SCREENING-LEVEL HAZARD CHARACTERIZATION

Reclaimed Petroleum Hydrocarbons: Naphtha Hydrocarbon Wastes from Petroleum Refining Category

SPONSORED CHEMICALS

Fuel oil, residual, wastewater skimming's	**CASRN 68956-48-9**
Petroleum products, C5 - C12, reclaimed, wastewater treatment	**CASRN 68956-70-7**

SUPPORTING CHEMICALS

Light Alkylate Naphtha	**CASRN 64741-66-8**
Light Catalytic Cracked Naphtha	**CASRN 64741-55-5**
Sweetened Naphtha	**CASRN 64741-87-3**
Full Range Catalytic Reformed Naphtha	**CASRN 68955-35-1**
Gasoline	**CASRN 8006-61-9**
Heavy Straight Run Naphtha	**CASRN 64741-41-9**
Full Range Coker Naphtha	**CASRN 68513-02-0**
PONA mixture	**No CASRN**

The High Production Volume (HPV) Challenge Program[1] was conceived as a voluntary initiative aimed at developing and making publicly available screening-level health and environmental effects information on chemicals manufactured in or imported into the United States in quantities greater than one million pounds per year. In the Challenge Program, producers and importers of HPV chemicals voluntarily sponsored chemicals; sponsorship entailed the identification and initial assessment of the adequacy of existing toxicity data/information, conducting new testing if adequate data did not exist, and making both new and existing data and information available to the public. Each complete data submission contains data on 18 internationally agreed to "SIDS" (Screening Information Data Set[1,2]) endpoints that are screening-level indicators of potential hazards (toxicity) for humans or the environment.

The Environmental Protection Agency's Office of Pollution Prevention and Toxics (OPPT) is evaluating the data submitted in the HPV Challenge Program on approximately 1400 sponsored chemicals by developing hazard characterizations (HCs). These HCs consist of an evaluation of the quality and completeness of the data set provided in the Challenge Program submissions. They are not intended to be definitive statements regarding the possibility of unreasonable risk of injury to health or the environment.

The evaluation is performed according to established EPA guidance[2,3] and is based primarily on

[1] U.S. EPA. High Production Volume (HPV) Challenge Program; http://www.epa.gov/chemrtk/index.htm.
[2] U.S. EPA. HPV Challenge Program – Information Sources; http://www.epa.gov/chemrtk/pubs/general/guidocs.htm.
[3] U.S. EPA. Risk Assessment Guidelines; http://cfpub.epa.gov/ncea/raf/rafguid.cfm.

hazard data provided by sponsors; however, in preparing the hazard characterization, EPA considered its own comments and public comments on the original submission as well as the sponsor's responses to comments and revisions made to the submission. In order to determine whether any new hazard information was developed since the time of the HPV submission, a search of the following databases was made from one year prior to the date of the HPV Challenge submission to the present: (ChemID to locate available data sources including Medline/PubMed, Toxline, HSDB, IRIS, NTP, ATSDR, IARC, EXTOXNET, EPA SRS, etc.), STN/CAS online databases (Registry file for locators, ChemAbs for toxicology data, RTECS, Merck, etc.) and Science Direct. OPPT's focus on these specific sources is based on their being of high quality, highly relevant to hazard characterization, and publicly available.

OPPT does not develop HCs for those HPV chemicals which have already been assessed internationally through the HPV program of the Organization for Economic Cooperation and Development (OECD) and for which Screening Initial Data Set (SIDS) Initial Assessment Reports (SIAR) and SIDS Initial Assessment Profiles (SIAP) are available. These documents are presented in an international forum that involves review and endorsement by governmental authorities around the world. OPPT is an active participant in these meetings and accepts these documents as reliable screening-level hazard assessments.

These hazard characterizations are technical documents intended to inform subsequent decisions and actions by OPPT. Accordingly, the documents are not written with the goal of informing the general public. However, they do provide a vehicle for public access to a concise assessment of the raw technical data on HPV chemicals and provide information previously not readily available to the public.

Chemical Abstract Service Registry Number (CASRN)	**<u>Sponsored Chemicals</u>** **See Appendix** **<u>Supporting Chemicals</u>** **See Table 2**
Chemical Abstract Index Name	**<u>Sponsored Chemicals</u>** **See Appendix** **<u>Supporting Chemicals</u>** **See Appendix**
Structural Formula	**See Appendix**

Summary

The naphtha hydrocarbon wastes category contains complex waste streams derived from the refining of petroleum crude oils. Because they are not intentionally manufactured and come from many parts of the refinery process, the naphthas are complex petroleum substances made up of an almost infinite combination of petroleum hydrocarbons and water. The components of this category are generally liquids that are expected to possess negligible to high vapor pressure and negligible to moderate water solubility. The category members are expected to possess moderate to low mobility in soil. Volatilization is expected to be moderate to high. The rate of hydrolysis is negligible. The rate of atmospheric photooxidation is slow to rapid. The members of the naphtha hydrocarbon wastes category are expected to possess low (P1) to high (P3) persistence and low (B1) to moderate (B2) bioaccumulation potential.

No data are available for the sponsored substances. The acute oral and dermal toxicity of CASRN 64741-87-3 is low in rats and rabbits, respectively; the acute inhalation toxicity in rats is moderate. The acute oral (rat) and dermal (rabbit) toxicity of CASRN 64741-66-8 is low; the inhalation toxicity in rats is moderate. The acute oral (rat) and dermal (rabbit) toxicity of CASRN 64741-55-5 is low; the acute inhalation toxicity in rats is moderate. The acute oral and dermal toxicity of CASRN 68955-35-1 and unleaded gasoline (no CASRN) is low in rats and rabbits, respectively. Several representative studies in gasoline are available. In unleaded gasoline (no CASRN), a decrease in brain weight in males was observed at 1.57 mg/L/day, the lowest dose tested in a repeated-dose toxicity study by the inhalation route in rats; the NOAEC for systemic toxicity was not be established. Effects on pulmonary function were observed at 6.35 mg/L/day in a repeated-dose toxicity study by the inhalation route in monkeys; the NOAEC for systemic toxicity is 1.57 mg/L/day. In unleaded gasoline blend (no CASRN), signs of kidney toxicity in males were reported at 0.15 mg/L/day in a repeated-dose toxicity study by the inhalation route in rats; the NOAEC for systemic toxicity is 14.7 mg/L/day in females (highest dose tested). The NOAEC is not established in males. In leaded gasoline (no CASRN), signs of blood toxicity and effects on pulmonary function were reported at 1.53 mg/L/day in repeated-

dose toxicity studies by the inhalation route in rats and monkeys; the NOAEC for systemic toxicity is 0.42 mg/L/day in rats and in male monkeys, and 1.53 mg/L/day in female monkeys (highest dose tested). A 13-week repeated-dose inhalation toxicity study with PONA mixture (No CASRN) showed increases in thrombocytes in males and reticulocytes in females at 6.35 mg/L/day; the NOAEC for systemic toxicity is 1.57 mg/L/day. In a combined inhalation repeated-dose/reproductive/developmental toxicity screening test in rats, CASRN 64741-41-9 showed a decrease in body weight gain and hypertrophy of thyroid follicular epithelium in both sexes at 13.7 mg/L/day; the NOAEC for systemic toxicity is 2.3 mg/L/day. Several combined repeated-dose reproductive/developmental toxicity screening studies with paraffinic, olefinic, and aromatic naphthas by the inhalation route in rats showed no signs of reproductive or developmental toxicity at any dose level; the lowest NOAEC is 23.9 mg/L/day. In a prenatal inhalation developmental toxicity study with gasoline vapor (CASRN 8006-61-9) in rats, no adverse treatment related effects were observed; the NOAEC for maternal and developmental toxicity is 1.6mg/L/day (highest concentration tested). In a prenatal inhalation developmental toxicity study in rats with PONA mixture vapor (No CASRN), no adverse treatment-related effects were observed in the dams; the NOAEC for maternal toxicity is 6.2 mg/L/day (highest concentration tested). An increase in skeletal variations was seen in fetuses at 6.2mg/L/day; the NOAEC for developmental toxicity is 1.7 mg/L/day. CASRNs 64741-55-5 and 64741-87-3 did not increase mutation frequency in mouse lymphoma cells *in vitro*. Gasoline (no CASRN) induced sister chromatid exchange in rats but did not induce micronuclei in rats *in vivo*. CASRN 64741-87-3 did not induce chromosomal aberrations in rats *in vivo*. Gasoline (No CASRN) is not irritating to rabbit eye nor is it a skin sensitizer in guinea pigs. Gasoline (No CASRN) is irritating to the rabbit skin. Gasoline was carcinogenic in rats and mice via the inhalation route, but not carcinogenic to mice via the dermal route. Aromatic naphthas were neurotoxic in rats via the inhalation route, whereas paraffinic and olefinic naphthas and gasoline were not neurotoxic in rats via the inhalation route. Unleaded and leaded gasoline are neurotoxic in humans.

No data on the sponsored substances are available. Based on the supporting chemicals, CASRNs 64741-66-8, 64741-55-5, 64741-46-4 and 64741-63-5, the 96-h LC_{50} for fish ranges from 0.305 to 11 mg/L, the 48-h EC_{50} for aquatic invertebrates ranges from 0.556 to 2.6 mg/L and the 72-h EC_{50} for aquatic plants ranges from 0.26 to 4.6 mg/L for growth rate. Based on the supporting chemicals, CASRNs 64741-66-8 and 64741-55-5, the 21-d chronic EC_{50} for aquatic invertebrates ranges from 0.46 to 1.9 mg/L for mortality, and 0.14 to 0.55 mg/L for reproduction.

No data gaps were identified under the HPV Challenge Program.

The sponsor, American Petroleum Institute (API) Petroleum HPV Testing Group, submitted a Test Plan and Robust Summaries to EPA for Reclaimed Petroleum Hydrocarbons category. EPA posted the submission on the ChemRTK HPV Challenge website on November 20, 2003 (http://www.epa.gov/chemrtk/pubs/summaries/recpethy/c14755tc.htm). EPA comments on the original submission were posted to the website on April 6, 2004. The sponsor submitted updated/revised documents on July 16, 2004 and September 3, 2010, which were posted to the ChemRTK website on September 20, 2004 and November 15, 2010, respectively.

Category Justification

The sponsor proposed a category comprised of hydrocarbon mixtures that have been reclaimed from process water, catalysts, filters, and other materials in contact with refinery streams, including spilled oil and oil recovered from wastewater treatment plants. In its original test plan, the sponsor grouped five waste streams into the reclaimed petroleum hydrocarbons category. In the final submission, however, the sponsor separated them into two categories: (1) Reclaimed petroleum hydrocarbons; residual hydrocarbon wastes from petroleum refining category and (2) Reclaimed petroleum hydrocarbons; naphtha hydrocarbon wastes from petroleum refining category. This hazard characterization pertains to the Reclaimed petroleum hydrocarbons; naphtha hydrocarbon wastes from petroleum refining category. A separate hazard characterization has been prepared for the Reclaimed petroleum hydrocarbons; residual hydrocarbon wastes from petroleum refining category.

The members of the reclaimed petroleum hydrocarbons; naphtha hydrocarbon wastes from petroleum refining category (see Table 1) are represented by the fuel oil, residual, wastewater skimming (CASRN 68956-48-9) and petroleum products, C5 – C12, reclaimed, wastewater treatment (CASRN 68956-70-7). The two wastes in this category are both examples of naphtha with carbon number ranges between 5 and 12 (or narrower). Naphthas are complex petroleum substances consisting of paraffinic hydrocarbons (normal and branched-chain), olefinic hydrocarbons, naphthenic hydrocarbons (cycloparaffins), and aromatic hydrocarbons (mainly alkylbenzenes); designated by the acronym PONA. These hydrocarbons are also represented in the HPV submission for the gasoline blending streams category (http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409tc.htm) for which EPA is preparing a hazard characterization that will be available for viewing at the following link: http://iaspub.epa.gov/oppthpv/hpv_hc_characterization.get_report_by_cas?doctype=2. Petroleum crude (see EPA hazard characterization for Crude Oil: http://iaspub.epa.gov/oppthpv/hpv_hc_characterization.get_report_by_cas?doctype=2) is a complex substance containing thousands of different organic hydrocarbon molecules. It contains 83-87% carbon, 11-15% hydrogen, and 1-6% sulfur. Three types of hydrocarbons predominate: paraffins (saturated chains), naphthenes (saturated rings), and aromatics (unsaturated rings). In many respects, the chemical composition of waste oils and sludges provides a snapshot of individual crude oil components at any particular stage of the refining process. This method of characterizing the individual waste streams is somewhat imprecise. Because individual wastes are not uniform and are often mixed and combined in a tank or other containment structure, the composition of the wastes are not static, but change rapidly as they are collected and stored for processing. For this reason, the compositional information described should not be viewed as an absolute characterization, but rather

as a general picture that is subject to change depending on the type of crude being refined and wastes being collected.

Table 1. Naphtha Hydrocarbon Wastes Category Streams Names and Assigned CASRNs for Sponsored Streams

Streams	CASRN	Descriptions
Fuel oil, residual, wastewater skimming's	68956-48-9	The recovered oil obtained by skimming all plant oil-bearing water streams. It consists predominantly of hydrocarbons having carbon numbers predominantly in the range of C7 through C10.
Petroleum products, C5 - C12, reclaimed, wastewater treatment	68956-70-7	A complex combination of hydrocarbons recovered in a dilute solution from a wastewater treatment plant. It consists of hydrocarbons having carbon numbers predominantly in the range of C5 through C12.

Justification for Supporting Chemicals

Human Health Endpoints
No data are available for members of this category. Seven supporting chemicals will be used to evaluate human health endpoints. These supporting chemicals are members of the gasoline blending streams category (see above) that are volatile liquid petroleum substances consisting of paraffinic, olefinic, naphthenic and aromatic hydrocarbons, with carbon numbers approximately in the range of C4 – C12 (as defined in the API Petroleum HPV Testing Group's test plan for gasoline blending streams, dated August 21, 2008; http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409tc.htm). The supporting chemicals used to address the human health endpoints for these sponsored category members can be found in Table 2.

For evaluation of human health endpoints, read-across is utilized where more than one potentially toxic constituent is present in the stream. The sponsor and EPA have used a conservative approach and used data for the most toxic constituent to characterize the hazard for the steam.

Ecotoxicity Endpoints
For the aquatic toxicity of the naphtha hydrocarbon wastes category, the sponsor indicated there were no data for the sponsored chemicals and instead referred to aquatic toxicity data in the HPV submission for the gasoline blending streams category (see above). EPA agrees that these data (see Table 2) are appropriate for supporting this category based on their similar physico-chemical properties, environmental fate characteristics and mode of toxic action (narcosis).

