficulty of obtaining reliable dissections of this region. Regardless of its statistical significance no adverse biological significance can be assigned to a GFAP decrease at the present time

Conclusion: Under the conditions of the study, the test substance did not result in gliosis in any representative brain regions in males or females of 1st generation rat pups in a two-generation reproduction toxicity study

Reliability/Data Quality - Neurotoxicity

Reliability: 1 - Valid Without Restrictions

Reliability Remarks: HPV Supporting study from Section 211(b) Testing Consortium, Fuels and Fuel Additives Health Effects Testing Regulation, administered by API, Washington DC

Key Study Sponsor Indicator: Not Key

Reference - Neurotoxicity

Reference: Baseline Gasoline Vapor Condensate. A Two-Generation Whole Body Inhalation Reproductive Study in Rats. HLS Study No. 00-4207· GFAP Levels in Specific Rat Brain Areas In F1 generation animals, J. O'Callaghan, Principal Investigator. 2006. Huntingdon Life Sciences Laboratories, East Millstone, NJ and CDC Health Effects Laboratories, Morgantown, WV.

Neurotoxicity

Test Substance - Neurotoxicity

Category Chemical: (64741-66-8) Naphtha, petroleum, light alkylate

Test Substance: (64741-66-8) Naphtha, petroleum, light alkylate

Test Substance Purity/Composition and Other Test Substance Comments:

Category Chemical Result Type: Derived from Other Endpoint Data

Method - Neurotoxicity

Species:

Mammalian Strain:

Gender:

Number of Animals per Dose:

Dose:

Year Study *Performed*:

Method/Guideline Followed:

GLP:

Vehicle Used:

Vehicle Name:

Vehicle Amount and Units:

Method/Guideline and Test Condition Remarks:

Test Results - Neurotoxicity

Effect Level :

Effect Type	Population	Value Description	Effect Level	Effect Level Upper Value	Units
NOEL	Male	>	24300		mg/m3 air (analytical)
NOEL	Female	>	24300		mg/m3 air (analytical)

Results Remarks: See repeated-dose RSS for CAS # 64741-66-8

Conclusion:

Reliability/Data Quality - Neurotoxicity

Reliability:

Reliability Remarks:

Key Study Sponsor Indicator:

Reference - Neurotoxicity

Reference:

Schreiner, C., Lapadula, E., Breglia, R., Bui, Q., Burnett, D., Koschier, F., Podhasky, P and White,R. (1998) Toxicity evaluation of petroleum blending streams: inhalation subchronic toxicity/neurotoxicity study of a light alkylate naphtha distillate in rats J. Toxicol. and Env. Health, Part A, Vol 55, pp 277-296

Neurotoxicity

Test Substance - Neurotoxicity

Category Chemical: (68955-35-1) Naphtha, petroleum, catalytic reformed

Test Substance: (68955-35-1) Naphtha, petroleum, catalytic reformed

Test Substance Purity/Composition and Other Test Substance Comments:

Category Chemical Result Type: Derived from Other Endpoint Data

Method - Neurotoxicity

Species:

Mammalian Strain:

Gender:

Number of Animals per Dose:

Dose:

Year Study Performed:

Method/Guideline Followed:

GLP:

Vehicle Used:

Vehicle Name:

Vehicle Amount and Units:

Method/Guideline and Test Condition Remarks:

Test Results - Neurotoxicity

Effect Level :

Effect Type	Population	Value Description	Effect Level	Effect Level Upper Value	Units
LOAL	Male	=	27800		mg/m3 air
NOEL	Male	=	9250		mg/m3 air
NOEL	Female	>	27800		mg/m3 air

Results Remarks: A 13 week with 4 week recovery inhalation repeated dose study for this CAS # 68955-35-1 included evaluation of neurotoxicity (motor activity, functional activity and nervous tissue histopathology). Please see the Repeated-Dose Toxicity summary for details

Conclusion: The male neurotoxicity LOEC was also 27,800 mg/m3, based on the increased motor activity in the hight dose rcovery group. The system and neurotoxicity NOEC for male rats was 9250 mg/m3.

There were no neurotoxic effects observed in female rats; the female NOEC > 27,800 mg/m3.

