

*Safe Handling and Storage of*  
*1-Tetradecene, 1-Hexadecene,*  
*and*  
*1-Octadecene*

## Operational Excellence Policy

We will strive each day to conduct our business in a safe, secure, injury-free, and environmentally responsible manner. We are committed to comply with all laws and regulations. We will strive to make optimal use of the resources we consume and minimize emissions and waste. We will strive to limit the risks of our products throughout their lifecycle. We are committed to reducing risks in our operations to safeguard our employees and the communities where we operate. We will openly communicate our results and welcome the input of regulatory agencies, our communities, our customers, and other interested stakeholders.

We will accomplish this by integrating environmental, health, safety, security, reliability, and quality into our management processes using our Operational Excellence System (OE). OE will be used worldwide to: set goals for improvement, provide alignment of activities and resources, assess and manage risks, gain stakeholder input, and rigorously audit our performance against operational objectives and compliance requirements.

*Ray Wilcox*

5/30/2006

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## PRODUCT STEWARDSHIP

Chevron Phillips Chemical Company LP (“Chevron Phillips Chemical Company”) is committed to being a good Product Steward of the products we produce. We want anyone who comes in contact with one of our products to have access to information that will help them to understand its potential risk and how to use it safely. The thrust of our Product Stewardship program is the implementation of an Operation Excellence Management System (OEMS) initiative, which makes health, safety and environmental protection an integral part of our products. Successful implementation of this system must include a shared responsibility of all those who come in contact with a product throughout its life cycle. Chevron Phillips Chemical Company will continue to work with customers and others to help ensure that all who use and handle our products follow safe and environmentally sound practices.

**The information contained in this technical bulletin is not intended to, nor does it, amend or replace the Chevron Phillips Chemical Company Material Safety Data Sheet (MSDS) for 1-Tetradecene (#PE0020), 1-Hexadecene (#PE0021), or 1-Octadecene (#PE0023). The most current MSDS can be obtained from Chevron Phillips Chemical Company by calling (800) 852-5530 and should be carefully examined prior to working with these products.**

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## INTRODUCTION

Gulf Oil Chemicals Company first commercialized the production of normal alpha olefins, Gulftene<sup>®</sup> alpha olefins, in 1965. Today, alpha olefin products are produced and marketed by Chevron Phillips Chemical Company (CPChem). This brochure covers the safe handling and storage of 1-tetradecene (Alpha Olefin 14), 1-hexadecene (Alpha Olefin 16), and 1-octadecene (Alpha Olefin 18) alpha olefins. A brief description of typical applications of these products follows.

CPChem 1-tetradecene, 1-hexadecene and 1-octadecene are employed in the production of alpha olefin sulfonate (AOS) surfactants, which are used in shampoos, liquid and powdered detergents, and liquid hand soaps. Other surfactants that can be produced include alkyl aromatics, alkyl dimethyl amines (ADMA) and detergent alcohols (1-tetradecene only). ADMAs are precursors to foam boosters used in shampoos, bubble baths, dishwashing detergents, biocides and antistatic agents (quaternary ammonium halides) and mild, amphoteric surfactants.

Alkenyl succinic anhydrides (ASA) from 1-tetradecene, 1-hexadecene and 1-octadecene are used as dispersants in lube oils and automatic transmission fluids, and as pour-point depressants in lube and crude oils. The maleic anhydride copolymer with 1-octadecene, PA-18, is used in water-resistant sunscreen formulas and as a release agent in tapes and paper templates for PVC curtains. One of the largest applications of 1-hexadecene and 1-octadecene involves their use as paper-sizing agents in alkaline media.

In the area of specialty chemicals, these CPChem products are found in applications such as epoxides, metal working agents, halogenated olefins, and alkyl silanes. Epoxides are used to produce epoxy resins and polyether ingredients in polyurethanes. Halogenated olefins are incorporated into fire retardant agents and into PVC formulations as secondary plasticizers.

**NOTE:**

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## PART 1

### SALES SPECIFICATIONS, PROPERTIES AND TEST METHODS

#### 1-TETRADECENE (C<sub>14</sub>H<sub>28</sub>)

##### Sales Specification

PROPERTY	METHOD	SPECIFICATION
Carbon Number, wt. % C <sub>14</sub> , min.	GLC	98.0
n-Alpha Olefin, wt. %, min.	GLC	93.4
Vinylidene, wt. %, max.	GLC	5.4
cis- & trans-2-Tetradecene, wt. %, max.	GLC	0.3
Paraffin, wt. %, max.	GLC	0.3
Color, Saybolt, min.	ASTM D 6045	+30
Water, ppm by wt., max.	ASTM E 1064	100
Appearance	ASTM D 4176	Clear & Bright

Revision Date February, 2002

##### Technical Data<sup>1</sup>

PROPERTY	METHOD	TYPICAL VALUE
Carbon Number, wt. % C <sub>14</sub>	GLC	98.64
n-Alpha Olefin, wt. %	GLC	94.18
Vinylidene, wt. %	GLC	4.62
cis- and trans-2-Tetradecene, wt. %	GLC	0.26
Paraffin, wt. %	GLC	0.25
Color, Saybolt	ASTM D 6045	30.00
Specific Gravity at 15.6°C/15.6°C (60°F/60°F)	ASTM D 287	0.775
API Gravity at 15.6°C/15.6°C (60°F/60°F)	ASTM D 287	51.0
Density, lb./gal., 15.6°C (60°F)	--	6.46
Water, ppm by wt.	ASTM E 1064	32.60
Pour Point, °C (°F)	ASTM D 97	-12.2 (10)
Flash Point, PM, °C (°F)	ASTM D 93	107 (225)
Freezing Point, °C (°F)	ASTM D 1015	-12.8 (9)
Appearance	ASTM D 4176	Clear and Bright
Auto Ignition Temperature, °C (°F)	ASTM E 659	235 (455)

<sup>1</sup> The nominal properties herein are typical of the product but do not reflect normal production and testing variances and therefore should not be used for specification purposes. Values are rounded.

## 1-HEXADECENE (C<sub>16</sub>H<sub>32</sub>)

### Sales Specification

PROPERTY	METHOD	SPECIFICATION
Carbon Number, wt. % C <sub>16</sub> , min.	GLC	97.5
n-Alpha Olefin, wt. %, min.	GLC	92.2
Vinylidene, wt. %, max.	GLC	6.5
cis- and trans-2-Hexadecene, wt. %, max.	GLC	0.3
Paraffin, wt. %, max.	GLC	0.3
Color, Saybolt, min.	ASTM D 6045	+30
Water, ppm by wt., max.	ASTM E 1064	100
Appearance	ASTM D 4176	Clear and Bright

Revision Date February, 2002

### Technical Data<sup>1</sup>

PROPERTY	METHOD	TYPICAL VALUE
Carbon Number, wt. % C <sub>16</sub>	GLC	98.90
n-Alpha Olefin, wt. %	GLC	93.16
Vinylidene, wt. %	GLC	5.56
cis- and trans-2-Hexadecene, wt. %	GLC	0.18
Paraffin, wt. %	GLC	0.25
Color, Saybolt	ASTM D 6045	30.00
Specific Gravity at 15.6°C/15.6°C (60°F/60°F)	ASTM D 287	0.785
API Gravity at 15.6°C/15.6°C (60°F/60°F)	ASTM D 287	48.8
Density, lb./gal., 15.6°C (60°F)	--	6.54
Water, ppm by wt.	ASTM E 1064	30.80
Pour Point, °C (°F)	ASTM D 97	7.2 (45)
Flash Point, PM, °C (°F)	ASTM D 93	132 (270)
Freezing Point, °C (°F)	ASTM D 1015	3.9 (39)
Appearance	ASTM D 4176	Clear and Bright
Auto Ignition Temperature, °C (°F)	ASTM E 659	240 (464)

<sup>1</sup> The nominal properties herein are typical of the product but do not reflect normal production and testing variances and therefore should not be used for specification purposes. Values are rounded.