Table 2. Supporting Chemicals for Reclaimed Petroleum Hydrocarbons; Naphtha Hydrocarbon Wastes from Petroleum Refining Category	
CASRN	**CA Index Name**
64741-66-8	Naphtha (petroleum), light alkylate
64741-55-5	Naphtha (petroleum), light catalytic cracked
64741-87-3	Naphtha (petroleum), sweetened
68955-35-1	Naphtha (petroleum), catalytic reformed
8006-61-9 or no CASRN	Gasoline, natural
64741-41-9	Naphtha (petroleum), heavy straight run
68513-02-0	Naphtha (petroleum), full range coker
64741-46-4	Naphtha (petroleum), light straight-run
64741-63-5	Naphtha (petroleum), light catalytic reformed
No CASRN	PONA mixture

1. Chemical Identity

1.1 Identification and Purity

The following description is taken from the Category Assessment Document (August, 2010):

These waste streams are all complex substances that are reflective of the crude oils and product streams generated within an oil refinery. Because wastes streams are not uniform and are often mixed and combined in a tank or other containment structure, the composition of the wastes are not static, but change rapidly as they are collected and stored for processing. Typically they contain hydrocarbons boiling over 350 degrees Fahrenheit and may contain significant amounts of polycyclic aromatic compounds (PAC). All exist as liquids, emulsions, or suspensions at room temperature with variable solution densities and viscosities.

1.2 Physical-Chemical Properties

The physical-chemical properties of the naphtha hydrocarbon wastes category are summarized in Table 3. A description of the complex mixtures used to describe this category is provided in the Appendix. Naphtha hydrocarbon wastes are liquids recovered when crude oil is refined into fuels and other downstream products. The components of this category are generally liquids that possess high vapor pressure and low to moderate water solubility.

Table 3. Physical-Chemical Properties of the Reclaimed Petroleum Hydrocarbons Category[1]		
Naphtha Hydrocarbon Wastes from Petroleum Refining		
Property	**SPONSORED CHEMICAL** **Petroleum products, C5-12, reclaimed, wastewater treatment[2]**	**SPONSORED CHEMICAL** **Fuel oil, residual, wastewater skimmings[2]**
CASRN	68956-70-7	68956-48-9
Molecular Weight	Complex mixture with carbon number C5–C12	Complex mixture with carbon number C5–C12
Physical State	Liquid	Liquid
Melting Point	<25 °C	<25 °C
Boiling Point	37–200 °C (measured); 34–220 °C (measured); 36–218 °C (measured/estimated)[3-5]	37–200 °C (measured); 34–220 °C (measured); 111–156 °C measured/estimated)[3-5]
Vapor Pressure	970–6,880 mm Hg (measured for unspecified gas blending streams); 0.14–514 mm Hg at 25 °C (measured/estimated)[3-5]	970–6,880 mm Hg (measured for unspecified gas blending streams); 3.9–28.4 mm Hg at 25 °C (measured/estimated)[3-5]
Dissociation Constant (pK_a)	Not applicable	Not applicable
Henry's Law Constant	0.0066 – 1.2 atm-m^3/mol (measured/estimated)[3-5]	0.0066 – 5.3 atm-m^3/mol (measured/estimated)[3-5]
Water Solubility	1.6–13.7 mg/L (measured in freshwater)[2,6]; 0.9 –14 mg/L (measured in seawater)[2,6]; 0.1–526 mg/L (measured/estimated)[3-5]	1.6 –13.7 mg/L (measured in freshwater)[2,6]; 0.9–14 mg/L (measured in seawater)[2,6]; 1.2–526 mg/L (measured/estimated)[3-5]
Log K_{ow}	2.7–6.0 (measured/estimated)[3-5]	2.7–5.0 (measured/estimated)[3-5]

[1] American Petroleum Institute Petroleum HPV Testing Group. Revised Test Plan and Robust Summary for the Reclaimed Petroleum Hydrocarbons Category (Residual hydrocarbon wastes from petroleum refining). Available at: http://www.epa.gov/chemrtk/pubs/summaries/recpethy/c14755tc.htm as of December 22, 2010.
[2] American Petroleum Institute Petroleum HPV Testing Group. Revised Test Plan and Robust Summary for the Reclaimed Petroleum Hydrocarbons Category (Naphtha hydrocarbon wastes from petroleum refining). Available at: http://www.epa.gov/chemrtk/pubs/summaries/recpethy/c14755tc.htm as of December 22, 2010.
[3] Data range based upon the CASRN definition, from which representative structures were derived; see Appendix for detailed information on structures and composition.
[4] SRC. The Physical Properties Database (PHYSPROP). Syracuse, NY: Syracuse Research Corporation. Available online at http://www.syrres.com/esc/physprop.htm as of December 15, 2010.
[5] U.S. EPA. 2010. Estimation Programs Interface Suite™ for Microsoft® Windows, v4.00. U.S. Environmental Protection Agency, Washington, DC, USA. Available online from: http://www.epa.gov/opptintr/exposure/pubs/episuitedl.htm as of December15, 2010.
[6] Solubility corresponds to water-accommodated fractions (WAFs) at nominal loading rates of 50 – 1,000 mg/L of gasoline blending streams.

2. General Information on Exposure

2.1 Production Volume and Use Pattern

The naphtha hydrocarbon wastes category chemicals had an aggregated production and/or import volume in the United States greater than 1billion, 100 million pounds in calendar year 2005.

- CASRN 68956-48-9: 100 to <500 million pounds;
- CASRN 68956-70-7 1 billion pounds and greater;

CASRN 68956-48-9 and 68956-70-7:
No industrial processing and uses and commercial and consumer uses were reported for these chemicals.

2.2 Environmental Exposure and Fate

The components of the naphtha hydrocarbons category contain low molecular weight components that are expected to possess high to moderate mobility in soil. Petroleum products, C5-12, reclaimed, wastewater treatment (CASRN 68956-70-7) and fuel oil, residual, wastewater skimming's (CASRN 68956-48-9), consist of lighter molecular weight hydrocarbons that are skimmed from the surface of water present in oil wastewater treatment plants that are expected to have many components that are readily biodegradable. Many of these substances may be persistent in the environment. The rate of hydrolysis is expected to be negligible since the substances in this category do not possess functional groups that hydrolyze under environmental conditions. The members of the naphtha hydrocarbons category are expected to contain substances that have low (P1) to high (P3) persistence and low (B1) to high (B3) high bioaccumulation potential.

The environmental fate properties are provided in Table 4.

Table 4. Environmental Fate Properties of the Reclaimed Petroleum Hydrocarbons Category[1]		
Naphtha hydrocarbon wastes from petroleum refining		
Property	**SPONSORED CHEMICAL** **Petroleum products, C5-12, reclaimed, wastewater treatment**[2]	**SPONSORED CHEMICAL** **Fuel oil, residual, wastewater skimmings**[2]
CASRN	68956-70-7	68956-48-9
Photodegradation Half-life	1.9–31.7 hours (estimated)[3,4]	2.0–24.6 hours (estimated)[3,4]
Hydrolysis Half-life	Stable	Stable
Biodegradation	No data. Mixture is likely to contain biodegradable and not readily biodegradable substances	No data. Mixture is likely to contain biodegradable and not readily biodegradable substances
Bioaccumulation Factor	148–3,083 (estimated)[3,4]	37.8–975.4 (estimated)[3,4]
Log K_{oc}	1.9–3.5 (estimated)[3,4]	2.4–3.0 (estimated)[3,4]
Fugacity (Level III Model)[3,4] Air (%) Water (%) Soil (%) Sediment (%)	 2.1–43.4 27.0–85.1 0.9–60.9 0.2–8.2	 2.4–23.7 41.2–91.5 1.2–39.4 0.4–3.0
Persistence[5]	P1 (low) to P3 (high)	P1 (low) to P3 (high)
Bioaccumulation[5]	B1 (low) to B2 (moderate)	B1 (low)

[1] American Petroleum Institute Petroleum HPV Testing Group. Revised Test Plan and Robust Summary for the Reclaimed Petroleum Hydrocarbons Category (Residual hydrocarbon wastes from petroleum refining). Available at: http://www.epa.gov/chemrtk/pubs/summaries/recpethy/c14755tc.htm as of December 22, 2010.
[2] American Petroleum Institute Petroleum HPV Testing Group. Revised Test Plan and Robust Summary for the Reclaimed Petroleum Hydrocarbons Category (Naphtha hydrocarbon wastes from petroleum refining). Available at: http://www.epa.gov/chemrtk/pubs/summaries/recpethy/c14755tc.htm as of December 22, 2010.
[3] Data range based upon the CASRN definition, from which representative structures were derived; see Appendix for detailed information on structures and composition.
[4] U.S. EPA. 2010. Estimation Programs Interface Suite™ for Microsoft® Windows, v4.00. U.S. Environmental Protection Agency, Washington, DC, USA. Available online from: http://www.epa.gov/opptintr/exposure/pubs/episuitedl.htm as of December15, 2010.
[5] Federal Register. 1999. Category for Persistent, Bioaccumulative, and Toxic New Chemical Substances. *Federal Register* 64, Number 213 (November 4, 1999) pp. 60194–60204.

Conclusion: The naphtha hydrocarbons from petroleum wastes refining category contains complex waste streams derived from the refining of petroleum crude oils and are commonly referred to as slop oils. Because they are not intentionally manufactured and come from many parts of the refinery process, the slop oils are made up of an almost infinite combination of petroleum hydrocarbons and water. The components of this category are generally liquids that are expected to possess negligible to high vapor pressure and negligible to moderate water solubility. The category members are expected to possess high to low mobility in soil. Volatilization is expected to be moderate to high. The rate of hydrolysis is negligible. The rate of atmospheric photooxidation is slow to rapid. The members of the reclaimed petroleum hydrocarbons category are expected to possess low (P1) to high (P3) persistence and low (B1) to high (B3) bioaccumulation potential.

3. Human Health Hazard

A summary of the human health toxicity data submitted for SIDS endpoint is provided in Table 5. The table indicates where test data are read-across (RA) to the sponsored chemicals of the reclaimed petroleum hydrocarbons: residual hydrocarbon wastes from petroleum refining category.

Acute Oral Toxicity

Naphtha (petroleum), light catalytic cracked (CASRN 64741-55-5, supporting chemical)
Paraffins: 30.6% (v/v) Olefins: 45.6% Naphthenes: 10.4% Aromatics: 13.1%
Sprague-Dawley rats (5/sex/dose) were administered naphtha (petroleum), light catalytic cracked (API 83-20) via gavage at 5000 mg/kg and observed for 14 days following dosing. No mortalities occurred.
LD_{50} > 5000 mg/kg

Naphtha (petroleum), sweetened (CASRN 64741-87-3, supporting chemical)
Paraffins: 72.1% (v/v) Olefins: < 0.1% Naphthenes: 20.9% Aromatics: 4.1%
Sprague-Dawley rats (5/sex/dose) were administered naphtha (petroleum), sweetened (API 81-08) via gavage at 5000 mg/kg and observed for 14 days following dosing. No mortalities occurred.
LD_{50} > 5000 mg/kg

Naphtha (petroleum), light alkylate (CASRN 64741-66-8, supporting chemical)
Paraffins: 99.4% (v/v), Olefins: 0%, Naphthenes: 0.6%, Aromatics: 0%
See additional information at HPV submission for gasoline blending streams category: http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409rr3.pdf.
LD_{50} Rat > 7000 mg/kg

Unleaded gasoline (No CASRN, supporting chemical)
Paraffins: 57.8% (v/v) Olefins: 9.9% Naphthenes: 3.9% Aromatics: 28.1%
Sprague-Dawley rats (5/sex/dose) were administered unleaded gasoline (API PS-6) via gavage at 10, 15, 17.5, 20 or 25 mL/kg (~ 13,875 mg/kg)[4] and observed for 14 days following dosing. Mortality occurred at doses ≥ 15 mL/kg.
LD_{50} ~ 13,875 mg/kg

Full range catalytic reformed naphtha (CASRN 68955-35-1, supporting chemical)
Sprague-Dawley rats (5/sex/dose) were administered a single dose of the test substance [API 83-05; approximately 63% aromatics] at 5.0, 6.0, 6.5, 7.0 and 9.8 g/kg (males) and 3.57, 4.29, 5.0, 7.0, and 9.8 g/kg (females) via oral gavage. The animals were observed every hour for the first six hours and then twice daily thereafter for 14 days. Specific dose mortality were reported as 5.0(0/5), 6.0(1/5), 6.5(1/5), 7.0(5/5) and 9.8 g/kg (5/5) males; and 3.57(0/5), 4.29(0/5), 5.0(3/5), 7.0(3/5), and 9.8 g/kg (5/5) for females.
LD_{50} (males) = 6,620 mg/kg
LD_{50} (females) = 5,390 mg/kg

Acute Dermal Toxicity

Naphtha (petroleum), light alkylate (CASRN 64741-66-8, supporting chemical)
Paraffins: 99.4% (v/v), Olefins: 0%, Naphthenes: 0.6%, Aromatics: 0%
New Zealand White rabbits (4/sex/dose) were administered naphtha (petroleum), light alkylate (API 83-19) via the dermal route at 2000 mg/kg-bw on either abraded or intact skin under occluded conditions for 24 hours and observed for 14 days following dosing. No mortalities occurred. [See additional information at HPV submission for gasoline blending streams category: http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409rr3.pdf].
LD_{50} > 2000 mg/kg-bw

Sweetened naphtha (CASRN64741-87-3, supporting chemical)
Rabbit (4/sex/dose) were administered the test substance [API 81-08; approximately 21% naphthenics] on abraded and intact dorsal skin (2/sex/dose) at 2 mg/kg. The skin was wiped clean after 24 hours and the animals observed for 14 days. No mortalities were observed during the study.
LD_{50} > 2000 mg/kg

Naphtha (petroleum), catalytic reformed (CASRN 68955-35-1, supporting chemical)
Paraffins: 32.1% (v/v), Olefins: 0.5%, Naphthenes: 3.7%, Aromatics: 63.3%
See additional information at HPV submission for gasoline blending streams category: http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409rr3.pdf.
LD_{50} Rabbit > 2000 mg/kg

[4] Gasoline units were converted from volume to mass using a density of 0.74 g/mL, which was calculated using the specific gravity provided in the robust summaries for the gasoline sample API 94-01. Density of API PS-6 was not provided.

