Product Stewardship Summary
Fuels Products

This product stewardship summary is intended to give general information about the chemical or categories of chemicals addressed. It is not intended to provide an in-depth discussion of all health and safety information. Additional information is available through the applicable Safety Data Sheet (SDS) which should be consulted before use of any chemical. This product stewardship summary does not supplant or replace required regulatory and/or legal communication documents.

Chemical Identity

The Fuels Products are composed of three subgroups: Fire Training Fluids, Performance Fuels, and Reference Fuels.

I. Fire Training Fluids

These products are produced from petroleum or crude oil and consist of aliphatic hydrocarbons (primarily branched paraffins) ranging in carbon number from C_5 to C_{13}. The two products are:

- E-III® Aviation Grade FTF
- E-III® Industrial Grade FTF

II. Performance Fuels

These products are produced from the refining of petroleum or crude oil and are complex mixtures of aliphatic hydrocarbons (linear, branched, and cyclo-paraffins), and aromatic hydrocarbons. Olefins are present in some of the unleaded test gasoline blends. Jet A (jet fuel) consists mainly of aliphatic and aromatic hydrocarbons from a middle distillate petroleum stream generically known as kerosene, with a carbon number range of C_9 to C_{16} and a boiling range from 300 to 572ºF (149 to 300ºC). Jet RF (AMS 2629B Type 1) consists of a mixture of C_6 to C_8 aliphatic (branched and cyclo-paraffins) and aromatic hydrocarbons with a boiling point range of 180 to 280ºF (82 to 139ºC). The unleaded test gasoline blends are obtained from various blending streams called naphthas and has a complex mixture of aliphatic, aromatic, and olefinic hydrocarbons in the carbon number range of C_4 to C_{12} with a boiling point range of 93 to 399ºF (34 to 204ºC). The Performance Fuels are:

- 65th Percentile Fuel
- California Phase III Certification Fuel
- Gasoline 100 ULE
- Jet A
- Jet RF (AMS 2629B Type 1)
- Octane Test Fuel
- Oxygenated Test Fuel – Ethanol
- UTG 96

February 6, 2019

III. Reference Fuels

Gas oil (CAS No. 68783-08-4) is one of the products in the Reference Fuels. It is produced by atmospheric distillation of crude oil and it consists of hydrocarbons having carbon numbers predominantly in the range of C_7 through C_{35} and boiling in the range of approximately 239 to 887°F (115 to 475°C). The other Reference Fuels are also produced from petroleum or crude oil and consists of either a single or blend of aliphatic and/or aromatic hydrocarbons. The aliphatic hydrocarbons (linear branched, cyclic) range in carbon number from C_6 to C_8; the aromatic hydrocarbons have carbon numbers of C_7 or C_8. The Reference Fuels are:

- D-2887 Reference Gas Oil #1 (ASTM)
- Hydrocarbon Fluid Type I
- Hydrocarbon Fluid Type III
- PRF Isooctane
- PRF Isooctane + TEL
- PRF n-Heptane
- PRF Octane Blend No. 80, 82, 84, 86, 88, 90, 92, 94, 96, 98
- Reference Fuel A
- Reference Fuel B
- Toluene Reference Fuel
- Toluene Standard Fuel, 89.3, 93.4, 96.9, 99.7

Product Uses

I. Fire Training Fluids

The E-III® Fire Training Fluids are used in training applications to accurately simulate aircraft, motor vehicle, industrial, and watercraft liquid petroleum fuel fires.

II. Performance Fuels

The Performance Fuels products are generally used as test fuels for emission certification and aviation applications. Products in this group are commercially available to industrial customers only for such testing, primarily including engine component manufacturers, distributors, engine designers and manufacturers, and testing, research and development facilities.

III. Reference Fuels

The Reference Fuels products are used to establish the quality or performance characteristics of various fuels used in commercial and industrial applications. Reference fuels are not generally used as fuels in transportation vehicles.

Physical/Chemical Properties

The Fuels Products are volatile (except for gas oil), flammable, and combustible liquids, and vapors may readily form flammable mixtures.

I. Fire Training Fluids

The flash points for the E-III® Fire Training Fluids are 100°F (38°C) for the Aviation Grade and <50°F (<10°C) for the Industrial Grade.

II. Performance Fuels
The flash points for the Performance Fuels are < -35°F (< -37°C) for Gasoline 100 ULE; -35°F (-37°C) for the other gasoline blends; 1.4°F (-17°C) for Jet RF (AMS 2629B Type 1); 100°F (38°C) for Jet A; and 122°F (50°C) for gas oil.