## 1-OCTADECENE (C<sub>18</sub>H<sub>36</sub>)

### Sales Specification

PROPERTY	METHOD	SPECIFICATION
Carbon Number, wt. % C <sub>18</sub> , min.	GLC	97.0
n-Alpha Olefin, wt. %, min.	GLC	90.6
Vinylidene, wt. %, max.	GLC	7.4
cis- and trans-2-Octadecene, wt. %, max.	GLC	0.3
Paraffin, wt. %, max.	GLC	0.3
Color, Saybolt, min.	ASTM D 6045	+30
Water, ppm by wt., max.	ASTM E 1064	100
Appearance	ASTM D 4176	Clear and Bright

Revision Date June, 2002

### Technical Data<sup>1</sup>

PROPERTY	METHOD	TYPICAL VALUE
Carbon Number, wt. % C <sub>18</sub>	GLC	98.58
n-Alpha Olefin, wt. %	GLC	91.51
Vinylidene, wt. %	GLC	6.07
Cis- and trans-2-Octadecene, wt. %	GLC	0.23
Paraffin, wt. %	GLC	0.29
Color, Saybolt	ASTM D 6045	30.00
Specific Gravity at 15.6°C/15.6°C (60°F/60°F)	ASTM D 287	0.793
API Gravity at 15.6°C/15.6°C (60°F/60°F)	ASTM D 287	46.9
Density, lb./gal., 15.6°C (60°F)	--	6.60
Water, ppm by wt.	ASTM D 1064	31.50
Pour Point, °C (°F)	ASTM D 97	18.3 (65)
Flash Point, PM, °C (°F)	ASTM D 93	154 (310)
Freezing Point, °C (°F)	ASTM D 1015	17.8 (64)
Appearance	ASTM D 4176	Clear and Bright
Auto Ignition Temperature, °C (°F)	ASTM E 659	250 (482)

<sup>1</sup> The nominal properties herein are typical of the product but do not reflect normal production and testing variances and therefore should not be used for specification purposes. Values are rounded.

## PROPERTIES

	<u>1-Tetradecene</u>	<u>1-Hexadecene</u>	<u>1-Octadecene</u>
API Gravity <sup>1</sup> at 15.6°C (60°F)	51.11	48.83	47.10
Appearance	Clear & Bright	Clear & Bright	Clear & Bright
Autoignition Temperature <sup>2</sup> , °C (°F)	235 (455)	240 (464)	250 (482)
Boiling Point <sup>3</sup> , °C			
<u>Vapor Pressure, mm of Hg</u>			
760	251.165	284.942	314.93
700	247.558	281.175	311.0
600	240.960	274.283	303.8
500	233.420	266.406	295.7
400	224.559	257.148	286.0
300	213.691	245.793	274.2
200	199.349	230.806	258.6
100	177.156	207.609	234.45
80	170.566	200.720	227.27
50	157.47	187.028	213.00
20	134.6	163.13	188.09
Color			
Saybolt	+30	+30	+30
Critical Density <sup>3</sup>			
gm/cm <sup>3</sup>	0.241	0.241	0.241
lb/ft <sup>3</sup>	15.05	15.05	15.05
Critical Pressure <sup>3</sup>			
atmosphere	15.297	13.323	11.646
lb/in <sup>2</sup>	224.81	195.80	171.14
bar	15.500	13.500	11.800
Critical Temperature <sup>3</sup>			
°K	691.1	719.7	744.2
°C	418.0	446.6	471.0
°R	1,244.1	1,295.6	1339.5
°F	784.4	835.9	879.8
Critical Volume <sup>3</sup>			
cm <sup>3</sup> /gm-mole	816.5	932.5	1048.5
ft <sup>3</sup> /lb-mole	13.08	14.94	16.80
ft <sup>3</sup> /lb	0.0700	0.0704	0.0704

	<u>1-Tetradecene</u>	<u>1-Hexadecene</u>	<u>1-Octadecene</u>
Critical PV/RT <sup>(3)</sup>	0.221	0.210	0.200
Density of the Liquid <sup>3</sup> , gm/cm <sup>3</sup>			
<u>Temperature, °C</u>			
10	0.7785	0.7882	-
20	0.7713	0.7811	-
25	0.7677	0.7776	0.7853
40	0.7570	0.7671	0.7749
50	0.7498	0.7600	0.7679
<u>Linear Least Squares Constants<sup>4</sup></u> (for units of gm/cm <sup>3</sup> )			
m	-0.716545	-0.703151	-0.696060
b	0.785660	0.795210	0.802770
Entropy of Vaporization <sup>4</sup> at Boiling Point, Cal/mol-K	21.38	21.59	21.66
Flammability Limits <sup>1</sup> , vol%	0.5 lower to 5.4 upper (Estimated)	0.5 lower to 5.8 upper (Estimated)	0.4 lower to 6.9 upper (Estimated)
Flash Point (PM) <sup>7</sup> , °C (°F)	107 (225)	132 (270)	154 (310)
Free Energy of Formation <sup>3</sup> at 25 °C, kcal/mole Gas, Ideal State	36.59	40.55	44.50
Freezing Point <sup>1</sup> , °C (°F)	-12.9 (8.87)	4.12 (39.42)	17.8 (64.0)
Heat Capacity <sup>3</sup> at 25°C, cal/gm-°C			
Gas	0.3799	0.3806	0.3812
Liquid	0.5146	0.5164	0.5185
Heat of Combustion of the Liquid <sup>3</sup> at 25°C and Constant Pressure, Gross, kcal/mole			
H <sub>2</sub> O(l) +CO <sub>2</sub> (g)	2206.8	2519.2	2831.7
H <sub>2</sub> O(g) +CO <sub>2</sub> (g)	2059.5	2350.9	2642.4
Heat of Formation of the Gas <sup>3</sup> at 25°C, kcal/mole	-49.55	-59.43	-69.31
Heat of Vaporization <sup>3</sup> at Boiling Point, kcal/mole	11.21	12.05	12.74

	<u>1-Tetradecene</u>	<u>1-Hexadecene</u>	<u>1-Octadecene</u>
Ideal Gas Thermodynamic Properties <sup>3</sup>			
<u>Temperature, °C</u>	<u>Heat Capacity, cal/gm-mole-°C</u>	<u>Heat Capacity, cal/gm-mole-°C</u>	<u>Heat Capacity, cal/gm-mole-°C</u>
0	70.17	80.35	90.45
25	75.37	86.29	97.23
100	90.41	103.53	116.65
500	149.76	171.51	193.22
1000	187.54	214.56	241.62
<u>Temperature, °C</u>	<u>Enthalpy, cal/gm-mole</u>	<u>Enthalpy, cal/gm-mole</u>	<u>Enthalpy, cal/gm-mole</u>
0	12382	14108	15833
25	14173	16159	18143
100	20384	23273	26157
500	69617	79650	89706
1000	155140	177569	199989
Molecular Formula	C <sub>14</sub> H <sub>28</sub>	C <sub>16</sub> H <sub>32</sub>	C <sub>18</sub> H <sub>36</sub>
Molecular Weight	196.38	224.43	252.48
Refractive Index <sup>3</sup>			
<u>Temperature, °C</u>	<u>n<sub>D</sub></u>	<u>n<sub>D</sub></u>	<u>n<sub>D</sub></u>
20	1.4363	1.4412	1.4449
25	1.4342	1.4391	1.4428
Relative Density (Specific Gravity) <sup>5</sup> ,			
10°C/15.6°C	0.7793	0.7890	-
20°C/15.6°C	0.7721	0.7819	-
25°C/15.6°C	0.7685	0.7784	0.7861
40°C/15.6°C	0.7577	0.7679	0.7757
50°C/15.6°C	0.7505	0.7608	0.7687
Relative Vapor Density <sup>5</sup> (Air = 1)	6.8	7.7	8.7
Surface tension <sup>3</sup> , dynes/cm			
<u>Temperature, °C</u>			
0	28.56	-	-
25	26.36	27.32	28.1
50	24.16	25.16	25.9
70	22.41	23.44	24.2
100	19.77	20.86	21.7

	<u>1-Tetradecene</u>	<u>1-Hexadecene</u>	<u>1-Octadecene</u>
Vapor Pressure <sup>3</sup> at 176.7 °C (350°F), mm Hg	98.38	34.15	37.03
<u>Antoine Coefficients<sup>6</sup></u>			
A	7.03065	7.04011	7.06065
B	1754.09	1840.52	1932.9
C	171.524	157.565	147.50
Viscosity, Absolute <sup>3</sup>			
<u>Temperature, °C</u>	<u>centipoises</u>	<u>centipoises</u>	<u>centipoises</u>
0	3.22	-	-
25	1.82	2.69	3.85
50	1.199	1.68	2.28
75	0.848	1.150	1.52
100	0.638	0.836	1.071
Viscosity, Kinematic <sup>3</sup>			
<u>Temperature, °C</u>	<u>centiStokes</u>	<u>centiStokes</u>	<u>centiStokes</u>
0	4.11	-	-
25	2.38	3.46	4.90
50	1.60	2.21	2.98
75	1.159	1.55	2.01
100	0.891	1.149	1.46