Naphtha (petroleum), light catalytic cracked (CASRN 64741-55-5, supporting chemical)
Paraffins: 30.6% (v/v) Olefins: 45.6% Naphthenes: 10.4% Aromatics: 13.1%
New Zealand White rabbits (4/sex/dose) were administered naphtha (petroleum), light catalytic cracked (API 83-20) via the dermal route at 2000 or 3000 mg/kg under occluded conditions for 24 hours and observed for 14 days following dosing. Mortality was limited to one male and one female at 2000 mg/kg.
LD_{50} > 3000 mg/kg

Unleaded gasoline (CASRN 8006-61-9, supporting chemical)
Paraffins: 57.8% (v/v) Olefins: 9.9% Naphthenes: 3.9%Aromatics: 28.1%
New Zealand White rabbits (4/sex/dose) were administered unleaded gasoline (API PS-6) via the dermal route at 5 mL/kg-bw (~ 3700 mg/kg-bw)[5] to intact or abraded skin under occluded conditions for 24 hours and observed for 14 days following dosing. Mortality occurred in one female.
LD_{50} > 3700 mg/kg

Acute Inhalation Toxicity

Light alkylate naphtha (CASRN 64741-66-8, supporting chemical)
Sprague-Dawley rats (5/sex/concentration) were exposed by whole body inhalation to the test substance [API 83-19; approximately 100% paraffinic] at a nominal concentration of 5.04mg/L for 4 hours. After 4 hours, the animals were observed twice daily for 14 days. No mortalities were observed during the study. The mean measured concentration was 6.31 mg/L
LC_{50} > 6.31 mg/L

Light catalytic cracked naphtha (CASRN 64741-55-5, supporting chemical)
Sprague-Dawley rats (5/sex/test concentration) were exposed whole-body to light catalytic cracked naphtha (API 83-20) via inhalation at a nominal concentration of 5 mg/L for 4 hours and observed for 14 days following dosing. The mean measured concentration was 5.28 mg/L. No mortality was observed.
LC_{50} > 5.3 mg/L

Naphtha (petroleum), sweetened (CASRN 64741-87-3, supporting chemical)
Paraffins: 72.1% (v/v), Olefins: < 0.1%, Naphthenes: 20.9%, Aromatics: 4.1% [API 81-08]
[See additional information at HPV submission for gasoline blending streams category: http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409rr3.pdf].
LC_{50} Rat > 5.2 mg/L

[5] Gasoline units were converted from volume to mass using a density of 0.74 g/mL, which was calculated using the specific gravity provided in the robust summaries for the gasoline sample API 94-01. Density of API PS-6 was not provided.

Naphtha (petroleum), catalytic reformed (CASRN 68955-35-1, supporting chemical)
Paraffins: 32.1% (v/v), Olefins: 0.5%, Naphthenes: 3.7%, Aromatics: 63.3%
See additional information at HPV submission for gasoline blending streams category: http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409rr3.pdf.
LC_{50} Rat > 5.2 mg/L

Naphtha (petroleum), hydrotreated heavy (CASRN 64742-48-9, supporting chemical)
PONA Composition Not Specified
Additional details are available from TSCATS (OTS0537641) and http://iaspub.epa.gov/oppthpv/hpv_hc_characterization.get_report?doctype=2
LC_{50} = 1.1 – 1.9 mg/L

Repeated-Dose Toxicity

Heavy straight run naphtha (CASRN 64741-41-9, supporting chemical)
In a combined inhalation repeated-dose/reproductive/developmental toxicity screening test, Sprague Dawley rats (12/sex/concentration) were exposed via flash evaporation to 0, 100, 500 or 3000 ppm (0, 0.1, 2.28, or 13.65 mg/L) CASRN 64741-41-9 (approximately 30% naphthenic) for 30 days (males) and 31 days (females). Satellite groups of 12 young, nulliparous, nonpregnant female rats were exposed to 0, 100, 500, or 3000 ppm during a premating period of approximately 2 weeks, a cohabitation period of approximately 2 weeks, and a gestation period of approximately 3 weeks. The animals were not exposed after gestation day 19, or during the approximately 4-day lactation period. 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. After approximately 30 days, hematology and clinical chemistry measurements were completed on all males, all sub-chronic female rats and lactation day 4 satellite females. 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 following approximately 4 weeks of test substance administration for males, subchronic females and lactation day 4 for satellite 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 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.

Mortality did not occur at any exposure concentration. Decreases in body weight, weight gain, and food efficiency occurred at 3000ppm in female rats. Slightly decreased body weight and/or weight gain occurred at 3000ppm in male rats and satellite females; however, the magnitude of these effects was not statistically significant. There were no adverse or test substance related effects on neurobehavioral parameters, hematology or clinical chemistry parameters. Liver weight parameters were increased at 3000ppm in male and female rats, which correlated with

hepatocellular hypertrophy. Kidney weight was increased at 500ppm and in male rats and at 3000ppm in female rats. In male rats, the increased absolute/relative kidney weights correlated with hyaline droplet accumulation observed in 100ppm and above males, indicative of alpha 2-microglobulin mediated nephropathy also identified as light hydrocarbon nephropathy, a species and sex specific syndrome not relevant to humans. At 3000ppm, increased kidney weight were not associated with any functional or microscopic change in sub-chronic female rats, and therefore were considered secondary to non-adverse enzyme induction. Minimal hypertrophy of thyroid follicular epithelium occurred at 3000ppm in male and sub-chronic female rats.
LOAEC ~ 13.7 mg/L (based on decreased body weight, weight gain, hypertrophy of thyroid follicular epithelium in both sexes and signs of liver toxicity)
NOAEC ~ 2.3 mg/L

Unleaded gasoline blend (CASRN 8006-61-9, supporting chemical)
(1) PONA: Paraffins + Naphthenes: 45% (units not specified) Olefins: 12% Aromatics: 43%
In a 90-day repeated-dose inhalation study, Sprague-Dawley rats (10/sex/dose) were exposed whole-body to an unleaded gasoline blend as a vapor at 0, 0.15, 1.44 or 14.7 mg/L, 6 hours/day, 5 days/week for 90 days. General toxicity and kidney effects were evaluated. No treatment-related mortalities were noted. Irreversible tubular dilatation and necrosis at the corticomedullary junction were observed in male rats at all dose levels, with dose-related severity. No effects were observed in females.
LOAEL (male) = 0.15 mg/L/day (based on nephropathy)
NOAEL (male) = Not established
NOAEL (female) = 14.7 mg/L/day

(2) PONA: Paraffins: 77.4% (v/v), Olefins: 15.2%, Naphthenes: 3.3%, Aromatics: 4.2%
In a 13-week repeated-dose inhalation toxicity test, Sprague-Dawley rats (10/sex/dose) were administered unleaded gasoline (API 99-01) vapor condensate via whole-body inhalation as a vapor at nominal concentrations of 0, 2, 10 or 20 mg/L, 6 hours/day, 5 days/week for 13 weeks. Mean measured concentrations were 0, 2.1, 10.2 and 20.3 mg/L. Endpoints included clinical signs, body weight, feed consumption, ophthalmology, hematology, clinical chemistry, neurobehavioral effects, organ weights and histopathology. No treatment-related mortalities occurred. A slight and reversible increase in red nasal discharge was observed in the 20.3 mg/L group. This effect corresponded with eosinophilic material within the nasolacrimal duct lumen. There were no toxicologically significant differences in ophthalmoscopic findings, body weights, feed consumption, motor activity, functional observational battery measures, clinical chemistry, hematology and coagulation values between groups compared to controls. No gross anomalies were observed. Microscopic renal histopathologic changes, consisting of hyaline droplet nephropathy, were observed in male rats at all exposure levels.
NOAEC = 20.3 mg/L/day (based on no adverse systemic effects at the highest concentration tested)[6]

[6] Nephropathy seen in male rats may be occurring by an alpha 2μ-globulin-mediated mechanism (which is male rat-specific and not considered relevant to humans). EPA's Risk Assessment Forum has outlined key events and data that are necessary to demonstrate this mode of action (Alpha 2μ-Globulin: Association with Chemically Induced Renal Toxicity and Neoplasia in the Rat, EPA/625/3-91/019F).

Leaded gasoline (No CASRN, supporting chemical)

(1) Paraffins + Naphthenes: 64.8% (units not specified), Olefins: 7.8%, Aromatics: 27.4%

Sprague-Dawley rats (20/sex/dose) were exposed whole-bod y to leaded gasoline as a vapor at nominal concentrations of 0, 100 or 400 ppm (approximately 0, 0.4 or 1.6 mg/L),[7] 6 hours/day, 5 days/week for 13 weeks. Mean measured concentrations were 0, 0.42 and 1.53 mg/L. Endpoints measured in the control and high-dose animals included hematology and histopathology. Endpoints measured at all doses included urinalysis and organ weights. No treatment-related mortality was observed. Hematological changes at 1.53 mg/L included a decrease in mean corpuscular hemoglobin concentration in males, increases in hematocrit and mean corpuscular volume in
females and a decrease in WBC count in females. Decreases in absolute and relative liver weights were observed in females at 1.53 mg/L. Increases in absolute liver and kidney weights were observed at 0.42 mg/L in males and females, respectively. Decreased relative heart weight was observed in males at ≥ 0.42 mg/L. No evidence of treatment-related histopathology was observed, with the exception of kidney lesions in males at all doses, which were characterized by subtle, but discernible increases in the incidence and severity of regenerative epithelium and dilated tubules. Affected tubules contained protein in their lumens.

LOAEC ~ 1.53 mg/L (based on decreased mean corpuscular hemoglobin concentration in males, increased hematocrit and mean corpuscular volume in females and decreased WBC count in females)

NOAEC ~ 0.42 mg/L

(2) PONA: Paraffins + Naphthenes: 61.7% (units not specified) Olefins: 8.2% Aromatics: 30.1%

In a 13-week repeated-dose inhalation toxicity study, Sprague-Dawley rats (20/sex/dose) were exposed whole-body to unleaded gasoline as a vapor at nominal concentrations of 0, 400 or 1500 ppm (approximately 0, 1.6 or 5.9 mg/L)[7], 6 hours/day, 5 days/week for 13 weeks. Mean measured concentrations were 0, 384 and 1552 ppm (0, 1.57 and 6.35 mg/L). Endpoints measured in the control and high-dose animals included hematology, central nervous system evaluation, pulmonary function and histopathology. Endpoints measured at all doses included urinalysis and organ weights. Decreases in respiratory rate (males only) and tidal volume (females only) and an increase in minute volume (males only) were observed at 6.35 mg/L. An increase in absolute thyroid weight was observed in males at concentrations ≥ 1.57 mg/L. A decrease in relative kidney weight was observed in males at 1.57 mg/L. No treatment-related mortality was observed. Increases were observed in thrombocytes in males and in reticulocytes in females at 6.35 mg/L. An increase in absolute liver weight was observed at 1.57 mg/L. Decreases in relative adrenal (females only) and brain (males only) weights were observed at 6.35 and ≥ 1.57 mg/L, respectively. No evidence of treatment-related histopathology was observed, with the exception of kidney lesions in males at all doses, which 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.

[7] Units were converted from ppm to mg/L using the molecular weight of 96.2 g/mole provided by the sponsor for unleaded gasoline sample API 99-01.

LOAEC ~ 6.35 mg/L/day (based on increases in thrombocytes in males and in reticulocytes in females, reduced respiratory rate in males and reduced tidal volume in females)
NOAEC ~ 1.57 mg/L/day

(3) PONA: Paraffins + Naphthenes: 64.8% (units not specified), Olefins: 7.8%, Aromatics: 27.4%
Squirrel monkeys (4/sex/dose) were exposed whole-body to leaded gasoline as a vapor at nominal concentrations of 0, 100 or 400 ppm (~ 0, 0.4 or 1.6 mg/L),[8] 6 hours/day, 5 days/week for 13 weeks. Mean measured concentrations were 0, 0.42 and 1.53 mg/L. Endpoints measured in the control and high-dose animals included hematology, central nervous system evaluation, pulmonary function and histopathology. Endpoints measured at all doses included urinalysis and organ weights. No treatment-related mortality was observed. One female exhibited emesis after 17 days of exposure at 1.53 mg/L. An increase in minute volume was observed in males at 1.53 mg/L. A decrease in absolute kidney weight was observed in males at 1.53 mg/L. No evidence of treatment-related histopathology was observed.
LOAEC (male) ~ 1.53 mg/L (based on an increase in minute volume)
NOAEC (male) ~ 0.42 mg/L
NOAEC (female) ~ 1.53 mg/L (based on no observed systemic effects at the highest concentration tested)

(4) PONA: Paraffins: 37.7% (v/v), Olefins: 53.7%, Naphthenes: 4.3%, Aromatics: 4.4%
See additional information at HPV submission for gasoline blending streams category: http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409rr3.pdf.
LOAEC (males) = 7.7 mg/L/day (increases in relative kidney weight, renal inflammation and tubular dilatation)
NOAEC (males) = 2.3 mg/L/day
LOAEC (females) = 23.4 mg/L/day (based on reductions in mean corpuscular hemoglobin concentration)
NOAEC (females) = 7.7 mg/L/day

(5) PONA: Paraffins: 33.2% (v/v), Olefins: 40.0%, Naphthenes: 10.1%, Aromatics: 16.8%
See additional information at HPV submission for gasoline blending streams category: http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409rr3.pdf.
NOAEC = 7.69 mg/L/day (based on no effects observed at the highest concentration tested)

(6) PONA: Paraffins: 33.2% (v/v), Olefins: 40.0%, Naphthenes: 10.1%, Aromatics: 16.8%
See additional information at HPV submission for gasoline blending streams category: http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409rr3.pdf.
LOAEC (males) = 7.69 mg/L/day (based on a decrease in the number of sperm per gram of cauda epididymis)
NOAEC (males) = 2.06 mg/L/day
NOAEC (females) = 7.69 mg/L/day (based on no effects at the highest concentration tested)

(7) PONA: Paraffins: 42.8% (v/v), Olefins: 36.5%, Naphthenes: 10.2%, Aromatics: 10.2%

[8] Units were converted from ppm to mg/L using the molecular weight of 96.2 g/mole provided by the sponsor for unleaded gasoline sample API 99-01.