Reliability/Data Quality - Neurotoxicity

Reliability: 1 - Valid Without Restrictions

Reliability Remarks:

Key Study Sponsor Indicator:

Reference - Neurotoxicity

Reference: Schreiner, C., Bui, Q., Breglia, R., Burnett, D , Koschier, F., Lapadula, E , Podhasky, P , White, R., Hoffman, G. and Mandella, R. (2000) Toxicity evaluation of petroleum blending streams: Inhalation subchronic toxicity/neurotoxicity study of a light catalytic reformed naphtha distillate in rats. J. Tox. and Env. Health, Part A. Vol. 60, pp 489-512

Category Submission Information

High Production Volume Information System (HPVIS)

Submission Report

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Submission Information

Submission ID : 24961678 **Submission Name** : Gasoline Blending Streams Category

AR Number :

Category Information

Chemical Category Name : Gasoline Category

Chemicals within Category : ~~(1330-20-7) Benzene, dimethyl-~~

(64741-41-9) Naphtha, petroleum, heavy straight-run
(64741-42-0) Naphtha, petroleum, full-range straight-run
(64741-46-4) Naphtha, petroleum, light straight-run
(64741-47-5) Natural gas condensates, petroleum
(64741-48-6) Natural gas, petroleum, raw liq. mix
(64741-54-4) Naphtha, petroleum, heavy catalytic cracked
(64741-55-5) Naphtha, petroleum, light catalytic cracked
(64741-63-5) Naphtha, petroleum, light catalytic reformed
(64741-64-6) Naphtha, petroleum, full-range alkylate
(64741-65-7) Naphtha, petroleum, heavy alkylate
(64741-66-8) Naphtha, petroleum, light alkylate
(64741-68-0) Naphtha, petroleum, heavy catalytic reformed
(64741-69-1) Naphtha, petroleum, light hydrocracked
(64741-70-4) Naphtha, petroleum, isomerization
(64741-72-6) Naphtha, petroleum, polymn.
(64741-74-8) Naphtha, petroleum, light thermal cracked
(64741-78-2) Naphtha, petroleum, heavy hydrocracked
(64741-83-9) Naphtha, petroleum, heavy thermal cracked
(64741-84-0) Naphtha, petroleum, solvent-refined light
(64741-87-3) Naphtha, petroleum, sweetened
(64741-92-0) Naphtha, petroleum, solvent-refined heavy
(64741-99-7) Extracts, petroleum, light naphtha solvent
(64742-22-9) Naphtha, petroleum, chem. neutralized heavy
(64742-23-0) Naphtha, petroleum, chem. neutralized light
(64742-48-9) Naphtha, petroleum, hydrotreated heavy
(64742-49-0) Naphtha, petroleum, hydrotreated light
(64742-73-0) Naphtha, petroleum, hydrodesulfurized light
(64742-82-1) Naphtha, petroleum, hydrodesulfurized heavy
(64742-89-8) Solvent naphtha, petroleum, light aliph.
(64742-95-6) Solvent naphtha, petroleum, light arom.
(67891-79-6) Distillates, petroleum, heavy arom.
(67891-80-9) Distillates, petroleum, light arom.
(68333-29-9) Residues, petroleum, light naphtha solvent extract
(68410-05-9) Distillates, petroleum, straight-run light