#### REFERENCES:

1. "Physical Constants of Hydrocarbon and Non-Hydrocarbon Compounds", 2nd edition, ASTM Data Series DS 4B, Philadelphia, PA, 1988.
2. "Physical Properties of Hydrocarbons", R.W. Gallant and Carl L. Yaws, ISBN 0-88415-067-4.
3. TRC Thermodynamic Tables-Hydrocarbon; The Texas A&M University System, College Station, TX 77843-3124.
4. Density (gm/cm<sup>3</sup>) = [(m/1000) \* (Temperature (°C))] + b; 10 °C ≤ Temperature ≤ 120 °C. Values good to 4 decimal places up to 100 °C.
5. Values are calculated.
6. Log<sub>10</sub>P = A - B/ (C+t) (0.0004 mm Hg ≤ P ≤ 1500 mm Hg for 1-tetradecene; 10 mm Hg ≤ P ≤ 1500 mm Hg for 1-hexadecene and 1-octadecene, t in °C). Also, for 0.0004 mm Hg ≤ P ≤ 10 mm Hg, for 1-hexadecene, A = 8.6848, B = 2976.6 and C = 240.2; and for 1-octadecene, A = 6.5039, B = 1594.5 and C = 118.3.
7. Chevron Phillips Chemical Company Test Results

## **RECOMMENDED TEST METHODS**

The following ASTM methods are recommended for the analysis of 1-tetradecene, 1-hexadecene, and 1-octadecene:

1. ASTM D 93 Standard Test Methods for Flash-Point by Pensky-Martens Closed Cup Tester
2. ASTM D 97 Standard Test Method for Pour Point of Petroleum Products
3. ASTM D 287 Standard Test Method for API Gravity of Crude Petroleum and Petroleum Products (Hydrometer Method)
4. ASTM D 1015 Standard Test Method for Freezing Points of High-Purity Hydrocarbons
5. ASTM D 4176 Standard Test Method for Free Water and Particulate Contamination in Distillate Fuels (Visual Inspection Procedures)
6. ASTM D 6045 Standard Test Method for Color of Petroleum Products by the Automatic Tristimulus Method
7. ASTM E 1064 Standard Test Method for Water in Organic Liquids by Coulometric Karl Fischer Titration

## **PART 2**

### **SAMPLING AND HANDLING**

#### **TRAINING**

In any workplace, training should be conducted before sampling and handling operations of 1-tetradecene, 1-hexadecene and 1-octadecene are undertaken. Several commercial websites provide access to the Code of Federal Regulations, NIOSH, and OSHA databases which may help in answering questions and setting up safety programs. The training program may include the following:

1. Properties and health hazards of these materials.
2. Safe work and good housekeeping practices.
3. The importance of protection from contact with these materials; the proper clothing and cleaning requirements to ensure worker protection.
4. Signs and symptoms of exposure and action to be taken.
5. The care that must be taken whenever and wherever these materials are used, handled, stored and transported.
6. Emergency procedures for leaks, spills and fires, including protective clothing to be worn in such instances. Check the product's MSDS for further information.
7. First aid measures to be used after exposure.
8. The availability of written 1-tetradecene, 1-hexadecene, or 1-octadecene usage, health hazard and training program procedures.

It is recommended that this generalized sampling and handling training program should be part of a worker's initial instruction. Refresher training should be scheduled at least annually thereafter.

A summary of accidental release, fire and health information is presented in PART 4 of this brochure.

#### **RECOMMENDED PRACTICE FOR SAMPLING**

**This information is provided for use in establishing sampling and handling procedures. This information should only be utilized in conjunction with an existing health and safety program and cannot be used as a substitute for expert safety and medical advice.**

#### **SAMPLING:**

If testing for water, peroxide or carbonyl contaminants, samples must be obtained using a gas cylinder. As a best practice, Chevron Phillips Chemical Company uses cylinders specified by 49 CFR, Subpart C, Section 178.36 (3A or 3AX seamless steel cylinders). The charging of these cylinders must conform to Section 173.302. Purge the cylinder with product before collecting the final sample. Ensure the appropriate outage be left for the liquid. For all other testing procedures and before sampling 1-tetradecene, 1-hexadecene or 1-octadecene, the nitrogen atmosphere within the storage container or transport vessel should be depressurized safely. Samples may be taken through the sampling port (tank) or the manway opening (vessel) by means of a clean, dry 1-qt. (1-L) bottle held in a clean, dry sheath of nickel or stainless steel attached to a long rod or lightweight chain of the same material. Fit the bottle with a glass stopper to which is attached a light metal chain. Lower the bottle to near the bottom of the tank and pull out the stopper with a sharp jerk of the chain. Raise it at such a rate that it is about three-fourths full when it emerges from the liquid. Stopper the bottle before attempting to rinse the material from the outside. Label the sample bottle according to OSHA Regulations (refer to 29 CFR 1910.1200).

**NOTE: No special respiratory protection is normally required. Other personal protective gear may be required depending on exposure limits set in the individual workplace.**

Emphasis should be placed on cleanliness and dryness. Both the sample bottle and its holder must be CLEAN AND DRY. Transfer the sample to another bottle for storage. A suitable bottle for storing the sample is one known as a "Boston Round." The closure should be a screw cap with a Teflon® or aluminum foil liner.

If new bottles are used, first rinse them thoroughly with acetone or methanol and then dry in a hot-air oven. Hold the bottles in a desiccator while cooling to ambient temperature. Protect them from dirt or moisture by enclosure in a polyethylene bag. Rinse used bottles thoroughly with water, detergents and solvents. Treat the rinsed containers as new bottles.

The sampling device should be bonded to the tank manway (e.g., by resting the chain on the lip of the manway) prior to sampling.

#### **REFERENCE DOCUMENTS:**

ASTM E 300 –  
Standard Practice for Sampling Industrial Chemicals

API RP 500 –  
Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class I, Division 1, and Division 2.

OSHA Regulations –  
29 CFR, Paragraphs 1910.1000 and 1910.2000

U.S. DOT Regulations –  
49 CFR, Transportation Subchapters B and C, Parts 171-179

#### **STATIC ELECTRICITY AND GROUNDING**

Alpha olefins are characterized by high electrical resistivity (low conductivity), which can result in the buildup of excess static charge during transfer operations. These

three materials, 1-tetradecene, 1-hexadecene and 1-octadecene, are classified as low vapor pressure products under the API RP 2003 Guidelines. If these products are handled at temperatures well below their flash points, flammable vapors will not develop. However, a condition for ignition may exist if these products are handled at temperatures above their flash points or are contaminated with intermediate or high vapor pressure products. Likewise, in transporting these products, a condition for ignition can exist when the previous load contained a flammable vapor that was not flushed from the container. This type of loading is commonly called "switch loading".

Key operations which have the potential of generating a flammable atmosphere and/or static charge include tank and container filling, splash filling, tank cleaning, sampling, gauging, switch loading, filtering, mixing/agitation and vacuum truck operations. To minimize the hazard of static electricity during these operations, bonding and grounding may be necessary but may not by themselves be sufficient. For more information, refer to OSHA Standard 29 CFR 1910.106, "Flammable and Combustible Liquids", National Fire Protection Association (NFPA) 77, "Recommended Practice on Static Electricity" and/or the American Petroleum Institute (API) Recommended Practice 2003, "Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents".

#### **PRODUCT LOADING/UNLOADING REQUIREMENTS**

Loading operations must be performed only by qualified personnel. These individuals must be properly instructed in the loading of 1-tetradecene, 1-hexadecene or 1-octadecene. Workers should refer to their site's fire and safety guidelines for required personal protective equipment. Though considered noncombustible by most agencies, use caution to avoid creating any sparks that could ignite the product. As the product is being loaded/unloaded, static buildup can occur. Therefore, a ground cable must be placed on the container to prevent the buildup of static electricity. Use only clean, oil- and dirt-free, spark resistant tools and implements.

The importance of thorough pre-trip and post-trip safety inspections cannot be overemphasized. The process of physical inspection of the container is one of the best methods of minimizing human error, the principle cause of transportation incidents.

Take extreme care to prevent spills. In case material is spilled, wash contaminated areas thoroughly with large quantities of water and collect the liquid in the plant chemical waste system. Drums and trucks can be used for temporary storage until product can be recycled or disposed of properly. See PART 5 of this brochure for further information.

#### **WHEN LOADING OR UNLOADING A VESSEL OR BARGE:**

The United States Coast Guard classifies these materials as regulated commodities (combustible Grade E cargo under 46 CFR 30.10-15). Vessel/barge owners must comply with 46 CFR, Part 30, Table 30.25-1; cargo name: Olefins (C13+, all isomers).