See additional information at HPV submission for gasoline blending streams category: http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409rr3.pdf.
LOAEC (males) = 9.5 mg/L/day (based on increased liver weights and centrilobular hepatocellular hypertrophy)
NOAEC (males) = 5.5 mg/L/day
LOAEC (females) = 16.4 mg/L/day (based on increased liver weights and centrilobular hepatocellular hypertrophy)
NOAEC (females) = 9.5 mg/L/day

Naphtha (petroleum), light alkylate (CASRN 64741-66-8, supporting chemical)
PONA: Paraffins: 99.97% (v/v), Olefins: 0.03%, Naphthenes: 0%, Aromatics: 0%
See additional information at HPV submission for gasoline blending streams category: http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409rr3.pdf.
NOAEC = 24.3 mg/L/day (based on no effects observed at the highest concentration tested)

Light naphtha, n-hexane rich (No CASRN, supporting chemical)
PONA: Paraffins: 94.5% (v/v), Olefins: 0.03%, Naphthenes: 3.2%, Aromatics: 2.3%
See additional information at HPV submission for gasoline blending streams category: http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409rr3.pdf.
NOAEL ~ 665 mg/kg-bw/day (based on no systemic effects at the highest dose tested)

Naphtha (petroleum), sweetened (CASRN 64741-87-3, supporting chemical)
PONA: Paraffins: 49.6% (v/v), Olefins: 43.5%, Naphthenes: 5.6%, Aromatics: 0.5%
See additional information at HPV submission for gasoline blending streams category: http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409rr3.pdf.
NOAEL = 652 mg/kg-bw/day (based on no systemic effects at the highest dose tested)

Naphtha (petroleum), full-range coker (CASRN 68513-02-0, supporting chemical)
PONA: Paraffins: 37.8% (v/v), Olefins: 39.2%, Naphthenes: 12.6%, Aromatics: 10.5%
See additional information at HPV submission for gasoline blending streams category: http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409rr3.pdf.
LOAEL = 188 mg/kg-bw/day (based on increased globulin values [females], decreased albumin/globulin ratios [females] and lymph node hyperplasia [both sexes])
NOAEL = 38 mg/kg-bw/day

Naphtha (petroleum), light catalytic cracked (CASRN 64741-55-5, supporting chemical)
PONA: Paraffins: 43.6% (w/w), Olefins: 22.7%, Naphthenes: 9.7%, Aromatics: 24.0%
See additional information at HPV submission for gasoline blending streams category: http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409rr3.pdf.
NOAEL = 300 mg/kg-bw/day (based on no systemic effects observed at the highest dose tested)

Naphtha (petroleum), light catalytic reformed (CASRN 64741-63-5, supporting chemical)
Paraffins: 88.3% (v/v), Olefins: 1.4%, Naphthenes: 1.2%, Aromatics: 9.1%
See additional information at HPV submission for gasoline blending streams category: http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409rr3.pdf[9]
LOAEC (male) = 27.8 mg/L/day (based on decreases in total WBC count, lymphocyte count and absolute and relative spleen weights)
NOAEC (male) = 9.3 mg/L/day
NOAEC (female) = 27.8 mg/L/day (highest concentration tested)

Reproductive Toxicity

Naphtha (petroleum), heavy straight-run (CASRN 64741-41-9, supporting chemical)
Paraffins: 52.9% (v/v), Olefins: 5.1%, Naphthenes: 28.6%, Aromatics: 11.8%
In the combined repeated-dose/reproductive/developmental toxicity screening test described previously, Sprague-Dawley rats were exposed whole-body to naphtha (petroleum), heavy straight-run as a vapor for 30 – 54 days, including 14 days prior to mating, up to 14 days during mating and during gestation up to day 19. Pups were observed until lactation day 4. There were no effects on histopathology of reproductive organs, number of pregnant females, number of females delivering, mating index, fertility index, precoital interval, gestation length, number of corpora lutea, number of implantation sites, post-implantation losses, number of pups born, live born index, viability index, sex ratio, clinical observations of pups, pup body weights or pup body weight gain.
NOAEC (reproductive toxicity) = 13.4 mg/L/day (highest concentration tested)

Unleaded gasoline (no CASRN, supporting chemical)
(1) Paraffins: 48.7% (v/v) Olefins: 9.0% Naphthenes: 6.3% Aromatics: 36.0%
In a two-generation study, Sprague-Dawley rats (26/sex/dose) were exposed whole-body to unleaded gasoline (API 99-01) vapor condensate at nominal concentrations of 0, 2, 10 or 20 mg/L as a vapor for 6 hours/day, 7 days/week for 10 weeks prior to mating, 2 weeks during mating, 3 weeks during gestation and 4 weeks during lactation. Exposure was suspended on gestation day 19 and resumed on lactation day 5. Mean measured concentrations were 0, 2.01, 10.1 and 20 mg/L. No treatment-related mortalities were observed. Decreases were observed in body weight gain in P0 females and F1 males at 20 mg/L. No effects were observed on the following parameters in adults: clinical condition, feed consumption, estrous cycle data, mating, fertility and gestation indices, pregnancy rate, gestation duration, primordial and growing follicle counts and sperm motility, count and morphology. An increase in kidney weight was observed in P0 and F1 males at ≥ 10.1 mg/L and in P0 females at 20 mg/L. Males exhibited hyaline droplet nephropathy1at 20 mg/L. There were no effects observed on the number of pups delivered, number of pups dying, number of implantation sites per litter, sex ratio and number of live pups per litter. There were no exposure-related differences in measured parameters in pups,

[9] Nephropathy seen in male rats may be occurring by an alpha 2μ-globulin-mediated mechanism (which is male rat-specific and not considered relevant to humans). EPA's Risk Assessment Forum has outlined key events and data that are necessary to demonstrate this mode of action (Alpha 2μ-Globulin: Association with Chemically Induced Renal Toxicity and Neoplasia in the Rat, EPA/625/3-91/019F).

including body weight and body weight gain, macroscopic postmortem evaluations, viability and lactation survival indices, organ weights or neuropathological findings.
NOAEC (reproductive toxicity) = 20 mg/L/day (highest concentration tested)

(2) PONA (Paraffinic, Olefinic, Naphthenic and Aromatic) composition not specified
In a two-generation study, Sprague-Dawley rats (30/sex/dose) were exposed via inhalation to unleaded gasoline vapor condensate (~ 98.8% C3 – C8 non-aromatic hydrocarbons and ~ 1.4% aromatic hydrocarbons) at nominal concentrations of 0, 5, 10 or 20 mg/L for 6 hours/day, 7 days/week for 10 (P0) or 13 (F1) weeks prior to mating, 3 weeks during mating, during gestation until day 20 and resuming on postpartum day 5. Mean measured concentrations were 0, 5.08, 10.3 and 20.2 mg/L. No treatment-related mortality was observed. Increases were observed in liver, kidney and testis weights in males and lung weights in females (doses not specified), but no dose-response relationship was observed. Relative kidney weights in males were elevated at 20.2 mg/L in the F1 generation. Hyaline droplets were observed in the kidneys of males at 20.2 mg/L. No treatment-related effects were observed on clinical condition, body weight of pups and adults, food consumption, mating index, fecundity, fertility index, length of gestation, litter size, live birth index, numbers of live and dead pups, sex ratio, pup survival, pup body weight gain, sperm count, motility and morphology, estrous cycle data, number of corpora lutea and pup maturation rate.
NOAEC (reproductive toxicity) = 20.2 mg/L/day (highest concentration tested)

(3) Paraffins: 33.2% (v/v), Olefins: 40.0%, Naphthenes: 10.1%, Aromatics: 16.8%
In the repeated-dose inhalation study described previously, Sprague-Dawley rats exposed to naphtha (petroleum), light catalytic cracked (LCCN) as a vapor at a measured concentration of 7.69 mg/L for 13 weeks had a lower number of sperm per gram of cauda epididymis compared to the sham controls, but not the untreated controls. See additional information at HPV submission for gasoline blending streams category:
http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409rr3.pdf.

Naphtha (petroleum), light alkylate (CASRN 64741-66-8, supporting chemical)
Paraffins: 99.97% (v/v), Olefins: 0.03%, Naphthenes: 0%, Aromatics: 0%
See additional information at HPV submission for gasoline blending streams category:
http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409rr3.pdf.
NOAEC (reproductive toxicity) = 25 mg/L/day (based on no effects observed at the highest concentration tested)

Naphtha (petroleum), light catalytic cracked (CASRN 64741-55-5, supporting chemical)
Paraffins: 37.7% (v/v), Olefins: 53.7%, Naphthenes: 4.3%, Aromatics: 4.4%
See additional information at HPV submission for gasoline blending streams category:
http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409rr3.pdf.
NOAEC (reproductive toxicity) ~ 23.9 mg/L/day (based on no effects observed at the highest concentration tested)

Naphtha (petroleum), light catalytic reformed (CASRN 64741-63-5, supporting chemical)
Paraffins: 88.3% (v/v), Olefins: 1.4%, Naphthenes: 1.2%, Aromatics: 9.1%[10]
See additional information at HPV submission for gasoline blending streams category: http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409rr3.pdf.
NOAEC (reproductive toxicity) ~ 23.6 mg/L/day (highest concentration tested)

Developmental Toxicity

PONA composition not specified
(1) Pregnant female Sprague-Dawley rats (25/dose) were exposed to unleaded gasoline as a vapor at nominal concentrations of 0, 400 or 1600 ppm (~ 0, 1.6 or 6.3 mg/L) for 6 hours/day on gestation days 6 – 15. Mean measured concentrations were 0, 442 and 1573 ppm (~ 0, 1.7 and 6.2 mg/L). There were no treatment-related effects on maternal body weight, food consumption, number of implantation sites, number of resorptions, numbers of live and dead fetuses, fetal weight or incidence of visceral abnormalities. An increase in the number of fetuses with skeletal variations was observed at ~ 6.2 mg/L and consisted mainly of changes related to retarded ossification.
NOAEC (maternal toxicity) ~ 6.2 mg/L/day (based on no effects observed at the highest concentration tested)
LOAEC (developmental toxicity) ~ 6.2 mg/L/day (based on an increase in skeletal variations)
NOAEC (developmental toxicity) ~ 1.7 mg/L/day

(2) Pregnant Crl:CD-1(ICR)BR mice (25/dose) were exposed whole-body to gasoline (API 99-01) as a vapor at nominal concentrations of 0, 2, 10 or 20 mg/L, 6 hours/day on gestation days 5 – 17. Mean measured concentrations were 0, 2.9, 10.6 and 20.9 mg/L. Endpoints included clinical signs, maternal body weight, food consumption, uterine weights, numbers of live, dead and resorbed fetuses, number of corpora lutea, fetal weights and sex ratio and visceral and skeletal abnormalities. Decreases in body weight and body weight change were observed in dams at 20.9 mg/L. A reduction in fetal body weight was observed at 10.6 and 20.9 mg/L. A decrease in the number of live fetuses was observed at 20.9 mg/L, in combination with an increase in the ratio of resorptions to implantation sites.
LOAEC (maternal toxicity) = 20.9 mg/L/day (based on decreases in body weight and body weight change)
NOAEC (maternal toxicity) = 10.6 mg/L/day
LOAEC (developmental toxicity) = 10.6 mg/L/day (based on reduced fetal body weight)
NOAEC (developmental toxicity) = 2.9 mg/L/day

Naphtha (petroleum), light alkylate (CASRN 64741-66-8, supporting chemical)
Paraffins: 99.97% (v/v), Olefins: 0.03%, Naphthenes: 0%, Aromatics: 0%
See additional information at HPV submission for gasoline blending streams category: http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409rr3.pdf.
NOAEC (maternal/developmental toxicity) = 25 mg/L/day (based on no effects observed at the highest concentration tested)

[10] This sample only contains 9.1% aromatics, but is considered an aromatic naphtha because it is the vapor distillate of a mixture that contains 33% aromatics.

Naphtha (petroleum), light catalytic cracked (CASRN 64741-55-5, supporting chemical)
(1) Paraffins: 37.7% (v/v), Olefins: 53.7%, Naphthenes: 4.3%, Aromatics: 4.4%
See additional information at HPV submission for gasoline blending streams category: http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409rr3.pdf.
NOAEC (maternal/developmental toxicity) ~ 23.9 mg/L/day (based on no effects observed at the highest concentration tested)

(2) Paraffins: 33.2% (v/v), Olefins: 40.0%, Naphthenes: 10.1%, Aromatics: 16.8%
See additional information at HPV submission for gasoline blending streams category: http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409rr3.pdf.
NOAEC (maternal toxicity) = 7.7 mg/L/day (based on no effects observed at the highest concentration tested)
LOAEC (developmental toxicity) = 7.7 mg/L/day (based on an increase in the number of resorptions)
NOAEL (developmental toxicity) = 2.2 mg/L/day

(3) Paraffins: 33.2% (v/v), Olefins: 40.0%, Naphthenes: 10.1%, Aromatics: 16.8%
See additional information at HPV submission for gasoline blending streams category: http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409rr3.pdf.
NOAEL (maternal/developmental toxicity) = 500 mg/kg-bw/day (based on no effects observed at the highest dose tested)

Naphtha (petroleum), full-range coker (CASRN 68513-02-0, supporting chemical)
Paraffins: 37.8% (v/v), Olefins: 39.2%, Naphthenes: 12.6%, Aromatics: 10.5%
See additional information at HPV submission for gasoline blending streams category: http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409rr3.pdf.
NOAEL (maternal/developmental toxicity) = 1000 mg/kg-bw/day (highest dose tested)

Naphtha (petroleum), heavy straight-run (CASRN 64741-41-9, supporting chemical)
Paraffins: 52.9% (v/v), Olefins: 5.1%, Naphthenes: 28.6%, Aromatics: 11.8%
See additional information at HPV submission for gasoline blending streams category: http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409rr3.pdf.
LOAEC (maternal toxicity) ~ 13.4 mg/L (based on reduced body weight, body weight gain and food consumption in females and minimal hypertrophy of thyroid follicular epithelium)
NOAEC (maternal toxicity) ~ 2.37 mg/L
NOAEC (developmental toxicity) ~ 13.4 mg/L/day (highest concentration tested)

Unleaded gasoline (No CASRN 8006-61-9, supporting chemical)
Paraffins: 48.7% (v/v), Olefins: 9.0%, Naphthenes: 6.3%, Aromatics: 36.0%
Pregnant Sprague-Dawley (Crl:CD(SD)IGSBR) rats (25 females/dose) were exposed whole-body to unleaded gasoline (API 99-01) vapor condensate at 0, 2, 10 or 20 mg/L as a vapor, 6 hours/day on gestation days 5 – 20. Mean measured concentrations were 0, 2.0, 10.7 and 20.6 mg/L. No treatment-related mortalities were observed. A significant ($p < 0.05$) reduction in mean fetal body weight was observed in all exposed groups, but the study authors concluded that this effect was not treatment-related because mean fetal weights of treatment groups were within the historical control range of the laboratory, there was no dose response and the mean litter size

in the control group was smaller than any treated group. There were no significant adverse effects on maternal body weight and food consumption, uterine implantation data, number of corpora lutea, numbers of live, dead and resorbed fetuses and external, visceral and skeletal observations.
NOAEC (maternal/developmental toxicity) = 20.6 mg/L/day (highest concentration tested)

Gasoline (CASRN 8006-61-9, supporting chemical)
In a prenatal developmental toxicity study, pregnant Sprague-Dawley rats were exposed to unleaded gasoline and gasoline vapor at concentrations of 0, 400 and 1600ppm from day 6-15 of gestation; caesarean sections were performed on day 20. Mated females were weighed 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 examined for changes in the soft tissues of the head, thoracic and visceral organs. The remaining fetuses in each litter were examined for skeletal abnormalities.
There were no treatment-related effects on body weight. There were no treatment related effects on any reproductive parameter (pregnancy ratio, live litters, implantation sites, litters with resorptions, dead fetuses, litter size, fetal weights), or fetal soft tissue or skeletal examination.
NOAEC (maternal/developmental toxicity) = 1600ppm (highest concentration tested)

Naphtha (petroleum), light catalytic reformed (CASRN 64741-63-5, supporting chemical)
Paraffins: 88.3% (v/v), Olefins: 1.4%, Naphthenes: 1.2%, Aromatics: 9.1%
See additional information at HPV submission for gasoline blending streams category: http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409rr3.pdf.
NOAEC (maternal/developmental toxicity) = 23.7 mg/L/day (highest concentration tested)

Genetic Toxicity – Gene Mutation

In Vitro

Naphtha (petroleum), light alkylate (CASRN 64741-66-8, supporting chemical)
Paraffins: 99.4% (v/v), Olefins: 0%, Naphthenes: 0.6%, Aromatics: 0%
See additional information at HPV submission for gasoline blending streams category: http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409rr3.pdf.
Naphtha (petroleum), light alkylate was not mutagenic in this assay.