(68410-71-9) Raffinates, petroleum, catalytic reformer ethylene
(68410-96-8) Distillates, petroleum, hydrotreated middle, inter
(68410-97-9) Distillates, petroleum, light distillate hydrotrea
(68410-98-0) Distillates, petroleum, hydrotreated heavy naphtha
(68425-31-0) Gasoline, natural gas, natural
(68475-79-6) Distillates, petroleum, catalytic reformed depenta
(68476-43-7) Hydrocarbons, C4-6, C5-rich
(68476-46-0) Hydrocarbons, C3-11, catalytic cracker distillates
(68476-50-6) Hydrocarbons, C.gtoreq.5, C5-6-rich
(68476-55-1) Hydrocarbons, C5-rich
(68476-56-2) Hydrocarbons, cyclic C5 and C6
(68477-34-9) Distillates, petroleum, C3-5, 2-methyl-2-butene-ri
(68477-63-4) Extracts, petroleum, reformer recycle
(68477-89-4) Distillates, petroleum, dependanizer overheads
(68478-12-6) Residues, petroleum, butane splitter bottoms
(68478-15-9) Residues, petroleum, C6-8 catalytic reformer
(68478-16-0) Residual oils, petroleum, deisobutanizer tower
(68513-02-0) Naphtha, petroleum, full-range coker
(68513-03-1) Naphtha, petroleum, light catalytic reformed, arom
(68513-63-3) Distillates, petroleum, catalytic reformed straigh
(68514-15-8) Gasoline, vapor-recovery
(68514-38-5) Hydrocarbons, C4-10-unsatd.
(68514-79-4) Petroleum products, hydrofiner-powerformer reforma
(68526-52-3) Alkenes, C6
(68526-55-6) Alkenes, C8-10, C9-rich
(68527-21-9) Naphtha, petroleum, clay-treated full-range straig
(68527-26-4) Naphtha, petroleum, light steam-cracked, debenzeni
(68527-27-5) Naphtha, petroleum, full-range alkylate, butane-co
(68551-16-6) Alkanes, C9-11-iso-
(68551-17-7) Alkanes, C10-13-iso-
(68602-79-9) Distillates, petroleum, benzene unit hydrotreater
(68603-01-0) Distillates, petroleum, thermal cracked naphtha an
(68603-08-7) Naphtha, petroleum, arom.-contg.
(68606-11-1) Gasoline, straight-run, topping-plant
(68783-11-9) Naphtha, petroleum, light polymn.
(68783-12-0) Naphtha, petroleum, unsweetened
(68783-66-4) Naphtha, petroleum, light, sweetened
(68919-15-3) Hydrocarbons, C6-12, benzene-recovery
(68919-37-9) Naphtha, petroleum, full-range reformed
(68919-39-1) Natural gas condensates
(68920-06-9) Hydrocarbons, C7-9
(68921-08-4) Distillates, petroleum, light straight-run gasolin
(68921-09-5) Distillates, petroleum, naphtha unifiner stripper
(68955-29-3) Distillates, petroleum, light thermal cracked, deb
(68955-35-1) Naphtha, petroleum, catalytic reformed
(70024-92-9) Alkanes, C7-8-iso-
(70693-06-0) Aromatic hydrocarbons, C9-11
(70955-08-7) Alkanes, C4-6
(8006-61-9) Gasoline, natural
(8030-30-6) Naphtha
(8032-32-4) Ligroine
(8052-41-3) Stoddard solvent

(92045-58-4) Naphtha, petroleum, isomerization, C6-fraction

Submitter Information

Submitter's Name : American Petroleum Institute Petroleum HPV Testing Group

Address :

City :

State :

ZIP/Postal Code:

Country:

Type of Submitter :

Technical Point of Contact Information

Technical Point of Contact :

Title :

Phone Number :

Fax Number :

E-Mail Address : twerdokl@api.org

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Fax Number :

E-Mail Address :

Consortium Information

Consortium Name : American Petroleum Institute (API) Petroleum HPV Testing Group

Sponsors included in this consortium :

Alcoa

Amerada Hess Corporation

BP

Big West Oil LLC/Flying J Inc.

CHS Inc.

Calcasieu Refining Company

ChevronTexaco Corporation

Citgo Asphalt Refining Corporation (CARCO)

Citgo Petroleum Corporation

Coffeyville Resources LLC

ConocoPhillips Company

Countrymark Cooperative, LLP

Cross Oil Refining & Marketing, Inc.

Crown Central Petroleum Corporation

Dakota Gasification Company

Dynegy Liquids Marketing & Trade

Edginton Oil Company

Elkhorn Operating Company

Equilon Enterprises, LLC/Motiva Enterprises, LLC

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Flint Hills Refineries

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Giant Industries, Inc.

Holly Corp./Navajo Refining Co.
Honeywell International Inc.
Hovensa LLC
Hunt Refining Company
Kern Oil & Refining Company
Koch Industries, Inc.
La Gloria Oil & Gas Company
Lion Oil Company
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National Cooperative Refinery Association
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Silver Eagle Refining, Inc. (WY)
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South Hampton Refining Company
Sunoco, Inc.
Tesoro Corporation
The Goodyear Tire & Rubber Company
Total Petrochemicals USA, Inc.
True Oil LLC/Eighty Eight Oil LLC/Equitable Oil Purchasing Company
U.S. Oil & Refining Co.
Unocal Corporation
Valero Energy Corporation
Williams Energy Services
Wynnewood Refining Company