Plan and control the loading and unloading of 1-tetradecene, 1-hexadecene or 1-octadecene to limit personnel exposure and environmental releases. OSHA and the U.S. Coast Guard have published regulations applicable to personnel involved in the handling of chemical materials. Some of the key elements are:

1. Employee Training
2. Personal Protective Equipment
3. Warning Signs

Clean stainless steel tanks, rust-free mild steel tanks or suitably washed steel tanks are acceptable for transport of 1-tetradecene, 1-hexadecene or 1-octadecene. Barges are carefully selected by ChevronTexaco Shipping to ensure that product quality is not negatively affected during transport.

Qualified contractors should be used to inspect, clean and repair barges and ships in which these products are shipped. The contractor should have facilities to dispose of residual product in an acceptable manner.

#### **WHEN LOADING OR UNLOADING TANK CARS:**

General Purpose (GP) tank cars in the Chevron Phillips Chemical Company fleet are DOT 111A100W1 rated and are stenciled accordingly. They are insulated, have exterior heating coils and are equipped with both top and bottom loading/unloading valves.

#### **Loading**

Erect track warning signs, set hand brakes, place wheel chocks, turn on track warning lights (if available) and connect ground cable. Inspect tank car exterior for any damage or flags and verify that all appliances and test dates are in compliance. Check tank car for pressure. Loosen dome cover bolts slightly leaving two (2) bolts hand tight. Open dome carefully and inspect car interior for cleanliness and liquid heel. If a liquid heel exists, removal and cleaning may be required depending upon the previous cargo. Check dome cover bolts, gaskets and seating surfaces for a secure condition. Flush load filter and spout if necessary. Remove bottom cap, open outlet valve and drain if necessary. Any material from a previous load should be recycled or disposed of in accordance with federal, state and local regulations. Close bottom outlet valve and leave bottom cap off. If car is equipped with internal steam coils, remove caps. Open product line to tank car and start pump. Frequently check bottom unload valve for any signs of leakage during loading. If leakage occurs, stop loading immediately. Check steam coils for leakage. Load tank car to proper outage or weight desired.

After loading is completed, shut down pump, close block valves for product and purge line with nitrogen to clear spout. Remove spout, close and tighten dome with a wrench and seal all top appliances/covers. Check to ensure that all plugs and fittings are tight. Secure loading ramp and spout and remove ground cable. Replace bottom cap and tighten with a wrench. Seal bottom unload valve. Secure heater caps if the car is internally coiled. Remove wheel chocks and warning signs. Turn off track warning lights.

## **Unloading**

Erect track warning signs, set hand brakes, place wheel chocks, turn on track warning lights (if available) and connect ground cable. Relieve tank pressure gradually by slowly opening vent valve and loosening dome (manhole cover). Leave dome cover open so air can enter tank while unloading. Operate bottom valve rod handle to see that outlet valve in bottom of tank is seated before removing bottom cap. Loosen bottom cap and allow sufficient time to permit liquid in outlet chamber to escape. Check for leakage from bottom cap. If there is no leakage, remove bottom cap and connect unloading hose (check gasket in hose). Open bottom valve and start unloading pump (it may be necessary to bleed vapors off pump).

After tank car is unloaded completely, close all unloading valves tightly and remove unloading hose. Tighten all closures except heater coil inlet and outlet pipes, which must be left open for drainage. Close dome cover (check gasket), plug or cap all openings and tighten with wrench. Check gasket, replace bottom cap and tighten with a wrench. Leave appropriate placards in place until tank car is cleaned. Remove wheel chocks, ground cable, and caution signs. Turn off track warning lights.

### ***WHEN LOADING OR UNLOADING TANK TRUCKS:***

Open dome tank trucks are normally MC/DOT 307 or 407 type and are used to transport hazardous materials.

## **Loading**

Place wheel chocks in front and back of truck's rear wheels allowing  $\frac{3}{4}$ " clearance for ease of removal. Connect ground cable. Close bottom valve leaving the cap off to monitor for leakage while loading. Open dome cover and inspect interior for cleanliness. Flush loading spout and filter, if necessary. Purge trailers with nitrogen. Visually inspect trailer exterior for damage and inspection dates.

Open product line and start pump. Check bottom unload valve for leakage. When

loading is complete, shut down pump, close product block valves and nitrogen purge line to clear spout. Remove spout, secure dome lid and seal dome cover. Check all top openings or valves for tightness. Raise loading ramp and secure spout. Replace bottom unload cap and ensure internal/external valves are in closed position. Seal bottom cap. Remove wheel chocks and ground cable.

## **Unloading**

Place wheel chocks in front and back of truck's rear wheels allowing  $\frac{3}{4}$ " clearance. Connect ground cable. Relieve all tank pressure by opening a vent valve or slowly loosening dome cover bolts. Remove dome cover or outlet cap so air can enter the tank during unloading. Check internal and external valves making sure they are closed and remove unloading valve cap slowly to relieve any pressure. Check gasket in loading hose and connect to unloading valve. Open internal and external valves and start unloading pump.

After product transfer is complete, shut off unloading pump, close internal and external valves and remove unloading hose checking for possible product in the line. Close, tighten and cap all fittings. Remove wheel chocks and ground cable.

## **SAFETY REFERENCES**

The following publications are excellent references for product handling, safety and fire control:

### **NFPA 10 –**

Standard for Portable Fire Extinguishers

### **NFPA 11 –**

Standard for Low-, Medium-, and High-Expansion Foam Systems

### **NFPA 30 –**

Flammable and Combustible Liquids Code

### **NFPA 70 –**

National Electrical Code®

### **NFPA 77 –**

Recommended Practice on Static Electricity

## PART 3

### STORAGE DESIGN RECOMMENDATIONS

#### STORAGE TANKS

Storage tanks should be of welded steel construction. Underground storage tanks are not recommended because of the difficulty of locating leaks. However, some states require underground storage tanks. Diking, drainage and tank supports should be designed to conform to local regulations. A rule of thumb commonly used for determining the size of storage facilities suggests that storage facilities be 1½ times the size of shipments received. The secondary containment requirements, as well as tank layout and spacing requirements, should be in accordance with NFPA 30. Rotating equipment such as pumps should be kept outside of the secondary containment area. Some facilities may require larger inventories, and thus storage facilities, because of seasonal transportation problems.

The storage tank inlet should be located at the bottom of the tank. Should a top inlet be desired, the fill pipe should be extended to a depth no greater than the diameter of the fill pipe from the bottom of the tank in order to minimize static charge accumulating during filling. The fill pipe should be connected electrically to both the tank flange and the transfer pipeline. The purpose of this electrical connection is to dissipate any static charge that may build up during filling.

A nitrogen blanketing system is necessary for applications where the product is going to be stored for long periods of time and peroxides and/or carbonyls would present a problem in the process. A nitrogen system that maintains positive pressure and adds nitrogen as the product is withdrawn, and as the tank breathes, prevents the introduction of air that can cause peroxide buildup in the product and keeps moisture from condensing in the tank. Free water will settle out in the bottom of the tank and will normally not be seen until the tank is stripped. Dissolved water up to the saturation level may be found in the product. If water is a critical contaminant, an olefin sample should be tested periodically and withdrawn through the

sump. When peroxide and carbonyl development is a concern, use a closed handling system that maintains a nitrogen atmosphere on the product through the loading, unloading and other handling activities to minimize exposure to atmospheric oxygen.

CPChem 1-tetradecene, 1-hexadecene and 1-octadecene have pour points of -12.2°C (10°F), 7.2°C (45°F) and 18.3°C (65°F) respectively. Whether or not heating is required depends on the ambient temperature, how long the temperature remains at that level and the size of the tank. If the ambient temperature is likely to drop below the product's pour point and the nature of the process allows this product to sit in the lines for a long period of time, the tank and lines should be insulated and steam-traced.

All of the lines and valves, as well as the tank, can be carbon steel. However, carbon steel lines will accumulate rust if allowed to remain empty for long periods of time. In this situation the first few gallons of product moved down the line may have a yellow to orange color and particulates depending on the amount of rust that has accumulated. Unlined carbon steel tanks may also accumulate rust above the liquid level. This rust, along with the condensate, will settle to the bottom of the tank and may not be seen until the tank is stripped. Rust can be avoided by having storage tanks lined with zinc, epoxy or another coating that is compatible with these products.

Exercise care in selecting the gasket and seal materials to be used. These products can cause rubber to swell and subsequently deteriorate. Additionally, plastic materials will become brittle and crack or break. Viton® has proven to be compatible with these products.

Coat storage tanks with reflective paint to reduce temperature fluctuations.

**Specific bulk storage designs must conform to insurance underwriter's codes and local fire and building regulations. Critical design, placement, installation and**

**maintenance requirements are usually addressed in these codes and regulations and must be followed.**

Tanks should be periodically inspected for leaks and serviced in accordance with the principle of API Standard 653.