III. Reference Fuels
The flash point for the Reference Fuels ranges from -4°F (-20°C) to 87°F (27°C).

The Fuels Products have the potential to cause fires if they are exposed to an ignitable source. Electrostatic charge can accumulate and create a hazardous condition when handling these materials. Containers can explode under pressurized conditions. Due to their inherent explosive characteristics, there are specific requirements for handling, storage, transportation, labeling, and disposal. However, it should be noted that these products are typically stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.

Health Information

The Fuels Products have low acute toxicity. Exposures to vapors or aerosols may be irritating to the eyes and respiratory tract. At high concentrations, vapors and aerosols can also cause central nervous system depression with symptoms such as headaches, dizziness and drowsiness. Gas oil is not irritating to the skin or eyes; for the other Fuels Products, repeated or prolonged skin contact can cause skin irritation. None of the Fuels Products are dermal sensitizers. If accidently ingested, a small amount of liquid may be aspirated into the lungs which can occur from either swallowing or from vomiting. Aspiration of liquid into the lungs may cause inflammation of the lungs and lung edema. This is a medical emergency and requires immediate and proper treatment.

Additional health information on the subgroups are described below:

I. Fire Training Fluids
There is low concern that these products can cause reproductive or developmental effects, and they are not considered to have mutagenic or carcinogenic properties.

II. Performance Fuels
Unleaded gasoline has been shown to be a carcinogen to laboratory animals. Chronic (lifetime) vapor exposures resulted in kidney tumors in male rats and liver tumors in female mice. The male rat kidney tumors occur from a mechanism that is specific to male rats and thus these tumors are not considered relevant to humans. The liver tumors in female mice occurred at a very high vapor concentration. Unleaded gasoline is not a mutagen. No reproductive or developmental effects were seen in laboratory animals exposed to unleaded gasoline vapors.

The unleaded gasoline blends and Jet RF (AMS 2629B Type 1) contain toluene. Repeated and prolonged inhalation exposures (>1,000 ppm) of pregnant animals have been shown to cause adverse fetal developmental effects. Repeated and prolonged inhalation exposures cause neuropsychological effects, auditory dysfunction, and effects on color vision.

The unleaded gasoline blends (except for Gasoline 100 ULE) contains benzene. Benzene is a human carcinogen. Repeated and prolonged exposure to benzene may cause damage to the blood-forming organs, which can lead to anemia and acute myeloid leukemia (AML).

The unleaded gasoline blends (except for Gasoline 100 ULE) and Jet A contain naphthalene. Exposure to high concentrations of naphthalene may cause hemolytic anemia (from destruction of red blood cells) and cataracts. Naphthalene has been shown to be a carcinogen in laboratory animal studies. The relevance of these findings to humans is uncertain.

The unleaded gasoline blends (except for Gasoline 100 ULE) contain ethylbenzene. Ethylbenzene has been shown to be a carcinogen in laboratory animal studies. The relevance of these findings to humans is uncertain. In addition, repeated exposures to ethylbenzene have been shown to cause ototoxicity in animal studies.

Kerosene has been shown to be a dermal carcinogen to laboratory animals. The carcinogenic effects of kerosene are due to a mechanism involving repeated skin irritation or damage and regenerative hyperplasia, a situation that is unlikely to be tolerated by humans. Jet fuels and kerosene are not mutagens. No reproductive or developmental effects were seen in laboratory animals exposed to either Jet A or kerosene vapors.

III. Reference Fuels

Some of the Reference Fuels may contain toluene. Repeated and prolonged inhalation exposures (>1,000 ppm) of pregnant animals have been shown to cause adverse fetal developmental effects. Repeated and prolonged inhalation exposures can cause neuropsychological effects, auditory dysfunction, and effects on color vision.

Tetraethyllead is a constituent in one of the Reference Fuels. Tetraethyllead is acutely toxic by the oral, dermal and inhalation routes of exposure. Repeated and prolonged inhalation exposures to tetraethyllead cause adverse developmental effects to the fetus. Tetraethyllead can be metabolized in the body, resulting in the release of inorganic lead. Exposure to inorganic lead has been shown to affect the mental and physical growth of children; a safe level has not been identified.

A dermal study on gas oil showed toxic effects in the blood, liver, bone marrow and thymus. No reproductive effects were observed in laboratory animals, but developmental effects (decreased fetal weights and malformations) were observed in the presence of maternal toxicity. Gas oil can contain polycyclic aromatic compounds (PACs), which cause mutations *in vitro* and are carcinogenic in animal studies.