Naphtha (petroleum), light catalytic cracked (CASRN 64741-55-5, supporting chemical)
(1) Paraffins: 30.6% (v/v) Olefins: 45.6% Naphthenes: 10.4% Aromatics: 13.1%
Mouse lymphoma cells were exposed to naphtha (petroleum), light catalytic cracked (API 83-20) in ethanol at concentrations of 50 – 800 nL/mL without metabolic activation and 25 – 500 nL/mL with activation. Positive control and negative controls responded appropriately.

Cytotoxicity was observed at 175 nL/mL. Naphtha (petroleum), light catalytic cracked (API 83-20) did not cause an increase in mutation frequency.
Naphtha (petroleum), light catalytic cracked was not mutagenic in this assay.

(2) Paraffins: 42.8% (v/v), Olefins: 36.5%, Naphthenes: 10.2%, Aromatics: 10.2%
See additional information at HPV submission for gasoline blending streams category: http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409rr3.pdf.
Naphtha (petroleum), light catalytic cracked was not mutagenic in this assay.

(3) Paraffins: 34.6% (v/v), Olefins: 29.2%, Naphthenes: 14.5%, Aromatics: 21.1%
See additional information at HPV submission for gasoline blending streams category: http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409rr3.pdf.
Naphtha (petroleum), light catalytic cracked was equivocal for the induction of mutations in this assay.

Naphtha (petroleum), sweetened (CASRN 64741-87-3, supporting chemical)
Paraffins: 72.1% (v/v) Olefins: <0.1% Naphthenes: 20.9% Aromatics: 6.9%
See additional information at HPV submission for gasoline blending streams category: http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409rr3.pdf.
Naphtha (petroleum), sweetened was not mutagenic in this assay.

Naphtha (petroleum), catalytic reformed (CASRN 68955-35-1, supporting chemical)
Paraffins: 32.1% (v/v), Olefins: 0.5%, Naphthenes: 3.7%, Aromatics: 63.3%
See additional information at HPV submission for gasoline blending streams category: http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409rr3.pdf.
Naphtha (petroleum), catalytic reformed was mutagenic in this assay.

Unleaded gasoline (No CASRN 8006-61-9, supporting chemical)
(1) PONA composition not specified
Salmonella typhimurium strains TA98, TA100, TA1535, TA1537 and TA1538 and *Saccharomyces cerevisiae* strain D4 were exposed to unleaded gasoline in DMSO at concentrations of 0.375 to 3% for Salmonella typhimurium and of 0.625 to 5% for Saccharomyces cerevisiae, with and without metabolic activation. Positive and negative controls responded appropriately. Unleaded gasoline did not cause a reproducible increase in mutation frequency.
Unleaded gasoline was not mutagenic in this assay.

(2) PONA composition not specified
Mouse lymphoma L5178Y TK+/- cells were exposed to unleaded gasoline in acetone at concentrations of 0.065 – 1.04 µL/mL with and without metabolic activation. Positive and negative controls responded appropriately. Unleaded gasoline did not cause an increase in mutation frequency.
Unleaded gasoline was not mutagenic in this assay.

Naphtha (petroleum), light catalytic reformed (CASRN 64741-63-5, supporting chemical)
Paraffins: 52.1% (v/v), Olefins: 1.1%, Naphthenes: 5.4%, Aromatics: 42.1%

See additional information at HPV submission for gasoline blending streams category: http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409rr3.pdf.
Naphtha (petroleum), light catalytic reformed was not mutagenic in this assay.

Genetic Toxicity – Chromosome Aberrations

In vitro

Naphtha (petroleum), light catalytic cracked (CASRN 64741-55-5, supporting chemical)
Paraffins: 42.8% (v/v), Olefins: 36.5%, Naphthenes: 10.2%, Aromatics: 10.2%
In a sister chromatid exchange assay, CHO cells were exposed to naphtha (petroleum), light catalytic cracked (API 81-03) at concentrations of 0.05 – 0.3 µL/mL without metabolic activation and 0.03 – 0.2 µL/mL with metabolic activation. A small, but significant ($p < 0.05$) increase in the frequency of sister chromatid exchange was observed at two intermediate dose levels in the presence of metabolic activation. No increase in sister chromatid exchange frequency was observed without activation. Positive and negative controls responded appropriately.
Naphtha (petroleum), light catalytic cracked was equivocal for the induction of sister chromatid exchange in this assay.

In vivo

Naphtha (petroleum), light alkylate (CASRN 64741-66-8)
Paraffins: 99.4% (v/v), Olefins: 0%, Naphthenes: 0.6%, Aromatics: 0%
See additional information at
http://iaspub.epa.gov/oppthpv/hpv_hc_characterization.get_report?doctype=2
Naphtha (petroleum), light alkylate did not induce chromosomal aberrations in this assay.

Naphtha (petroleum), light catalytic cracked (CASRN 64741-55-5, supporting chemical)
(1) Paraffins: 42.8% (v/v), Olefins: 36.5%, Naphthenes: 10.2%, Aromatics: 10.2%
See additional information at HPV submission for gasoline blending streams category: http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409rr3.pdf.
Naphtha (petroleum), light catalytic cracked induced sister chromatid exchange in this assay.

(2) Paraffins: 34.6% (v/v), Olefins: 29.2%, Naphthenes: 14.5%, Aromatics: 21.1%
See additional information at HPV submission for gasoline blending streams category: http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409rr3.pdf.
Naphtha (petroleum), light catalytic cracked did not induce chromosomal aberrations in this assay.

Gasoline (No CASRN 8006-61-9, supporting chemical)
(1) In a sister chromatid exchange assay, Sprague-Dawley Crl:CD IGS BR rats (5/sex/dose) were exposed whole-body to gasoline (API 99-01) as a vapor at nominal concentrations of 0, 2, 10 or

20 mg/L, 6 hours/day, 5 days/week for 4 weeks. Mean measured concentrations were 0, 2.1, 10.1 and 20.3 mg/L. A positive control was used and responded appropriately. Increases in sister chromatid exchange were observed in females at all exposure levels and in males at concentrations ≥ 10 mg/L.
Gasoline induced sister chromatid exchange in this assay.

(2) In a micronucleus assay, Sprague-Dawley Crl:CD IGS BR rats (5/sex/dose) were exposed whole-body to gasoline (API 99-01) as a vapor at nominal concentrations of 0, 2, 10 or 20 mg/L, 6 hours/day, 5 days/week for 4 weeks. Mean measured concentrations were 0, 2.1, 10.1 and 20.3 mg/L. A positive control was used and responded appropriately. No increase in the frequency of micronuclei or cytotoxicity was observed in exposed mice.
Gasoline did not induce micronuclei in this assay.

Naphtha (petroleum), sweetened (CASRN 64741-87-3, supporting chemical)
Paraffins: 72.1% (v/v) Olefins: <0.1% Naphthenes: 20.9% Aromatics: 6.9%
In a bone marrow chromosomal aberration assay, Sprague-Dawley rats (10/sex/dose) were exposed whole-body to naphtha (petroleum), sweetened (API 81-08) as a vapor at nominal concentrations of 0, 65, 300 or 2050 ppm (0, 0.21, 0.99 or 6.8 mg/L) for 6 hours/day for 5 days. Mean measured concentrations were 0, 69, 293 and 2012 ppm (0, 0.23, 0.97 and 6.7 mg/L). Positive and negative controls responded appropriately. There were no treatment-related increases in chromosomal aberrations.
Naphtha (petroleum), sweetened did not induce chromosomal aberrations in this assay.

Naphtha (petroleum), catalytic reformed (CASRN 68955-35-1, supporting chemical)
Paraffins: 32.1% (v/v), Olefins: 0.5%, Naphthenes: 3.7%, Aromatics: 63.3%
In a bone marrow chromosomal aberration assay, Sprague-Dawley rats (5/sex/dose) were administered naphtha (petroleum), catalytic reformed (API 83-05) in corn oil at concentrations of 0, 0.26, 0.82 or 2.42 g/kg-bw via intraperitoneal injection and sacrificed up to 48 hours later. Positive and negative controls responded appropriately. There were no treatment-related increases in chromosomal aberrations.
Naphtha (petroleum), catalytic reformed did not induce chromosomal aberrations in this assay.

Unleaded gasoline (No CASRN 8006-61-9, supporting chemical)
(1) Paraffins: 48.7% (v/v) Olefins: 9.0% Naphthenes: 6.3% Aromatics: 36.0%
In a sister chromatid exchange assay, Sprague-Dawley rats (5/sex/dose) were exposed whole-body to unleaded gasoline (API 99-01) vapor condensate via inhalation at nominal concentrations of 0, 2, 10 or 20 mg/L for 6 hours/day, 5 days/week for 4 weeks. Mean measured concentrations were 0, 2.05, 10.2 and 20.3 mg/L. Positive and negative controls responded appropriately. A statistically significant ($p < 0.05$) increase in the frequency of sister chromatid exchange was observed at all dose levels.
Unleaded gasoline induced sister chromatid exchange in this assay.

(2) Paraffins: 48.7% (v/v) Olefins: 9.0% Naphthenes: 6.3% Aromatics: 36.0%
In a micronucleus assay, Sprague-Dawley rats (5/sex/dose) were exposed whole-body to unleaded gasoline (API 99-01) vapor condensate via inhalation at nominal concentrations of 0, 2,

10 or 20 mg/L for 6 hours/day, 5 days/week for 4 weeks. Mean measured concentrations were 0, 2.05, 10.2 and 20.3 mg/L. Positive and negative controls responded appropriately. Unleaded gasoline (API 99-01) caused neither an increase in micronucleated immature erythrocytes nor bone marrow cell toxicity.
Unleaded gasoline did not induce micronuclei in this assay.

(3) Paraffins: 57.8% (v/v) Olefins: 9.9% Naphthenes: 3.9% Aromatics: 28.1%
In a bone marrow chromosomal aberrations assay, male rats (3 – 5/dose) were administered unleaded gasoline (API PS-6) in acetone at concentrations of 0, 0.01, 0.024, 0.03, 0.08, 0.1 or 0.24 mL via intraperitoneal injection for 5 days. Positive and negative controls responded appropriately. There were no dose-related increases in chromosomal aberrations.
Unleaded gasoline did not induce chromosomal aberrations in this assay.

(4) Paraffins: 57.8% (v/v) Olefins: 9.9% Naphthenes: 3.9% Aromatics: 28.1%
In a dominant lethal assay, CD-1 mice (10 males/dose) were exposed to unleaded gasoline (API PS-6) as a vapor at nominal concentrations of 0, 400 or 1600 ppm (0, 1.5 or 6 mg/L) for 6 hours/day, 5 days/week for 8 weeks. Exposed males were mated with unexposed females and the numbers of live and dead implants were counted. Mean measured concentrations were 0, 396 and 1525 ppm (~ 0, 1.6 and 6.0 mg/L)[11]. Positive and negative controls responded appropriately. There were no treatment-related increases in post-implantation deaths.
Unleaded gasoline did not induce chromosome aberrations in this assay.

Additional Information

Eye Irritation

Naphtha (petroleum), light catalytic cracked (CASRN 64741-55-5, supporting chemical)
Paraffins: 30.6% (v/v) Olefins: 45.6% Naphthenes: 10.4% Aromatics: 13.1%
Rabbits (9/dose; strain and sex not specified) were administered 0.1 mL of naphtha (petroleum), light catalytic cracked (API 83-20) to one eye; the other eye served as a control. After 20 – 30 seconds, the treated eyes of three rabbits were rinsed with water for 1 minute. Animals were observed for 7 days after treatment. After 1 hour, primary eye irritation scores were 1.0 and 3.3 for unwashed and washed eyes, respectively. An irritation score of zero was recorded at all other times.
Naphtha (petroleum), light catalytic cracked was not irritating to rabbit eyes in this study.

Naphtha (petroleum), sweetened (CASRN 64741-87-3, supporting chemical)
Paraffins: 72.1% (v/v) Olefins: <0.1% Naphthenes: 20.9% Aromatics: 6.9%
Four male and five female rabbits (strain not specified) were administered 0.1 mL of naphtha (petroleum), sweetened (API 81-08) to one eye; the other eye served as a control. After 20 – 30 seconds, the treated eyes of three rabbits were rinsed with water for 1 minute. Animals were observed for 7 days after treatment. After 1 hour, primary eye irritation scores were 2.0 and 0.7 for unwashed and washed eyes, respectively. No irritation remained after 24 hours.

[11] Units were converted from ppm to mg/L using the molecular weight of 96.2 g/mole provided by the sponsor for unleaded gasoline sample API 99-01.

Naphtha (petroleum), sweetened was not irritating to rabbit eyes in this study.

Naphtha (petroleum), light alkylate (CASRN 64741-66-8, supporting chemical)
Paraffins: 99.4% (v/v), Olefins: 0%, Naphthenes: 0.6%, Aromatics: 0%
See additional information at HPV submission for gasoline blending streams category: http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409rr3.pdf.
Naphtha (petroleum), light alkylate was not irritating to rabbit eyes in this study.

Naphtha (petroleum), catalytic reformed (CASRN 68955-35-1)
Paraffins: 32.1% (v/v), Olefins: 0.5%, Naphthenes: 3.7%, Aromatics: 63.3%
See additional information at HPV submission for gasoline blending streams category: http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409rr3.pdf.
Naphtha (petroleum), catalytic reformed was moderately irritating to rabbit eyes in this study.

Gasoline (No CASRN 8006-61-9, supporting chemical)
Paraffins: 57.8% (v/v), Olefins: 9.9%, Naphthenes: 3.9%, Aromatics: 28.1%
See additional information at HPV submission for gasoline blending streams category: http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409rr3.pdf.
Unleaded gasoline was not irritating to rabbit eyes in this study.

Skin Irritation

Naphtha (petroleum), sweetened (CASRN 64741-87-3, supporting chemical)
Paraffins: 72.1% (v/v), Olefins: <0.1%, Naphthenes: 20.9%, Aromatics: 4.1%
Six rabbits (strain and sex not specified) were administered 0.5 mL of naphtha (petroleum), sweetened (API 81-08) to intact or abraded skin under occluded conditions for 24 hours and observed for 14 days following dosing. Slight edema and erythema were observed on both intact and abraded skin. The primary dermal irritation score was 1.2. **Naphtha (petroleum), sweetened was slightly irritating to rabbit skin in this study.**

Naphtha (petroleum), sweetened (CASRN 64741-87-3, supporting chemical)
Paraffins: 49.6% (v/v), Olefins: 43.5%, Naphthenes: 5.6%, Aromatics: 0.5%
See additional information at HPV submission for gasoline blending streams category: http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409rr3.pdf.
Naphtha (petroleum), sweetened was slightly irritating to rat skin in this study.

Naphtha (petroleum), light catalytic cracked (CASRN 64741-55-5, supporting chemical)
(1) Paraffins: 30.6% (v/v) Olefins: 45.6% Naphthenes: 10.4% Aromatics: 13.1%
Six rabbits (strain and sex not specified) were administered 0.5 mL of naphtha (petroleum), light catalytic cracked (API 83-20) to intact or abraded skin under occluded conditions for 24 hours and observed for 14 days following dosing. Edema and erythema were observed on both intact and abraded skin. The primary dermal irritation score was 3.7.
Naphtha (petroleum), light catalytic cracked was moderately irritating to rabbit skin in this study.