**Workers should never be permitted to enter an empty tank that has been used for these products until the requirements of the OSHA Confined Space Standard (29 CFR 1910.146) and the Safe Entry Recommendation of API Standard 2015 have been met, including, but not limited to, required concentrations for oxygen.**

### **API AND ANSI DESIGN REFERENCES**

American Petroleum Institute  
1220 L Street, NW  
Washington, DC 20005

#### ***PART I – DESIGN:***

API RP 520: *Sizing, Selection, and Installation of Pressure-relieving Devices in Refineries*

#### ***PART II – INSTALLATION:***

API Standard 601: *Metallic Gaskets for Raised-Face Pipe Flanges and Flanged Connections (Double-Jacketed Corrugated and Spiral-Wound)*

API Standard 620: *Design and Construction of Large, Welded, Low-Pressure Storage Tanks*

API Standard 650: *Welded Steel Tanks for Oil Storage*

API Standard 653: *Tank Inspection, Repair, Alteration, and Reconstruction*

API Standard 2000: *Venting Atmospheric and Low-Pressure Storage Tanks; Nonrefrigerated and Refrigerated*

API Standard 2015: *Requirements for Safe Entry and Cleaning of Petroleum Storage Tanks*

API RP 2003: *Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents*

API RP 2028: *Flame Arresters in Piping Systems*

API RP 2210: *Flame Arresters for Vents of Tanks Storing Petroleum Products*

API RP 2350: *Overfill Protection for Storage Tanks in Petroleum Facilities*

American National Standards Institute  
25 West 43<sup>rd</sup> Street, 4<sup>th</sup> Floor  
New York, New York 10036

ANSI B16.21: *Nonmetallic Flat Gaskets for Pipe Flanges*

ANSI B31: *Interpretations of Code for Pressure Piping*

### **PARTICULATE MATTER**

CPChem 1-tetradecene, 1-hexadecene and 1-octadecene should be free of particulate matter when shipped. However, some particulate matter may originate from outside contamination via the receiving-transfer system.

Particulate matter may be avoided by:

1. Paying careful attention to cleanliness.
2. Filtering product to remove particulate matter before use.

### **FILTERS**

Since small amounts of foreign matter may enter storage tanks and transport vessels from various sources, a filter in the transfer piping between the storage tank and processing equipment is recommended. This can be accomplished by inserting a corrugated cellulose filter paper (5 µm) inside a woven polyester fiber (10 µm mesh) cartridge-type filter. Other types of product-compatible filters might also be used. Flow rates and pressures should be used to determine the proper filter for specific situations. Contact Chevron Phillips Chemical Company's Aromatics Customer Technical Service Group at

800-852-5531 for recommendations. Inspect and renew filter cartridges periodically.

## **HOSES**

Hard piping is preferred to the use of hoses where possible and practical. If hoses are needed for loading or unloading operations, they should be inspected and pressure tested at the intervals required by the various regulations. A satisfactory type hose is Goodyear, rough-bore, style WH-7 with Viton<sup>®</sup> tube, or the equivalent. Multi-layered polypropylene and Teflon<sup>®</sup> are also recommended. U.S. Coast Guard regulation 33 CFR, Part 154.500 applies to hoses used for bulk transfers to and from tank vessels.

## **PUMPS**

Liquid product can be transferred by pump or vacuum. For most product handling, centrifugal pumps with mechanical seals perform satisfactorily. The pump manufacturer can make recommendations regarding the proper type of pump if the following parameters are known: 1) flow rate, 2) size and length of suction and discharge lines, 3) suction and discharge pressures, and 4) range of product temperatures during transfer. A drain valve should be installed at the lowest point in the system so that the pump and all piping can be completely drained and washed before any maintenance work is done. Totally enclosed fan cooled (TEFC) motors are recommended. However, local fire and insurance codes should be consulted to determine if an explosion-proof motor must be used. Pump seals must be capable of meeting EPA emission standards - this requires tandem or double seals. Tandem seals enhance safety when pumping these products at elevated temperatures. Demisting systems should be used to keep pump bearings lubed.

The following practices are recommended to minimize the possibility of pump leakage:

1. Mechanical seals in conformance with API Standard 682.
2. Pumps in conformance with API Standard 610.
3. Pumps designed so that pump bearings will be able to carry thrust at no flow. Consider

selecting non-metallic (PEEK) wear rings to minimize damage if the pump runs dry.

4. The pump shaft should be highly polished.
5. Pumps should not be subjected to forces beyond specified pump tolerances.
6. Vibration monitoring with automatic pump shutdown may be applicable in certain situations.

## **VALVES**

Full-bore ball valves are preferred for pigged pipelines. Gate valves, butterfly valves, or ball valves may be used for pipelines that are not pigged. These valves should be made of cast iron, case steel, or other recommended materials. Valves should be packed with the following graphite materials:

Garlock<sup>®</sup> EVSP Simplified (#9000/98)<sup>(1)</sup>  
 Garlock<sup>®</sup> 70# / 98 (-400 to 1200 °F;  
 10,000 psi)<sup>(2)</sup>  
 Garlock<sup>®</sup> 1303 (good for steam)<sup>(2)</sup>  
 Slade<sup>®</sup> 3300G (-400 to 1200 °F;  
 10,000 psi)<sup>(2)</sup>

- (1) Most efficient packing is flexible die-formed rings with flexible braided end-rings.
- (2) Used for field repacking.

## **PIPELINES**

The following are recommended practices in engineering pipelines for 1-tetradecene, 1-hexadecene or 1-octadecene:

1. A minimum of flanged connections should be used to avoid potential leaks.
2. Lines should not be buried because of the difficulty of checking for leakage.
3. All lines should be sloped with drain valves at appropriate locations so that they can be completely drained for maintenance.
4. All newly installed pipelines should be pressure tested by an approved method before use.
5. Bellows valves for 2-inch and smaller lines are recommended to eliminate emissions from packing glands.

## PART 4

### HEALTH, ENVIRONMENT, FIRE, AND ACCIDENTAL RELEASE INFORMATION

CPChem 1-tetradecene, 1-hexadecene and 1-octadecene have a low order of toxicity and if handled properly should not present a health hazard. These materials will burn but they are not considered a flammability or combustibility hazard.

Material Safety Data Sheets (MSDS) for 1-tetradecene, 1-hexadecene or 1-octadecene are available from Chevron Phillips Chemical Company to help customers further satisfy safe handling and disposal needs and the requirements of the OSHA Hazard Communication Standard. Such information should be requested and studied prior to working with these products. Please call Chevron Phillips Chemical Company at 800-852-5530 to request the MSDS for any of these products.

**NOTE:**

**The following information is not intended to, nor does it, amend or replace the MSDS for 1-tetradecene, 1-hexadecene or 1-octadecene. The most current MSDS should be carefully examined prior to working with these products.**

#### HEALTH HAZARDS AND FIRST AID

**EYE CONTACT:** Neither 1-tetradecene nor 1-hexadecene or 1-octadecene is expected to cause prolonged or significant eye irritation. If the material is heated, thermal burns may result from eye contact. **First Aid:** No first aid procedures are required for materials at room temperature. However, as a precaution, remove contact lenses, if worn, and flush eyes with water. If heated material should splash into the eyes, flush eyes immediately with fresh water for 15 minutes while holding the eyelids open. Get immediate medical attention if irritation persists.

**SKIN CONTACT:** Contact of 1-tetradecene, 1-hexadecene or 1-octadecene with skin is not expected to cause prolonged or significant irritation. Based on results of animal testing

with 1-hexadecene and other alpha olefins, these materials are not expected to cause allergic skin responses. Prolonged or frequently repeated contact may cause the skin to become cracked or dry from the defatting action of these materials. If absorbed through the skin, these materials are considered practically non-toxic to internal organs. The acute dermal LD50 in rabbits for 1-hexadecene and for several alpha olefin blends containing 1-tetradecene is >10 g/kg. Thermal burns may result from skin contact if these materials are heated. **First Aid:** Remove contaminated clothing and shoes. Wash skin with soap and water. Wash or clean contaminated clothing and shoes before reuse. If heated material gets on the skin, quickly cool in water. See a doctor for extensive burns.

**INGESTION:** If swallowed, these materials are considered practically non-toxic to internal organs. The acute oral LD50 in rats for 1-hexadecene and for several alpha olefin blends containing 1-tetradecene and 1-octadecene is >10 g/kg. Because of the low viscosity of these materials, they can directly enter the lungs if swallowed or vomited. Once in the lungs, these substances are very difficult to remove and can cause severe injury to the lungs or death. **First Aid:** If swallowed, do not induce vomiting. Give the person a glass of water or milk to drink and get immediate medical attention. Never give anything by mouth to an unconscious person.