Environmental Information

The environmental hazard potential for the Fuels Products is expected to be varied because their toxicity and fate will depend on the individual components in the mixture. If accidently spilled into the environment, these fuels have low solubility in water and will rapidly volatilize to air. These fuels biodegrade at moderate to rapid rates and are not expected to persist in the environment. However, the Fuels Products can cause significant harm to aquatic organisms, including plant life. Many of the components in these fuels have the potential to bioaccumulate, which can be reduced due to their physical properties and biotransformation.

Exposure Potential

The most likely routes of exposure to the Fuels Products are by inhalation and skin or eye contact. The best way to prevent exposure is to work in well-ventilated areas, wear appropriate personal protective equipment (PPE), and follow good personal hygiene practices.

Workplace Use:
Potentially exposed populations include: (1) workers who manufacture and/or blend these products; (2) quality assurance workers who sample and analyze the products to ensure that they meet specifications; (3) workers involved in distribution and storage of these products; and (4) commercial consumers in occupational settings that use these products in intended applications. The probability of exposure to workers is expected to be low because these products are manufactured in enclosed, controlled environments, and are transported in tightly sealed containers. These products are sold to industrial customers that are familiar with their intended applications, safe handling, storage, and disposal requirements. Manufacturing, quality assurance, and transportation workers should always adhere to safe handling practices and wear appropriate personal protective equipment (PPE). Additionally, they have access to exposure prevention measures (e.g., engineering controls). Customers should also use appropriate PPE during handling and have risk mitigation measures in place to address potential physical hazards or accidental releases.

Consumer Use:
Potential exposure or impact to the general public is not anticipated for these products, as they are sold by Chevron Phillips Chemical Company to sophisticated industry users and not to the general population.

Potential Environmental Release:
There may be some potential for significant exposure to the environment from accidental releases during transportation of drums, truck trailers, rail cars, or container ships; however, the frequency of distribution incidents involving accidental release of these products has been low, and reported volumes spilled have been minimal. Chevron Phillips Chemical Company is committed to operating in an environmentally responsible manner and participates in the American Chemistry Council's Responsible Care® program.

Risk Management

Chevron Phillips Chemical Company is committed to Product Stewardship and doing business responsibly. We endeavor to provide sufficient information for the safe use and handling of all our products. We make product information available to all our customers, distributors, carriers, and users of these products which contain detail about the properties of each product. To that end, a Safety Data Sheet and a certificate of analysis accompany each shipment from our manufacturing plant.

Before using these products, the user is advised and cautioned to make its own determination and assessment of the safety and suitability of the product for the specific use in question. It is the ultimate responsibility of the user to ensure suitability for use and determine if this information is applicable to the user's specific application. Chevron Phillips Chemical Company does not make, and expressly disclaims, all warranties, including warranties of merchantability or fitness for a particular purpose, regardless of whether oral or written, express or implied, or allegedly arising from any usage of any trade or from any course of dealing in connection with the use of the information contained herein or any product itself. The user expressly assumes all risk and liability, whether based in contract, tort or otherwise, in connection with the use of the information contained herein or any product itself.

Regulatory Information

Regulations exist that govern the manufacture, sale, transportation, use and disposal of the Fuels Products. These regulations may vary by city, state, country or geographic region. Additional relevant information may be found by consulting the applicable SDS.

Sources of Additional Information

Safety Data Sheets (SDS) at http://www.cpchem.com.

European Chemical Agency (ECHA) Dissemination portal with information on chemical substances registered under REACH

- http://echa.europa.eu/information-on-chemicals.

Organization for Economic Cooperation and Development (OECD): eChemPortal web-based search tool

- http://www.echemportal.org.

U.S. Environmental Protection Agency: High Production Volume Information System (HPVIS)

- http://www.epa.gov/chemrtk/hpvis/index.html.

ATSDR Toxicological Profile for Lead

- http://www.atsdr.cdc.gov/ToxProfiles/tp.asp?id=96&tid=22.

Conclusion

The Fuels Products are classified as hazardous chemicals. Efforts should be taken to minimize exposure to these products by adhering to safe-handling procedures, designated applications and uses, appropriate personal-protective equipment practices, and appropriate labeling, storage, and transportation procedures and requirements. The relevant SDS and applicable regulatory guidelines and requirements, including but not limited to Occupational Health and Safety Administration (OSHA) guidelines, should be consulted prior to the use or handling of these products.

Contact Information:

http://www.cpchem.com/