(2) Paraffins: 33.2% (v/v), Olefins: 40.0%, Naphthenes: 10.1%, Aromatics: 16.8%
See additional information at HPV submission for gasoline blending streams category: http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409rr3.pdf.
Naphtha (petroleum), light catalytic cracked was moderately irritating to rat skin in this study.

Gasoline (no CASRN 8006-61-9, supporting chemical)
Paraffins: 57.8% (v/v) Olefins: 9.9% Naphthenes: 3.9% Aromatics: 28.1%
Rabbits (3/sex, strain not specified) were administered 0.5 mL of unleaded gasoline (API PS-6) to intact or abraded skin under occluded conditions for 24 hours and observed for 14 days following dosing. Edema and erythema were noted at 72 hours on both intact and abraded skin. The primary dermal irritation score was 0.98.
Gasoline was slightly irritating to rabbit skin in this study.

Naphtha (petroleum), light alkylate (CASRN 64741-66-8, supporting chemical)
Paraffins: 99.4% (v/v), Olefins: 0%, Naphthenes: 0.6%, Aromatics: 0%
Six rabbits (strain and sex not specified) were administered 0.5 mL of naphtha (petroleum), light alkylate (API 83-19) to intact or abraded skin under occluded conditions for 24 hours and observed for 14 days following dosing. Erythema and edema were observed on both intact and abraded skin. The primary dermal irritation index was 3.9.
Naphtha (petroleum), light alkylate was moderately irritating to rabbit skin in this study.

Naphtha (petroleum), full-range coker (CASRN 68513-02-0, supporting chemical)
(1) Paraffins: 37.8% (v/v), Olefins: 39.2%, Naphthenes: 12.6%, Aromatics: 10.5%
See additional information at HPV submission for gasoline blending streams category: http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409rr3.pdf.
Naphtha (petroleum), full-range coker was moderately irritating to rat skin in this study.

(2) Paraffins: 37.8% (v/v), Olefins: 39.2%, Naphthenes: 12.6%, Aromatics: 10.5%
See additional information at HPV submission for gasoline blending streams category: http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409rr3.pdf.
Naphtha (petroleum), full-range coker was severely irritating to rat skin in this study.

Naphtha (petroleum), catalytic reformed (CASRN 68955-35-1, supporting chemical)
Paraffins: 32.1% (v/v), Olefins: 0.5%, Naphthenes: 3.7%, Aromatics: 63.3%
See additional information at HPV submission for gasoline blending streams category: http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409rr3.pdf.
Naphtha (petroleum), catalytic reformed was moderately irritating to rabbit skin in this study.

Sensitization

Gasoline (No CASRN 8006-61-9, supporting chemical)
Paraffins: 57.8% (v/v) Olefins: 9.9% Naphthenes: 3.9% Aromatics: 28.1%
Guinea pigs (10/sex, strain not specified) were administered 0.5 mL of unleaded gasoline (API PS-6) to shorn skin under occluded conditions for 6 hours, 3 times/week, for 3 weeks. The first application consisted of undiluted test substance; the remaining applications were 50% dilutions in mineral oil. After a 2-week resting period, a challenge dose of 0.5 mL of 50% unleaded gasoline in mineral oil was applied to a previously untreated site and animals were observed for 48 hours following treatment. On the basis of edema and erythema scores, the challenge dose did not appear to be more reactive than the sensitizing treatments.
Gasoline was not sensitizing to guinea pig skin in this study.

Naphtha (petroleum), light catalytic cracked (CASRN 64741-55-5, supporting chemical)
Paraffins: 30.6% (v/v) Olefins: 45.6% Naphthenes: 10.4% Aromatics: 13.1%
Guinea pigs (10/sex, strain not specified) were administered 0.4 mL of naphtha (petroleum), light catalytic cracked (API 83-20) to shorn skin under occluded conditions for 6 hours once per week for 3 weeks. After a 2-week resting period, a challenge dose of 0.4 mL of 25% test substance in paraffin oil was applied to a previously untreated site and animals were observed for 48 hours following treatment. No skin reactions were observed following application of the challenge dose.
Naphtha (petroleum), light catalytic cracked was not sensitizing to guinea pig skin in this study.

Naphtha (petroleum), light alkylate (CASRN 64741-66-8, supporting chemical)
Paraffins: 99.4% (v/v), Olefins: 0%, Naphthenes: 0.6%, Aromatics: 0%
See additional information at
http://iaspub.epa.gov/oppthpv/hpv_hc_characterization.get_report?doctype=2
Naphtha (petroleum), light alkylate was not sensitizing to guinea pig skin in this study.

Naphtha (petroleum), catalytic reformed (CASRN 68955-35-1, supporting chemical)
Paraffins: 32.1% (v/v), Olefins: 0.5%, Naphthenes: 3.7%, Aromatics: 63.3%
See additional information at
http://iaspub.epa.gov/oppthpv/hpv_hc_characterization.get_report?doctype=2
Naphtha (petroleum), catalytic reformed was not sensitizing to guinea pig skin in this

Carcinogenicity

Naphtha (petroleum), sweetened (CASRN 64741-87-3, supporting chemical)
Paraffins: 72.1% (v/v) Olefins: <0.1% Naphthenes: 20.9% Aromatics: 6.9%
Male C3H mice (47 – 50/dose) were administered 0.05 mL of naphtha (petroleum), sweetened (API 81-08) to shorn skin 2 times/week for 139 weeks. No adverse effects were observed on body weight or survival. There was no treatment-related effect on the incidence of non-neoplastic or neoplastic lesions.
Naphtha (petroleum), sweetened was not carcinogenic to mice in this study.

Gasoline (No CASRN 8006-61-9, supporting chemical)
(1) Paraffins: 57.8% (v/v) Olefins: 9.9% Naphthenes: 3.9% Aromatics: 28.1%
Fischer 344 rats (100/sex/dose) were exposed whole-body to gasoline (API PS-6) as a vapor at nominal concentrations of 0, 50, 275 or 1500 ppm (~ 0, 0.2, 1.1 or 5.9 mg/L)[12] for up to 113 weeks. Mean measured concentrations were 0, 67, 292 and 2056 ppm (0, 0.3, 1.1 or 8.1 mg/L). Increases were observed in the incidence of renal carcinomas, sarcomas and adenomas in males.
Gasoline was carcinogenic to rats in this study.

(2) Paraffins: 57.8% (v/v) Olefins: 9.9% Naphthenes: 3.9% Aromatics: 28.1%
B6C3F1 mice (100/sex/dose) were exposed whole-body to gasoline (API PS-6) as a vapor at nominal concentrations of 0, 50, 275 or 1500 ppm (~ 0, 0.2, 1.1 or 5.9 mg/L)[12] for up to 113 weeks. Mean measured concentrations were 0, 67, 292 and 2056 ppm (0, 0.3, 1.1 or 8.1 mg/L). Increases were observed in the incidence of hepatocellular carcinomas and adenomas.
Gasoline was carcinogenic to mice in this study.

(3) Paraffins: 57.8% (v/v) Olefins: 9.9% Naphthenes: 3.9% Aromatics: 28.1%
C3H/HeJ mice (50 males) were administered 0.05 mL of gasoline (API PS-6) via the dermal route 2 times/week to clipped skin for 131 weeks. There was no treatment-related effect on the incidence of systemic or dermal tumors.
Gasoline was not carcinogenic to mice in this study.

Naphtha (petroleum), light alkylate (CASRN 64741-66-8, supporting chemical)
Paraffins: 99.4% (v/v), Olefins: 0%, Naphthenes: 0.6%, Aromatics: 0.1%
See additional information at HPV submission for gasoline blending streams category: http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409rr3.pdf.
Naphtha (petroleum), light alkylate was not carcinogenic to mice in this study.

Naphtha (petroleum), light catalytic cracked (CASRN 64741-55-5)
Paraffins: 42.8% (v/v), Olefins: 36.5%, Naphthenes: 10.2%, Aromatics: 10.2%
See additional information at HPV submission for gasoline blending streams category: http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409rr3.pdf.
Naphtha (petroleum), light catalytic cracked was carcinogenic to mice in this study.

Neurotoxicity

Gasoline (CASRN 8006-61-9, supporting chemical)
(1) **Paraffins: 77.4% (v/v) Olefins: 15.2% Naphthenes: 3.3% Aromatics: 4.2%**
Sprague-Dawley rats (5/sex/dose) were administered unleaded gasoline (API 99-01) vapor condensate via whole-body inhalation as a vapor at nominal concentrations of 0, 2, 10 or 20 mg/L for 6 hours/day, 7 days/week. Mean measured concentrations were 0, 2.0, 10.1 and 20.0 mg/L. The parental generation was exposed for 10 weeks prior to mating, 2 weeks during mating, 3 weeks during gestation and 4 weeks postpartum. Exposure of pregnant females was

[12] Units were converted from ppm to mg/L using the molecular weight of 96.2 g/mole provided by the sponsor for unleaded gasoline sample API 99-01.

suspended between gestation day 19 and postpartum day 5. Pups were not exposed directly to unleaded gasoline (API 99-01). F1 pup brains were evaluated for glial fibrillary acidic protein (GFAP) levels on postpartum day 28. Exposure of the parental generation did not elevate GFAP levels in any assessed brain region, indicating that unleaded gasoline (API 99-01) did not cause gliosis.
Gasoline was not neurotoxic to rats in this study.

(2) **Paraffins: 77.4% (v/v) Olefins: 15.2% Naphthenes: 3.3% Aromatics: 4.2%**
Sprague-Dawley rats (5/sex/dose) were administered unleaded gasoline (API 99-01) vapor condensate via whole-body inhalation as a vapor at nominal concentrations of 0, 2, 10 or 20 mg/L, 6 hours/day, 5 days/week for 13 weeks. Mean measured concentrations were 0, 2.1, 10.2 and 20.3 mg/L. Adult brains were evaluated for GFAP levels at the end of exposure. Exposure to unleaded gasoline did not elevate GFAP levels in any assessed brain region, indicating that unleaded gasoline did not cause gliosis.
Gasoline was not neurotoxic to rats in this study.

(3) Although gasoline did not demonstrate neurotoxicity in the studies provided by the sponsor, the neurotoxicity of gasoline is well-established in humans. Information on the human neurotoxicity of gasoline may be found in the ATSDR Toxicological Profile for Automotive Gasoline, http://www.atsdr.cdc.gov/toxprofiles/tp72.pdf.

Naphtha (petroleum), light alkylate (CASRN 64741-66-8, supporting chemical)
Paraffins: 99.97% (v/v), Olefins: 0.03%, Naphthenes: 0%, Aromatics: 0%
See additional information at HPV submission for gasoline blending streams category: http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409rr3.pdf.
Naphtha (petroleum), light alkylate was not neurotoxic to rats in this study.

Gasoline, Leaded (No CASRN)
The sponsor did not provide studies pertaining to the neurotoxicity of leaded gasoline. However, the neurotoxicity of leaded gasoline to humans and laboratory animals is well established. Information on the human neurotoxicity of leaded gasoline may be found in the ATSDR Toxicological Profile for Automotive Gasoline (cited above) or in the ATSDR Toxicological Profile for Lead (http://www.atsdr.cdc.gov/toxprofiles/tp13.pdf).

Naphtha (petroleum), light catalytic cracked (CASRN 64741-55-5, supporting chemical)
Paraffins: 37.7% (v/v), Olefins: 53.7%, Naphthenes: 4.3%, Aromatics: 4.4%
See additional information at HPV submission for gasoline blending streams category: http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409rr3.pdf.
Naphtha (petroleum), light catalytic cracked was not neurotoxic to rats in this study.

Naphtha (petroleum), light catalytic reformed (CASRN 64741-63-5, supporting chemical)
Paraffins: 88.3% (v/v), Olefins: 1.4%, Naphthenes: 1.2%, Aromatics: 9.1%
See additional information at HPV submission for gasoline blending streams category: http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409rr3.pdf.
Naphtha (petroleum), light catalytic reformed was neurotoxic to rats in this study.

Conclusion: No data are available for the sponsored substances. The acute oral and dermal toxicity of CASRN 64741-87-3 is low in rats and rabbits, respectively; the acute inhalation toxicity in rats is moderate. The acute oral (rat) and dermal (rabbit) toxicity of CASRN 64741-66-8 is low; the inhalation toxicity in rats is moderate. The acute oral (rat) and dermal (rabbit) toxicity of CASRN 64741-55-5 is low; the acute inhalation toxicity in rats is moderate. The acute oral and dermal toxicity of CASRN 68955-35-1 and unleaded gasoline (no CASRN) is low in rats and rabbits, respectively. Several representative studies in gasoline are available. In unleaded gasoline (no CASRN), a decrease in brain weight in males was observed at 1.57 mg/L/day, the lowest dose tested in a repeated-dose toxicity study by the inhalation route in rats; the NOAEC for systemic toxicity was not be established. Effects on pulmonary function were observed at 6.35 mg/L/day in a repeated-dose toxicity study by the inhalation route in monkeys; the NOAEC for systemic toxicity is 1.57 mg/L/day. In unleaded gasoline blend (no CASRN), signs of kidney toxicity in males were reported at 0.15 mg/L/day in a repeated-dose toxicity study by the inhalation route in rats; the NOAEC for systemic toxicity is 14.7 mg/L/day in females (highest dose tested). The NOAEC is not established in males. In leaded gasoline (no CASRN), signs of blood toxicity and effects on pulmonary function were reported at 1.53 mg/L/day in repeated-dose toxicity studies by the inhalation route in rats and monkeys; the NOAEC for systemic toxicity is 0.42 mg/L/day in rats and in male monkeys, and 1.53 mg/L/day in female monkeys (highest dose tested). A 13-week repeated-dose inhalation toxicity study with PONA mixture (No CASRN) showed increases in thrombocytes in males and reticulocytes in females at 6.35 mg/L/day; the NOAEC for systemic toxicity is 1.57 mg/L/day. In a combined inhalation repeated-dose/reproductive/developmental toxicity screening test in rats, CASRN 64741-41-9 showed a decrease in body weight gain and hypertrophy of thyroid follicular epithelium in both sexes at 13.7 mg/L/day; the NOAEC for systemic toxicity is 2.3 mg/L/day. Several combined repeated-dose reproductive/developmental toxicity screening studies with paraffinic, olefinic, and aromatic naphthas by the inhalation route in rats showed no signs of reproductive or developmental toxicity at any dose level; the lowest NOAEC is 23.9 mg/L/day. In a prenatal inhalation developmental toxicity study with gasoline vapor (CASRN 8006-61-9) in rats, no adverse treatment related effects were observed; the NOAEC for maternal and developmental toxicity is 1.6mg/L/day (highest concentration tested). In a prenatal inhalation developmental toxicity study in rats with PONA mixture vapor (No CASRN), no adverse treatment-related effects were observed in the dams; the NOAEC for maternal toxicity is 6.2 mg/L/day (highest concentration tested). An increase in skeletal variations was seen in fetuses at 6.2mg/L/day; the NOAEC for developmental toxicity is 1.7 mg/L/day. CASRNs 64741-55-5 and 64741-87-3 did not increase mutation frequency in mouse lymphoma cells *in vitro*. Gasoline (no CASRN) induced sister chromatid exchange in rats but did not induce micronuclei in rats *in vivo*. CASRN 64741-87-3 did not induce chromosomal aberrations in rats *in vivo*. Gasoline (No CASRN) is not irritating to rabbit eye nor is it a skin sensitizer in guinea pigs. Gasoline (No CASRN) is irritating to the rabbit skin. Gasoline was carcinogenic in rats and mice via the inhalation route, but not carcinogenic to mice via the dermal route. Aromatic naphthas were neurotoxic in rats via the inhalation route, whereas paraffinic and olefinic naphthas and gasoline were not neurotoxic in rats via the inhalation route. Unleaded and leaded gasoline are neurotoxic in humans.