**INHALATION:** With respect to short-term inhalation exposures, based on results of animal testing, these materials are practically non-toxic (LC50 for 1-hexadecene 6.4 g/m<sup>3</sup> [4 hr, rat]; LC50 for C12-C16 alpha olefin blend >9.9 g/m<sup>3</sup> [1 hr, rat]). If any of these materials are heated, vapors may be unpleasant and produce nausea and irritation to the upper respiratory tract. **First Aid:** No specific first aid measures are required because these materials are not expected to be harmful if inhaled. If a person is exposed

to excessive levels of one of these materials in the air, move the exposed person to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if breathing difficulties continue.

## **ECOTOXICITY/ENVIRONMENTAL FATE**

**ECOTOXICITY:** Based on the results of laboratory tests with rainbow trout, daphnia, and freshwater green algae, these materials are not expected to be harmful to aquatic organisms.

**ENVIRONMENTAL FATE:** Based on the results of 28-day ready biodegradability tests, 1-tetradecene and 1-hexadecene are expected to be readily biodegradable. 1-Octadecene is considered ultimately, but not readily, biodegradable.

## **FIRE INFORMATION**

### **FLAMMABILITY PROPERTIES:**

Critical Properties: 1-Tetradecene 1-Hexadecene

Flash Point, PM, °C (°F):	107 (225)	132 (270)
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Autoignition Temperature, °C (°F):	235 (455)	224 (435)
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Flammable Limits in Air, vol%:	0.5-5.4	0.5-5.8
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NFPA Fire Hazard Rating	1	1
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Critical Properties: 1-Octadecene

Flash Point, PM, °C (°F):	154 (310)
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Autoignition Temperature, °C (°F):	250 (482)
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Flammable Limits in Air, vol%:	0.4-6.9
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NFPA Fire Hazard Rating	1
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Do not use or store 1-tetradecene, 1-hexadecene or 1-octadecene near heat, sparks or open flames. Use or store only in a well-ventilated area. Keep container closed when material is not in use. Do not use pressure to empty drum or drum may rupture with explosive force; the drum is not designed to contain pressure. Empty containers retain product residue (solid, liquid, and/or vapor) and can be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind or expose such containers to heat, flame, sparks, static electricity or other sources of ignition. They may explode and cause injury or death. Empty drums should be completely drained, properly bunged and promptly returned to a drum reconditioner or be properly disposed of. Static hazards should be eliminated to prevent ignition. Refer to the Static Electricity subsection in PART 2 for further information.

### **FIRE HAZARDS:**

CPChem 1-tetradecene, 1-hexadecene and 1-octadecene can burn but are not considered flammability or combustibility hazards.

### **FIRE FIGHTING INSTRUCTIONS AND COMBUSTION PRODUCTS:**

For fires involving any of these materials, do not enter any enclosed or confined fire space without proper protective equipment. This may include self-contained breathing apparatus (SCBA) to protect against the hazardous effects of normal products of combustion or oxygen deficiency. Normal combustion forms carbon dioxide and water vapor, while incomplete combustion can produce carbon monoxide.

Fires involving these materials can be safely extinguished with foam, dry chemical or carbon dioxide. Use water in flooding quantities as fog; solid streams of water may be ineffective. Cool exposed containers near the fire with water.

Drainage and runoff should be controlled and collected in a remote location for recovery or disposal. Minimize spread to reduce cleanup cost.



## **PERSONAL PROTECTIVE EQUIPMENT & OCCUPATIONAL EXPOSURE LIMITS**

### ***PERSONAL PROTECTIVE EQUIPMENT:***

Use in a well-ventilated area. No special eye protection is normally required. As a good safety practice, wear safety glasses with side shields or chemical goggles when working with these materials. Wear impervious protective clothing to prevent skin contact. Selection of protective clothing may include gloves, apron, boots and complete facial protection and will depend on operations conducted. Users should determine acceptable performance characteristics of protective clothing. Consider physical requirements and other substances present when selecting protective clothing. Suggested materials for protective gloves include Viton<sup>®</sup>, nitrile and polyurethane. No special respiratory protection is normally required.

### ***ANSI REFERENCES:***

- ANSI Z41.1 Protective Footwear
- ANSI Z87.1 Practice for Occupational and Educational Eye and Face Protection
- ANSI Z88.2 Practices for Respiratory Protection
- ANSI Z89.1 Protective Headwear for Industrial Workers
- ANSI Z358.1 Emergency Eyewash and Shower Equipment

### ***OCCUPATIONAL EXPOSURE LIMITS:***

	<u>1-Tetradecene</u>
	<u>1-Hexadecene</u>
	<u>1-Octadecene</u>
OSHA	
Permissible	
Exposure Limit:	
8-Hour Time	
Weighted	
Average (TWA):	none established

ACGIH Threshold  
 Limit Value:  
 8-Hour Time  
 Weighted  
 Average (TWA): none established

## **ACCIDENTAL RELEASE MEASURES**

If a transportation incident involving 1-tetradecene, 1-hexadecene or 1-octadecene does occur, the Chemical Transportation Emergency Center (CHEMTREC) should be contacted for immediate assistance. CHEMTREC is a public service organization established by the American Chemistry Council to provide assistance in hazardous material incidents. **FOR A CHEMICAL EMERGENCY CALL CHEMTREC AT (800) 424-9300 toll free in the United States, Canada, Puerto Rico, and the Virgin Islands. For emergency calls outside the United States call (703) 527-3887.**

CHEMTREC will provide the caller preliminary emergency assistance in the form of Material Safety Data Sheet (MSDS) information. In all cases once CHEMTREC determines the incident involves a Chevron Phillips Chemical material, CHEMTREC will immediately contact the on-call Chevron Phillips Chemical Company Crisis Management Team (CMT) member at 1-866-4HAZMAT (442-9628). The contacted Chevron Phillips Chemical CMT member will then be responsible for coordinating an appropriate response to the transportation incident. In addition, if the CMT member determines that the incident involves exposure or potential health effects, the on-call Chevron Phillips Chemical toxicologist will also be contacted.

If an accidental release of 1-tetradecene, 1-hexadecene or 1-octadecene has occurred, eliminate all sources of ignition in vicinity of spill. Stop the source of the leak or release. Clean up releases as soon as possible, observing precautions in the Personal Protective Equipment section. All spill cleanup activities must meet the requirements of any state and local regulations. Contain liquid to prevent further contamination of soil, surface water or groundwater. Clean up small spills using appropriate techniques such as sorbent materials or pumping. Effective absorbents include sand or Claymax<sup>®</sup>, a loose

“vermiculite-like” material. Claymax® may be purchased from:

Road Fabric, Inc.  
Environmental Division  
27 West 045 St. Charles Road  
Carol Stream, IL 60188  
Phone: (630) 293-3111

Where feasible and appropriate, remove contaminated soil. Follow the prescribed procedure for reporting and responding to larger releases. Contact local environmental or health authorities for guidance on how to dispose of the used absorbing agent, contaminated liquid product or soil. If the spill is on a hard surface, the area should be scrubbed with soap and water after the bulk of the 1-tetradecene, 1-hexadecene or 1-octadecene has been removed. There is no Reportable Quantity (RQ) for these materials under CERCLA Section 302.4.

Release of this product should be prevented from contaminating soil and water and from entering drainage and sewer systems. U.S.A. regulations require reporting spills of any of these materials that could reach any surface waters. The reportable quantity is an amount that causes a sheen on nearby surface water. The toll free number for the U.S. Coast Guard National Response Center is (800) 424-8802.

## **DISPOSAL**

**All disposal procedures are to be carried out in strict conformance to federal, state and local regulations.**

Recovered liquid from a spill or contaminated product may be reprocessed. However, if the product cannot be reprocessed, it must be disposed of in a legally acceptable manner. Recovered material may be incinerated in a properly designed furnace. Please contact Chevron Phillips Chemical Company’s Aromatics Customer Technical Service Group at 800-852-5531 if additional assistance is required.