Table 5. Summary of the Screening Information Data Set as Submitted under the U.S. HPV Challenge Program - Human Health Data

Endpoints	SPONSORED CHEMICAL Fuel oil, residual, wastewater skimmings (68956-48-9)	SPONSORED CHEMICAL Petroleum products, C5 – 12, reclaimed, wastewater treatment (68918-73-0)	SUPPORTING CHEMICAL Catalytic reformed naphtha (68955-35-1)	SUPPORTING CHEMICAL Sweetened alkylate naphtha (64741-87-3)	SUPPORTING CHEMICAL Light alkylate naphtha (64741-66-8)	SUPPORTING CHEMICAL Heavy straight run naphtha (64741-41-9)	SUPPORTING CHEMICAL PONA Mixture (No CASRN)	SUPPORTING CHEMICAL Gasoline (No CASRN)
Acute Oral Toxicity LD_{50} (mg/kg)	No Data >5000 (RA)	No Data >5000 (RA)	**6620 (male) 5390 (female)**	**>5000**	**>7000**	–	–	–
Acute Dermal Toxicity LD_{50} (mg/kg)	No Data >2000	No Data >2000	**>2000**	**>2000**	**>2000**	–	–	–
Acute Inhalation Toxicity LD_{50} (mg/L)	No Data > 5.22	No Data > 5.22	**5.22**	–	**> 6.3**	–	–	–
Repeated-Dose Toxicity NOAEC/LOAEC Inhalation (mg/L)	No Data LOAEC= 6.35 NOAEC= 1.57 (RA)	No Data LOAEC= 6.35 NOAEC= 1.57 (RA)	–	–	–	**LOAEC = 13.65 NOAEC = 2.28**	**LOAEC= 6.35 NOAEC= 1.57**	–
Reproductive Toxicity NOAEL/LOAEL (mg/L/day) Reproductive Toxicity	NOAEC= 13.4	NOAEC= 13.4	–	–	–	**NOAEC = 13.4 (highest concentration tested)**	–	**NOAEC= 20 (highest concentration tested)**
Developmental Toxicity NOAEL/LOAL Vapor Inhalation (mg/L/day)			–	–	–		–	
Maternal Toxicity	No Data NOAEC= 6.2	No Data NOAEC= 6.2				**NOAEL = 2.37 LOAEL = 13.4**		**NOAEC= 6.2**
Developmental Toxicity	LOAEC= 6.2 NOAEC= 1.7 (RA)	LOAEC= 6.2 NOAEC= 1.7 (RA)				**NOAEL = 13.4 (highest concentration tested)**		**LOAEC= 6.2 NOAEC= 1.7**

Table 5. Summary of the Screening Information Data Set as Submitted under the U.S. HPV Challenge Program - Human Health Data

Endpoints	SPONSORED CHEMICAL Fuel oil, residual, wastewater skimmings (68956-48-9)	SPONSORED CHEMICAL Petroleum products, C5 – 12, reclaimed, wastewater treatment (68918-73-0)	SUPPORTING CHEMICAL Catalytic reformed naphtha (68955-35-1)	SUPPORTING CHEMICAL Sweetened alkylate naphtha (64741-87-3)	SUPPORTING CHEMICAL Light alkylate naphtha (64741-66-8)	SUPPORTING CHEMICAL Heavy straight run naphtha (64741-41-9)	SUPPORTING CHEMICAL PONA Mixture (No CASRN)	SUPPORTING CHEMICAL Gasoline (No CASRN)
Genetic Toxicity – Gene Mutation ***In vitro***	No Data Negative (RA)	No Data Negative (RA)	−	**Negative**	**Negative**	–	**Negative**	**Negative**
Genetic Toxicity – Chromosomal Aberrations ***In vivo***	No Data Negative (RA)	No Data Negative (RA)	−	**Negative**	–	–	**Negative**	–
Genetic Toxicity – Other Sister Chromatid Exchange	–	–	–	–	–	–	–	**Positive**
Additional Information								
Eye Irritation	–	–	–	–	–	–	–	**Negative**
Skin Irritation	–	–	–	–	–	–	–	**Irritating**
Sensitization	–	–	–	–	–	–	–	**Negative**
Carcinogenicity	–	–	–	–	–	–	–	**Positive**
Neurotoxicity	–	–	–	–	–	–	–	**Negative**

Measured data in bold text; (RA) = read-across; − endpoint not addressed for this chemical

4. Hazard to the Environment

There were no data submitted for the sponsored chemicals. A summary of aquatic toxicity data for the supporting chemicals of the HPV Challenge category, gasoline blending streams, for SIDS endpoints is provided in Table 6. The table also indicates where test data are read-across (RA) to the sponsored chemicals of the naphtha hydrocarbon wastes category. The data for the supporting chemicals, the gasoline blending streams category, can be found at http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409tc.htm.

Acute Toxicity to Fish

Naphtha (petroleum), light alkylate (CASRN 64741-66-8)
http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409tc.htm
96-h LL_{50} = 8.2 mg/L
96-h LC_{50} = 0.305 mg/L

Naphtha (petroleum), light catalytic cracked (CASRN 64741-55-5)
http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409tc.htm
96-h LL_{50} = 46 mg/L
96-h LC_{50} = 4.1 mg/L

Naphtha (petroleum), light straight-run (CASRN 64741-46-4)
http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409tc.htm
96-h LL_{50} = 15 mg/L
96-h LC_{50} = 0.689 mg/L

Naphtha (petroleum), light catalytic reformed (CASRN 64741-63-5)
http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409tc.htm
96-h LL_{50} = 34 mg/L
96-h LC_{50} = 11 mg/L

Acute Toxicity to Aquatic Invertebrates

Naphtha (petroleum), light alkylate (CASRN 64741-66-8)
http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409tc.htm
48-h EL_{50} = 32 mg/L
48-h EC_{50} = 0.556 mg/L

Naphtha (petroleum), light catalytic cracked (CASRN 64741-55-5)
http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409tc.htm
48-h EL_{50} = 18 mg/L
48-h EC_{50} = 1.4 mg/L

Naphtha (petroleum), light straight-run (CASRN 64741-46-4)
http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409tc.htm
48-h EL_{50} = 18 mg/L
48-h EC_{50} = 0.65 mg/L

Naphtha (petroleum), light catalytic reformed (CASRN 64741-63-5)
http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409tc.htm
48-h EL_{50} = 10 mg/L
48-h EC_{50} = 2.6 mg/L

Toxicity to Aquatic Plants

Naphtha (petroleum), light alkylate (CASRN 64741-66-8)
http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409tc.htm
96-h EL_{50} (growth) = 45 mg/L
96-h EC_{50} (growth) = 0.741 mg/L

Naphtha (petroleum), light catalytic cracked (CASRN 64741-55-5)
http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409tc.htm
96-h EL_{50} (growth) = 64 mg/L
96-h EC_{50} (growth) = 4.6 mg/L

Naphtha (petroleum), light straight-run (CASRN 64741-46-4)

http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409tc.htm
96-h EL_{50} (growth) = 6.4 mg/L
96-h EC_{50} (growth) = 0.26 mg/L

Naphtha (petroleum), light catalytic reformed (CASRN 64741-63-5)
http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409tc.htm
96-h EL_{50} (growth) = 8.5 mg/L
96-h EC_{50} (growth) = 1.7 mg/L

Sub-Chronic Toxicity to Fish

Naphtha (petroleum), light alkylate (CASRN 64741-66-8)
http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409tc.htm
14-d LL_{50} = 8 mg/L
14-d LC_{50} = 0.15 mg/L

Naphtha (petroleum), light catalytic cracked (CASRN 64741-55-5)
http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409tc.htm
14-d LL_{50} = 23 mg/L
14-d LC_{50} = 1.5 mg/L

Naphtha (petroleum), light catalytic reformed (CASRN 64741-63-5)
http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409tc.htm
14-d LL_{50} = 5.2 mg/L
14-d LC_{50} = 0.67 mg/L

Chronic Toxicity to Aquatic Invertebrates

Naphtha (petroleum), light alkylate (CASRN 64741-66-8)
http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409tc.htm
21-d EL_{50} (mortality) > 40 mg/L
21-d EL_{50} (reproduction) = 10 mg/L
21-d EC_{50} (mortality) > 0.46 mg/L
21-d EC_{50} (reproduction) = 0.14 mg/L

Naphtha (petroleum), light catalytic cracked (CASRN 64741-55-5)
http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409tc.htm
21-d EL_{50} (mortality) = 27 mg/L
21-d EL_{50} (reproduction) = 13 mg/L
21-d EC_{50} (mortality) = 1.9 mg/L
21-d EC_{50} (reproduction) = 0.55 mg/L

Naphtha (petroleum), light catalytic reformed (CASRN 64741-63-5)
http://www.epa.gov/chemrtk/pubs/summaries/gasnecat/c13409tc.htm
21-d EL_{50} (mortality) = 26 mg/L
21-d EL_{50} (reproduction) = 14 mg/L
21-d EC_{50} (mortality) = 7.5 mg/L
21-d EC_{50} (reproduction) = 3.2 mg/L

Conclusion: No data on the sponsored substances are available. Based on the supporting chemicals, CASRNs 64741-66-8, 64741-55-5, 64741-46-4 and 64741-63-5, the 96-h LC_{50} for fish ranges from 0.305 to 11 mg/L, the 48-h EC_{50} for aquatic invertebrates ranges from 0.556 to 2.6 mg/L and the 72-h EC_{50} for aquatic plants ranges from 0.26 to 4.6 mg/L for growth rate. Based on the supporting chemicals, CASRNs 64741-66-8 and 64741-55-5, the 21-d chronic EC_{50} for aquatic invertebrates ranges from 0.46 to 1.9 mg/L for mortality, and 0.14 to 0.55 mg/L for reproduction.

Table 6. Summary of the Screening Information Data Set as Submitted under the U.S. HPV Challenge Program – Aquatic Toxicity Data						
Endpoint	**SUPPORTING CHEMICAL Naphtha (petroleum), light alkylate (64741-66-8)**	**SUPPORTING CHEMICAL Naphtha (petroleum), light straight-run (64741-46-4)**	**SUPPORTING CHEMICAL Naphtha (petroleum), light catalytic cracked (64741-55-5)**	**SUPPORTING CHEMICAL Naphtha (petroleum), light catalytic reformed (64741-63-5)**	**SPONSORED CHEMICAL Fuel oil, residual, wastewater skimmings (68956-48-9)**	**SPONSORED CHEMICAL Petroleum products, C5 – 12, reclaimed, wastewater treatment (68956-70-7)**
Fish 96-h LC_{50} (mg/L)	**0.305**	**0.689**	**4.1**	**11**	No Data 0.305 - 11 (RA)	No Data 0.305 - 11 (RA)
Aquatic Invertebrates 48-h EC_{50} (mg/L)	**0.556**	**0.65**	**1.4**	**2.6**	No Data 0.556 - 2.6 (RA)	No Data 0.556 - 2.6 (RA)
Aquatic Plants 72-h EC_{50} (mg/L) Growth Rate	**0.741**	**0.26**	**4.6**	**1.7**	No Data 0.26 – 4.6 (RA)	No Data 0.26 – 4.6 (RA)
Chronic Aquatic Invertebrates 21-d EC_{50} (mg/L)	**> 0.46 (mortality) 0.14 (reproduction)**	–	**1.9 (mortality) 0.55 (reproduction)**	–	No Data >0.46 – 1.9 (mortality) 0.14 – 0.55 (reproduction) (RA)	No Data >0.46 – 1.9 (mortality) 0.14 – 0.55 (reproduction) (RA)

Bold = experimental data (i.e. derived from testing); RA = read across; – indicates that endpoint was not addressed for this chemical.

APPENDIX

The following pages below:

- Table 7: Representative structures of the sponsored and supporting chemical substances, description of the origin of the naphtha hydrocarbon wastes category members and the associated diagram are taken from the sponsor's original final 2010 Category Summary.
    - The table also includes a list of supporting chemicals used to evaluate the human health toxicity for the category.
- Figure 1: Crude Oil Distillation Process
- Figure 2: Processing Plan for Petroleum Refinery

The structures chosen for each category member were based on the description of the process stream provided in the Test Plan and Robust Summary and supplemented by information from the CASRN definition included in the CASRN registry name. According to the revised Test Plan this category consists of complex waste streams derived from the refining of petroleum crude oils. Therefore, these streams can contain a wide range of differing substances. They likely consist of paraffinic, olefinic, napthenic and aromatic components ranging in carbon length from C_5 to greater than C_{20}. The structures depicted below are chosen to represent the wide range of values that may be expected for both the physical-chemical and environmental fate properties of these streams and are not a comprehensive listing of the expected substances in these process streams.

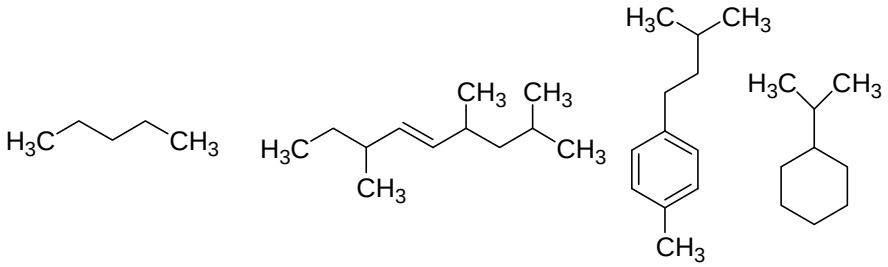
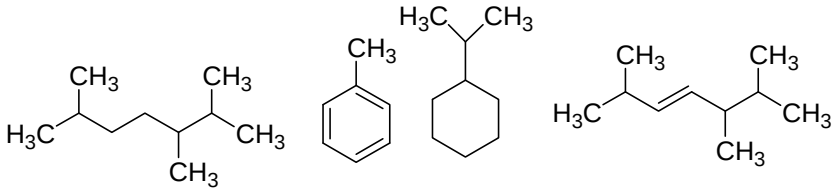
Table 7. Process Streams, CASRN, and Description of the Reclaimed Petroleum Hydrocarbons Category: Naphtha Hydrocarbon Wastes from Petroleum Refining [1]		
NAME	**CASRN**	**TSCA Description**
Petroleum products, C5-12, reclaimed, wastewater treatment	68956-70-7	 A complex combination of hydrocarbons recovered in a dilute solution from a wastewater treatment plant. It consists of hydrocarbons having carbon numbers predominantly in the range of C5 through C12. This material represents the lighter hydrocarbons that are skimmed from the surface of water present in wastewater treatment plants. Oil skimmed from wastewater is typically transferred to tanks where further water separation occurs. The oil fraction is introduced back into the refinery. Since the wastewater can come from many different parts of the refinery, the exact carbon range and hydrocarbon types that are present in any one oil mixture is highly variable and dependent on the crude source and the refining processes that the hydrocarbon streams had undergone.
Fuel oil, residual, wastewater skimmings	68956-48-9	 The recovered oil obtained by skimming all plant oil-bearing water streams. It consists predominantly of hydrocarbons having carbon numbers predominantly in the range of C7 through C10.