## PART 5

### TRANSPORTATION INFORMATION AND REGULATORY PROFILES

#### TRANSPORTATION INFORMATION

##### **BILL OF LADING DESCRIPTION:**

	<u>1-Tetradecene</u>	<u>1-Hexadecene</u>	<u>1-Octadecene</u>
Bulk Truck Bill of Lading Description:	Petroleum Naphtha, Oil	Petroleum Naphtha, Oil	Petroleum Wax, NEC
Bulk Rail Bill of Lading Description:	Petroleum Naphtha, Oil STCC = 2911982	Petroleum Naphtha, Oil STCC = 2911982	Petroleum Wax, NEC STCC = 2911990
Package Bill of Lading Description:	Not Regulated	Not Regulated	Not Regulated

**Note: The preceding descriptions are subject to frequent changes. Consult current DOT regulations and other appropriate sources to verify proper bill of lading descriptions.**

##### **CHEMICAL DESIGNATIONS:**

CG Compatibility Class:	Olefin	Olefin	Olefin
Formula:	C <sub>14</sub> H <sub>28</sub>	C <sub>16</sub> H <sub>32</sub>	C <sub>18</sub> H <sub>36</sub>
CAS Registry No.:	1120-36-1	629-73-2	112-88-9

##### **INTERNATIONAL MARITIME ORGANIZATION (IMO):**

Pollution Category	B	B	B
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##### **SHIPPING INFORMATION:**

Grades of Purity (n-Alpha Olefin, wt. %):	93+%( <sup>1</sup> )	93+%( <sup>1</sup> )	90+%( <sup>1</sup> )
Storage Temperature:	Ambient	Ambient	23.9-37.8°C
Inert Atmosphere:	No requirement	No requirement	No requirement
Venting:	Open (flame arrester)	Open (flame arrester)	Open (flame arrester)

<sup>(1)</sup> The data are for informational purposes only.

## HAZARD CLASSIFICATIONS

### 1-Tetradecene, 1-Hexadecene or 1-Octadecene

OSHA (29 CFR 1910.1200):	Not Classified as Flammable/Combustible
American National Standards Institute Precautionary Labeling Standard (1994):	Noncombustible
U.S. Dept. of Transportation (49 CFR 173.120):	Not Regulated as Hazardous Materials
EU Dangerous Substance Directive (93/21/EEC):	Not Classified as Flammable or Combustible
National Fire Protection Association (NFPA 30):	Class IIIB Combustible Liquids

### ***NFPA HAZARD CLASSIFICATION:***

<u>Category:</u>	<u>Classification:</u>
Health Hazard (Blue)	0
Flammability (Red)	1
Reactivity (Yellow)	0

**Various restrictions apply to the preceding classifications. Please refer to the specific regulation for details concerning classification requirements. 46 CFR, Part 30 should also be referenced for information about Coast Guard regulations governing the transport of 1-tetradecene, 1-hexadecene and 1-octadecene.**

## **REGULATORY PROFILES**

### **1-TETRADECENE:**

ODCs: Contains Class 1 or Class 2 Ozone Depleting Chemicals (ODCs)?: **NO**

TSCA: Is this product or its components subject to any of the following TSCA requirements of 40 CFR?

Part:		
707	Export Notification (12b)	<b>NO</b>
712	Chemical Information Reporting (8a)	<b>NO</b>
716	Health & Safety Data Reporting (8d)	<b>NO</b>
721	Significant New Use (5e)	<b>NO</b>
723.50	Low Volume Exemption	<b>NO</b>
720.36	R&D Exemption	<b>NO</b>
720.38	Test Marketing Exemption	<b>NO</b>
723.25	Polymer Exemption	<b>NO</b>
790	Health and/or Environmental Effects Testing (4e)	<b>NO</b>

Is this material distribution under limitations of a 5(e) or 5(f) Consent Order? **NO**  
 Have there been any Section 8(e) submissions for this material? **YES**

**INTERNATIONAL REGISTRATION:** Are all components of this material listed on the following international inventories?:

TSCA	(United States)	<b>YES</b>	(TSCA Reg. No. 1120-36-1)
DSL	(Canada)	<b>YES</b>	
EINECS	(Europe)	<b>YES</b>	(EINECS Reg. No. 214-306-9)
METI	(Japan)	<b>YES</b>	
AICS	(Australia)	<b>YES</b>	
ECL	(Korea)	<b>YES</b>	(KMOE Reg. No. KE-33369)
PICCS	(Philippines)	<b>YES</b>	
IENCS	(China)	<b>YES</b>	

**FDA:** Do FDA regulations permit use of this material as a direct or indirect food additive?

DIRECT: **NO**  
 INDIRECT: **YES** Complies with Food Additive Regulation 21 CFR 178.3620(b) as pertaining to Technical White Mineral Oil as a component of non-food articles intended for use in contact with food.

**USDA:** Do USDA regulations permit use of this material for incidental food contact? **YES**  
 Meets H-1 classification for lubricant with incidental food contact under the Federal Meat and Poultry Products Inspection Program. A Chevron Phillips Chemical Company representative should be contacted for detailed information on usage and authorization.

**HAZARDOUS METALS:** Does the sum of the concentration levels of lead, cadmium, mercury, and hexavalent chromium present in this material exceed 100 ppm by weight? **NO**

### **SARA 311 CATEGORIES:**

1. Immediate (Acute) Health Effects:	<b>YES</b>
2. Delayed (Chronic) Health Effects:	<b>NO</b>
3. Fire Hazard:	<b>NO</b>
4. Sudden Release of Pressure Hazard:	<b>NO</b>
5. Reactivity Hazard:	<b>NO</b>

**ADDITIONAL REGULATORY INFORMATION:** See CPChem MSDS PE0020, Section 15 for additional regulatory information.

**1-HEXADECENE:**

ODCs: Contains Class 1 or Class 2 Ozone Depleting Chemicals (ODCs)?: **NO**

TSCA: Is this product or its components subject to any of the following TSCA requirements of 40 CFR?

Part:		
707	Export Notification (12b)	<b>NO</b>
712	Chemical Information Reporting (8a)	<b>NO</b>
716	Health & Safety Data Reporting (8d)	<b>NO</b>
721	Significant New Use (5e)	<b>NO</b>
723.50	Low Volume Exemption	<b>NO</b>
720.36	R&D Exemption	<b>NO</b>
720.38	Test Marketing Exemption	<b>NO</b>
723.25	Polymer Exemption	<b>NO</b>
790	Health and/or Environmental Effects Testing (4e)	<b>NO</b>

Is this material distribution under limitations of a 5(e) or 5(f) Consent Order? **NO**

Have there been any Section 8(e) submissions for this material? **NO**

**INTERNATIONAL REGISTRATION:** Are all components of this material listed on the following international inventories?:

TSCA	(United States)	<b>YES</b>	(TSCA Reg. No. 629-73-2)
DSL	(Canada)	<b>YES</b>	
EINECS	(Europe)	<b>YES</b>	(EINECS Reg. No. 211-105-8)
METI	(Japan)	<b>YES</b>	(ENCS Reg. No. 2-27X)
AICS	(Australia)	<b>YES</b>	
ECL	(Korea)	<b>YES</b>	(KMOE Reg. No. KE-18475)
PICCS	(Philippines)	<b>YES</b>	
IENCS	(China)	<b>YES</b>	

**FDA:** Do FDA regulations permit use of this material as a direct or indirect food additive?

DIRECT:	<b>NO</b>	
INDIRECT:	<b>NO</b>	Complies with Food Additive Regulation 21 CFR 178.3620(b) as pertaining to Technical White Mineral Oil as a component of nonfood articles intended for use in contact with food.

**USDA:** Do USDA regulations permit use of this material for incidental food contact? **YES**  
 Meets H-1 classification for lubricant with incidental food contact under the Federal Meat and Poultry Products Inspection Program. A Chevron Phillips Chemical Company representative should be contacted for detailed information on usage and authorization.

**HAZARDOUS METALS:** Does the sum of the concentration levels of lead, cadmium, mercury, and hexavalent chromium present in this material exceed 100 ppm by weight? **NO**

**SARA 311 CATEGORIES:**

1. Immediate (Acute) Health Effects:	<b>YES</b>
2. Delayed (Chronic) Health Effects:	<b>NO</b>
3. Fire Hazard:	<b>NO</b>
4. Sudden Release of Pressure Hazard:	<b>NO</b>
5. Reactivity Hazard:	<b>NO</b>

**ADDITIONAL REGULATORY INFORMATION:** See CPChem MSDS PE0021, Section 15 for additional regulatory information.



**1-OCTADECENE:**

ODCs: Contains Class 1 or Class 2 Ozone Depleting Chemicals (ODCs)?: **NO**

TSCA: Is this product or its components subject to any of the following TSCA requirements of 40 CFR?

Part:		
707	Export Notification (12b)	<b>NO</b>
712	Chemical Information Reporting (8a)	<b>NO</b>
716	Health & Safety Data Reporting (8d)	<b>NO</b>
721	Significant New Use (5e)	<b>NO</b>
723.50	Low Volume Exemption	<b>NO</b>
720.36	R&D Exemption	<b>NO</b>
720.38	Test Marketing Exemption	<b>NO</b>
723.25	Polymer Exemption	<b>NO</b>
790	Health and/or Environmental Effects Testing (4e)	<b>NO</b>

Is this material distribution under limitations of a 5(e) or 5(f) Consent Order? **NO**

Have there been any Section 8(e) submissions for this material? **NO**

*INTERNATIONAL REGISTRATION:* Are all components of this material listed on the following international inventories?:

TSCA	(United States)	<b>YES</b>	(CAS Reg. No. 112-88-9)
DSL	(Canada)	<b>YES</b>	
EINECS	(Europe)	<b>YES</b>	(EINECS Reg. No. 204-012-9)
METI	(Japan)	<b>YES</b>	
AICS	(Australia)	<b>YES</b>	
ECL	(Korea)	<b>YES</b>	(KMOE Reg. No. KE-26436)
PICCS	(Philippines)	<b>YES</b>	
IENCS	(China)	<b>YES</b>	

FDA: Do FDA regulations permit use of this material as a direct or indirect food additive?

DIRECT: **NO**  
INDIRECT: **YES** Complies with Food Additive Regulation 21 CFR 178.3620(b) as pertaining to Technical White Mineral Oil as a component of nonfood articles intended for use in contact with food.

USDA: Do USDA regulations permit use of this material for incidental food contact? **YES**  
Meets H-1 classification for lubricant with incidental food contact under the Federal Meat and Poultry Products Inspection Program. A Chevron Phillips Chemical Company representative should be contacted for detailed information on usage and authorization.

HAZARDOUS METALS: Does the sum of the concentration levels of lead, cadmium, mercury, and hexavalent chromium present in this material exceed 100 ppm by weight? **NO**

**SARA 311 CATEGORIES:**

1. Immediate (Acute) Health Effects: **YES**
2. Delayed (Chronic) Health Effects: **NO**
3. Fire Hazard: **NO**
4. Sudden Release of Pressure Hazard: **NO**
5. Reactivity Hazard: **NO**

ADDITIONAL REGULATORY INFORMATION: See CPChem MSDS PE0023, Section 15 for additional regulatory information.

## **REVISION STATEMENTS**

This revision replaces the version titled 1-Tetradecene 1-Hexadecene 1-Octadecene 2005 rev 0.DOC. The following sections have been updated and should be reviewed by the user.

May 1, 2007

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## PART 6

### APPENDIX

#### GLOSSARY OF TERMS, ABBREVIATIONS AND ORGANIZATIONS

ACGIH	American Conference of Governmental Industrial Hygienists
AIAG	Automotive Industry Action Group
AIHA	American Industrial Hygienists Association
AALA	American Association for Laboratory Accreditation
ANSI	American National Standards Institute
API	American Petroleum Institute
ASME	American Society of Mechanical Engineers
ASQC	American Society for Quality Control
ASTM	American Society for Testing and Materials
BABT	British Approvals Board of Communication
BACT	Best Available Control Technology
Bonding	The connection of two or more conductive objects by means of a conductor (most commonly a wire or metal plate).
BSI	British Standards Institute
CAA	Clean Air Act
CAAA	Clean Air Act Amendments
CAD	Computer-Aided Design
CANUTEC	Canadian Transport Emergency Centre
Carbonyls	Compounds containing the C=O functional group. They can occur as impurities in many organic compounds forming from peroxide contaminants.
CE-mark	Conformity European Union Mark (The CE-mark is the official marking required by the European Community)
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CG	Coast Guard

CHEMTREC	Chemical Transportation Emergency Center
CMA	Chemical Manufacturers Association
Confined Space	An area that by design has limited openings for entry and exit. A confined space has unfavorable natural ventilation and is not intended for continuous worker occupancy.
CPC	Chemical Protective Clothing
DOT	Department of Transportation
EPA	Environmental Protection Agency
ESD	Electrostatic Discharge
EU	European Union
FDA	Food & Drug Administration
Flash Point	The minimum temperature at which a liquid gives off vapor in sufficient concentrations to form an ignitable mixture with air near the surface of a liquid.
FMEA	Failure Mode Effect Analysis
GLP	Good Laboratory Practices
Grounding	The connection of one or more conductive objects to the ground: a specific form of bonding. Grounding is also referred to as earthing.
HAP	Hazardous Air Pollutant
HAZWOPER	Hazardous Waste Operations and Emergency Response
HON	Hazardous Organic NESHAP
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
IDLH	Immediately Dangerous to Life and Health: the airborne concentration of a toxic material from which one could escape within 30 minutes without any escape-impairing symptoms or irreversible health effects.
IEEE	Institute of Electrical and Electronics Engineers
IMDG	International Maritime Dangerous Goods
IMO	International Maritime Organization
IQA	Institute of Quality Assurance
ISGOTT	International Safety Guide for Oil Tanker and Terminals
ISO	International Organization of Standardization

LFL	Lower Flammability Limit
MACT	Maximum Achievable Control Technology
MIL	Military
MSDS	Material Safety Data Sheet
MSHA	Mine Safety and Health Administration
NACCB	National Accreditation Council for Certification Board
NDE	Nondestructive Evaluation
NDT	Nondestructive Testing
NEC	National Electrical Code
NESHAP	National Emission Standard for Hazardous Air Pollutants
NFPA	National Fire Protection Association
NIST	National Institute of Standards and Technology
NIOSH	National Institute for Occupational Safety and Health
NPDES	National Pollutant Discharge Elimination System
OEM	Original Equipment Manufacture
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit. An occupational exposure limit established under OSHA's regulatory authority. It may be a time-weighted average (TWA) concentration or a maximum concentration never to be exceeded either instantaneously (CEILING) or during any 15-minute period (STEL).
Peroxides	Compounds containing the -O-O- linkage. They occur as impurities in many organic compounds, where they have been slowly formed by the action of oxygen.
PM	Preventative Maintenance
PPE	Personal Protective Equipment
ppm	parts per million
QA	Quality Assurance
QC	Quality Control
QMI	Quality Management Institute
RAB	Registrar Accreditation Board
RCRA	Resource Conservation and Recovery Act

RQ	Reportable Quantity
SARA	Superfund Amendment and Reauthorization Act
SCC	Standards Council of Canada
SPC	Statistical Process Control
SQC	Statistical Quality Control
STEL	Short Term Exposure Limit
TLV	Threshold Limit Value; the TLV is a copyrighted exposure standard developed by the ACGIH, that refers to the airborne concentration of a substance under which it is believed that nearly all workers may be repeatedly exposed day after day without adverse health effects. TLVs are expressed in four ways: (1) TLV-C; (2) TLV-STEL; (3) TLV-Skin; (4) TLV-TWA
TLV-C	Threshold Limit Value - Ceiling Exposure Limit; the concentration that should not be exceeded during any part of the working exposure.
TLV-Skin	The "skin" notation after the TLV indicates that there is a potential for the cutaneous route (mucous membranes, eyes, skin) to significantly contribute to the overall exposure. Vehicles present in solutions or mixtures can also significantly enhance potential skin absorption. The skin designation is an alert that air sampling alone is insufficient to accurately quantify exposure and that measures to prevent significant cutaneous absorption may be required.
TLV-STEL	Threshold Limit Value - Short Term Exposure Limit; the concentration to which it is believed that workers can be exposed continuously for a short period of time without suffering from 1) irritation, 2) chronic or irreversible tissue damage, or 3) narcosis of sufficient degree to increase the likelihood of accidental injury, impair self-rescue or materially reduce work efficiency, and provided that the daily TLV-TWA is not exceeded. A STEL is a 15-minute TWA exposure which should not be exceeded at any time during a workday even if the 8-hour TWA is within the TLV-TWA. Exposures above the TLV-TWA up to the STEL should not be longer than 15 minutes and should not occur more than four times per day. There should be at least 60 minutes between successive exposures in this range.
TLV-TWA	Threshold Limit Value - Time Weighted Average; the time-weighted average concentration for a conventional 8-hour workday and a 40-hour workweek, to which it is believed that nearly all workers may be repeatedly exposed, day after day, without adverse effect.
TOC	Total Organic Carbon
TPQ	Threshold planning quantity - under the Superfund Amendments Reauthorization Act (SARA Title III) Section 302, 304, 4311/312, a chemical specific quantity, in pounds, that triggers certain reporting requirements.
TQC	Total Quality Control
TQM	Total Quality Management

TWA	Time-Weighted Average
UL	Underwriters Laboratory
Ullage	Amount by which a packaging falls short of being liquid full
UN	United Nations
USCG	United States Coast Guard
Vapor Pressure	The pressure exerted by a volatile liquid while under defined equilibrium conditions. Vapor pressure is usually reported in millimeters of mercury (mm Hg) at specified temperatures.
VOC	Volatile Organic Compound