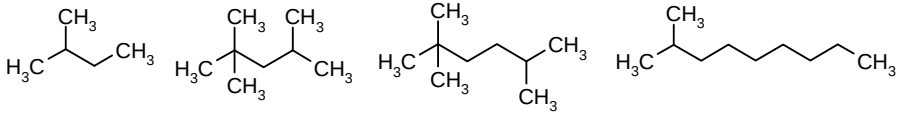
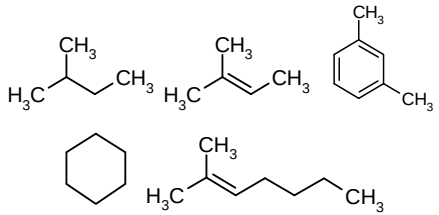
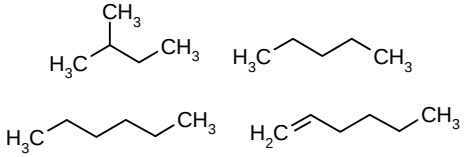
Table 7. Process Streams, CASRN, and Description of the Reclaimed Petroleum Hydrocarbons Category: Naphtha Hydrocarbon Wastes from Petroleum Refining [1]			
NAME	**CASRN**	**TSCA Description**	
SUPPORTING CHEMICALS			
Naphtha (petroleum), light alkylate	64741-66-8	 A complex combination of hydrocarbons produced by distillation of the reaction products of isobutane with monoolefinic hydrocarbons usually ranging in carbon numbers from C3 through C5. It consists predominantly of branched chain saturated hydrocarbons having carbon numbers predominantly in the range of C7 through C10 and boiling in the range of approximately 90–160°C.	**PONA** 99% Paraffin; 0% olefin; 1% naphthene; 0% aromatic From GC/MS data
Naphtha (petroleum), light catalytic cracked	64741-55-5	 A complex combination of hydrocarbons produced by the distillation of products from a catalytic cracking process. It consists of hydrocarbons having carbon numbers predominantly in the range of C4 through C11 and boiling in the range of approximately -20 to 190°C. It contains a relatively large proportion of unsaturated hydrocarbons.	**PONA** 34% Paraffin; 40% olefin; 11% naphthene; 15% aromatic From GC/MS data
Naphtha (petroleum), sweetened	64741-87-3	 A complex combination of hydrocarbons obtained by subjecting a petroleum naphtha to a sweetening process to convert mercaptans or to remove acidic impurities. It consists of hydrocarbons having carbon numbers predominantly in the range of C4 through C12 and boiling in the range of approximately -10 to 230°C.	**PONA** 48% Paraffin; 44% olefin; 6% naphthene; 1% aromatic From GC/MS data

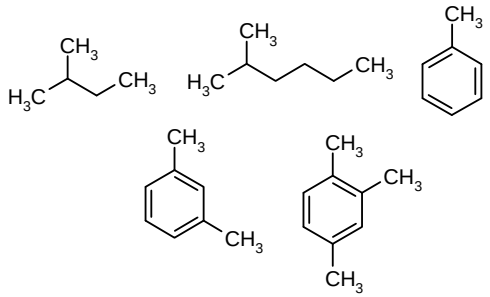
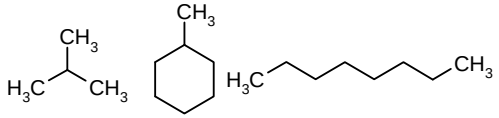
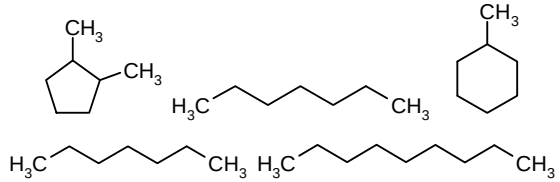
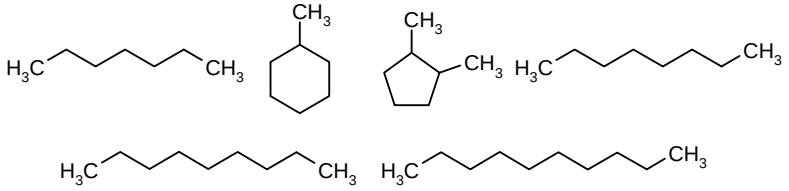
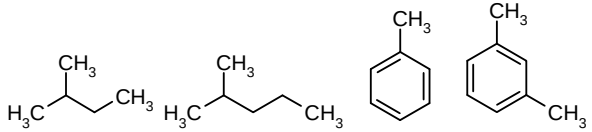
Table 7. Process Streams, CASRN, and Description of the Reclaimed Petroleum Hydrocarbons Category: Naphtha Hydrocarbon Wastes from Petroleum Refining [1]			
NAME	**CASRN**	**TSCA Description**	
Naphtha (petroleum), catalytic reformed	68955-35-1	 A complex combination of hydrocarbons produced by the distillation of products from a catalytic reforming process. It consists of hydrocarbons having carbon numbers predominantly in the range of C4 through C12 and boiling in the range of approximately 32–211°C. It contains a relatively large proportion of aromatic and branched chain hydrocarbons. This stream may contain 10% vol. or more benzene.	**PONA** 32% Paraffin; 1% olefin; 4% naphthene; 63% aromatic From GC/MS data
Gasoline, natural	8006-61-9	 A complex combination of hydrocarbons separated from natural gas by processes such as refrigeration or absorption. It consists predominantly of saturated aliphatic hydrocarbons having carbon numbers predominantly in the range of C4 through C8 and boiling in the range of approximately -20 to 120°C.	
Naphtha (petroleum), heavy straight-run	64741-41-9	 A complex combination of hydrocarbons produced by distillation of crude oil. It consists of hydrocarbons having carbon numbers predominantly in the range of C6 through C12 and boiling in the range of approximately 65–230°C.	**PONA** 48% Paraffin; 1% olefin; 40% naphthene; 11% aromatic From GC/MS data

Table 7. Process Streams, CASRN, and Description of the Reclaimed Petroleum Hydrocarbons Category: Naphtha Hydrocarbon Wastes from Petroleum Refining [1]

NAME	CASRN	TSCA Description	
Naphtha (petroleum), full-range coker	68513-02-0	 A complex combination of hydrocarbons produced by the distillation of products from a fluid coker. It consists predominantly of unsaturated hydrocarbons having carbon numbers predominantly in the range of C4 through C15 and boiling in the range of approximately 43–250°C.	**PONA** 45% Paraffin; 1% olefin; 40% naphthene; 14% aromatic From GC/MS data. Note: CAS def. does not agree with analytical data.
Naphtha (petroleum), light catalytic reformed	64741-63-5	 A complex combination of hydrocarbons produced from the distillation of products from a catalytic reforming process. It consists of hydrocarbons having carbon numbers predominantly in the range of C5 through C11 and boiling in the range of approximately 35–190°C. It contains a relatively large proportion of aromatic and branched chain hydrocarbons. This stream may contain 10 % vol. or more benzene.	**PONA** 52% Paraffin; 1% olefin; 5% naphthene; 42% aromatic From GC/MS data

Crude Oil Distillation Process

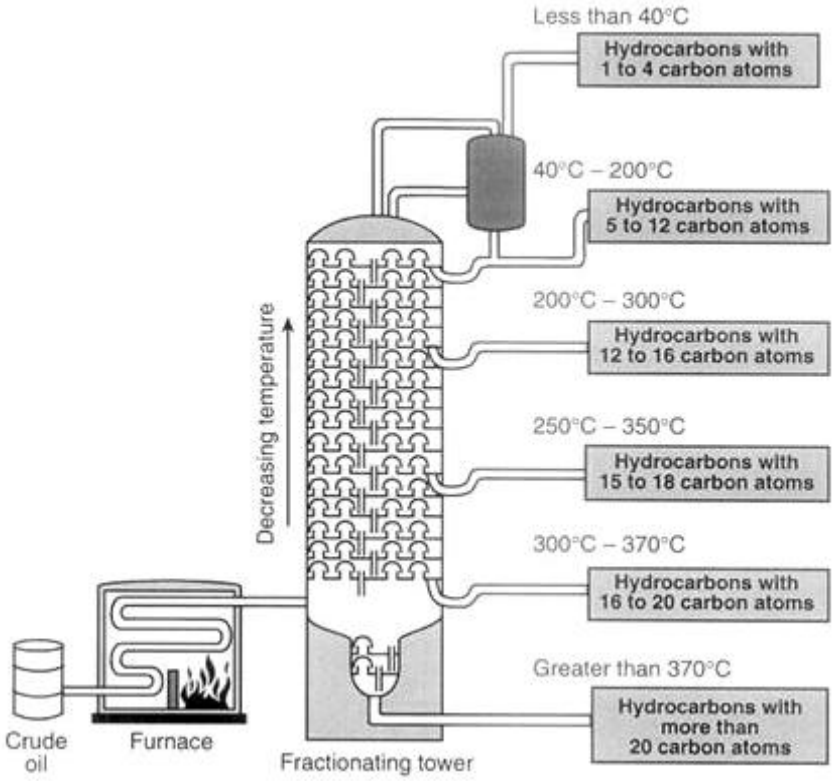


Figure 1. Crude Oil Distillation Process

As shown in Figure 1, the refining of crude oil into petroleum products uses distillation as well as chemical treatment, catalysts, and pressure to separate and combine the basic types of hydrocarbon molecules into petroleum streams, which have the characteristics needed for blending commercial petroleum products. As is the case for many industrial processes, the refining of petroleum products produces a number of unintentional byproducts, wastes, and other hydrocarbon-containing process streams that are not typically sold as products. For example, oil is recovered from wastewater streams and the catalysts, filters and other materials in contact with oil are washed to recover hydrocarbons. The oil that is occasionally spilled and the oil recovered from wastewater treatment are generally recycled back into the refinery (naphtha hydrocarbon waste).

Substances in the naphtha hydrocarbons waste category are recovered at wastewater treatment plants or by skimming floating product off of wastewater. The characteristic chemical composition of naphtha streams is described by PONA classification – the Paraffinic, Olefinic, Naphthenic and Aromatic classes in the stream; within each class, the hydrocarbons also vary in size. For more detailed information see the Petroleum HPV Gasoline Blending Streams Category Assessment Document (API, 2008). The same classes apply to naphtha hydrocarbons wastes. Some refining processes create naphtha that contains predominately one or two of these classes. For example, naphtha from catalytic reforming typically contains high concentrations of aromatics, while alkylation naphtha typically contains no aromatics. Other refinery processes do not significantly influence the chemical composition of the naphtha. As the members of this Category are recovered as waste products in the refinery, there is no set chemical composition.

Processing Plan for Petroleum Refinery

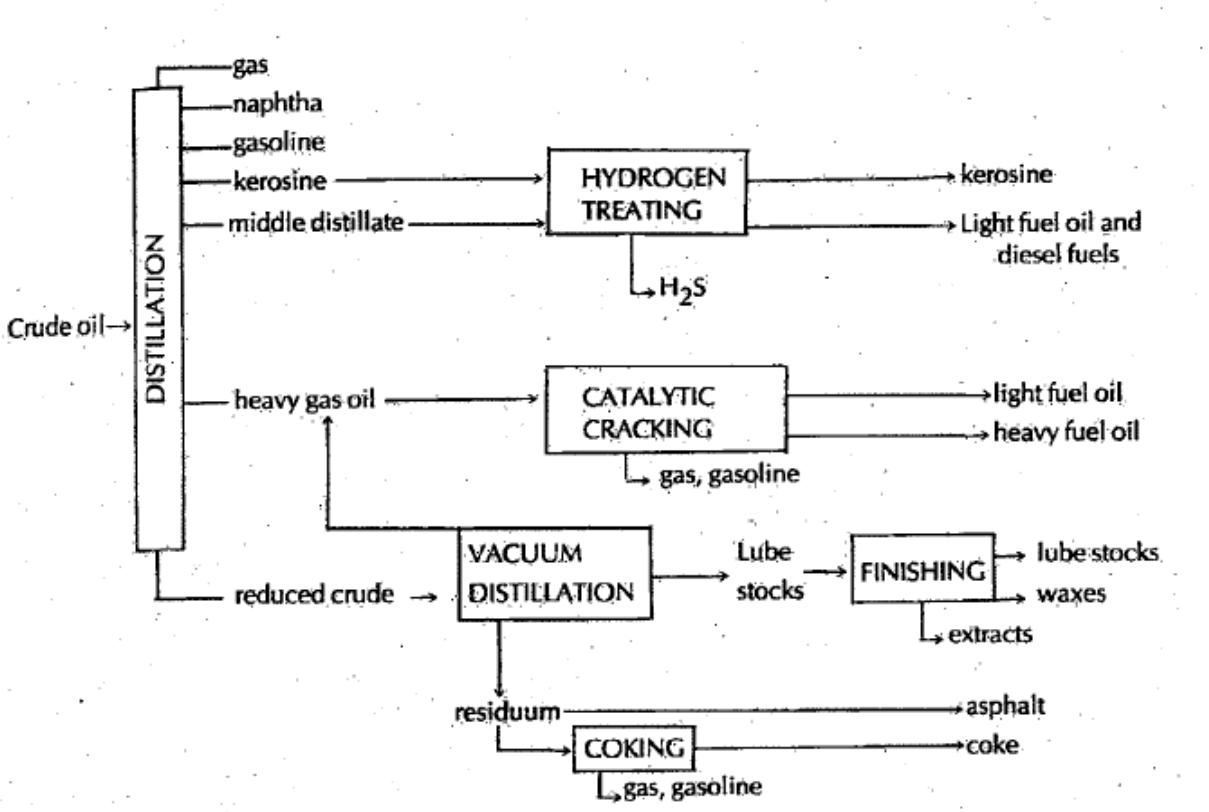


Figure 2. Processing Plan for Petroleum Refinery
U.S. Public Health Service, 1960

For a more background information on residual hydrocarbon waste generation and waste separation see the U.S. EPA HPV Challenge Program Category Assessment Document for Reclaimed Petroleum Hydrocarbons: Naphtha Hydrocarbon Wastes from Petroleum Refining at: http://www.petroleumhpv.org/docs/rec_subs/Naphtha%20hydrocarbon%20waste%20CAD%20final%208_31_10.pdf.