

## MESA REFINERY WATCH ISSUE PAPER – PHILLIPS 66 RAIL SPUR FINAL EIR

DATE: January 18, 2016

FROM: Sam Saltoun and Tom Ryan, Technology Committee, Mesa Refinery Watch

TO: Ryan Hostetter, Senior Planner, Phillips 66 Rail Spur Project  
County of San Luis Obispo, Planning and Building Department

SUBJECT: Comments on Mitigation Measure HM-2d as amended in Phillips 66 Rail Spur Final Environmental Impact Report (Final EIR) December 2015

SECTION: Part 1: Background  
Part 2: Discussion  
Part 3: Recommendation  
Part 4: Supporting Rationale  
Part 5: Significance of Preemption  
Part 6: Conclusion  
Contact Information  
Appendix A: CAL FIRE/COUNTY FIRE “*Summary of Information and Actions*”  
Appendix B: Sample Safety Data Sheets

**1. BACKGROUND.** Mitigation measure HM-2d included in the Phillips 66 Rail Spur Revised Public Draft Environmental Impact Report (October 2014), was significantly amended in the Final EIR (December 2015) without prior public notice as follows:

Revised Draft EIR Oct 2014: *HM-2d: Implement mitigation measures PS-4a through PS4e.*

Final EIR Dec 2015: *HM-2d: The refinery shall not accept or unload at the rail unloading facility any crude oil or petroleum product with an API Gravity of 30° or greater.*

This issue was first brought to Mesa Refinery Watch (MRW) attention in a meeting on December 11, 2015 with CAL FIRE/COUNTY FIRE Unit Fire Chief Robert Lewin, and now Acting Unit Fire Chief Steve Reeder. We were invited to review the project condition HM-2d on the API gravity threshold and comment. This paper has been written in response to that invitation.

Based on the discussion and supporting justification provided below, we believe that API gravity is being inappropriately used to limit hazards. API gravity is an oil industry measure of density, not a hazard classification found in the Code of Federal Regulations (CFR) and Hazardous Material Regulations (HMR). It is not an element in OSHA's Hazard Communication Standard (HCS), not found on Safety Data Sheets, nor included on US DOT placards required for Hazmat shipments.

## MESA REFINERY WATCH ISSUE PAPER – PHILLIPS 66 RAIL SPUR FINAL EIR

Diluted bitumen crude oil blends, which the Rail Spur project intends to import, require the same hazard classifications and Packing Group assignment for rail transport as all other Class 3 flammable liquids – including Bakken-like sweet crude oil, which HM-2d is intended to prohibit.<sup>1</sup>

CAL FIRE/COUNTY FIRE has stated: “Our overall position is that we are conditioning the project to prevent an incident, and if one occurs to prevent the loss of life, and minimize damage to the environment.” (*Summary of Information and Actions*, February 20, 2015 – See Appendix A.)

**To safeguard that original intent, HM-2d must shield the County from all Packing Group I (PG I, great danger) and Packing Group II (PG II, medium danger) crude oil imported by rail – not just the subset of hazardous products that also have an API gravity of 30° or greater.**

### 2. DISCUSSION.

In May 2015, the U.S. Department of Transportation (DOT) and Pipeline and Hazardous Materials Administration (PHMSA) issued a Final Rule for “*Enhanced Tank Car Standards and Operational Controls for High-Hazard Flammable Trains*” (Final HHFT Rule), and incorporated into the *Code of Federal Regulations* (CFR) and *Hazardous Material Regulations* (HMR) effective May 8, 2015.

Among other things, the Final HHFT Rule and included “*Supplementary Information*” reinforces flash point and initial boiling point as the exclusive means for assigning Packing Group; sets standards for properly classifying crude oil for transport; and acknowledges that oil sands bitumen, when diluted for shipment in unit trains, no longer qualify as Packing Group III (minor danger) materials.<sup>2</sup>

The API gravity threshold condition HM-2d, as amended in the Final EIR, has been made irrelevant under the Final HHFT Rule, which stress’s hazard classification for transport of crude oil by “flash point” and “initial boiling point” for assignment of Packing Group.<sup>3</sup>

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<sup>1</sup> 49 CFR §171.8 Definitions and abbreviations: “*Packing group* means a grouping according to the degree of danger presented by hazardous materials. Packing Group I indicates great danger; Packing Group II, medium danger; Packing Group III, minor danger...”

<sup>2</sup> DOT/PHMSA Final HHFT Rule and Supplementary Information pages 31-32, 53, 122-123, 227-229: [https://www.transportation.gov/sites/dot.gov/files/docs/final-rule-flammable-liquids-by-rail\\_0.pdf](https://www.transportation.gov/sites/dot.gov/files/docs/final-rule-flammable-liquids-by-rail_0.pdf)

<sup>3</sup> §173.120(c)(1) Class 3—Definitions: “Flash point means the minimum temperature at which a liquid gives off vapor within a test vessel in sufficient concentration to form an ignitable mixture with air near the surface of the liquid.”

§173.121(a)(2)(i) Determining initial boiling point per ASTM D86 - 15 Standard Test Method for Distillation of Petroleum Products and Liquid Fuels at Atmospheric Pressure: “The boiling range gives information on the composition, the properties, and the behavior of the fuel during storage and use. Volatility is the major determinant of the tendency of a hydrocarbon mixture to produce potentially explosive vapors.”

## MESA REFINERY WATCH ISSUE PAPER – PHILLIPS 66 RAIL SPUR FINAL EIR

### 3. RECOMMENDATION.

The following language is offered as a suggestion to replace the API threshold condition in mitigation measure HM-2d.

CITATION:

49 CFR §173.121 (1990) “*Class 3 – Assignment of Packing Group*”

*HM-2d (revised): The refinery shall not accept or unload at the rail unloading facility any crude oil, crude oil mixture or petroleum product with an assigned hazard classification of Packing Group I or Packing Group II.*

### 4. SUPPORTING RATIONALE.

- The terminology used in the current mitigation HM-2d, “API gravity” is the American Petroleum Institute’s (API) standard for describing oil density. API gravity is a very useful term-of-art in the industry and among regulators to broadly classify types of crude oil and roughly categorize physical properties. It is an important factor in extraction, marketing, and refining of crude oil.
- The Code of Federal Regulations (CFR), and included Hazardous Materials Regulations (HMR) Title 49, Parts 171, 172, 173, 174, and 179 on transportation of hazardous material, makes no mention of the term “API gravity”. Federal regulations use only “specific gravity” in reference to a material’s density.
- Likewise, the Final HHFT Rule promulgated May 8, 2015, along with its “*Supplementary Information*” and “*Regulatory Impact Analysis*” (RIA), is silent on “API gravity”.
- “API gravity” is not a hazard classification in the Occupational Safety and Health Administration’s (OSHA) Hazard Communication Standard (HCS), nor the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).
- “API gravity” is not a required element identified on Safety Data Sheets (SDS). SDS’s only require identification of “specific gravity” (SG) – or “relative density” (RD), which is an equivalent term. Hazmat teams might want to know material density information – such as for hazmat spills in water – but API gravity is not a property they would likely reference, or to which they would have ready access. SDS’s and OSHA’s HCS are directly tied to U.S. DOT hazard classification placards on rail cars and vehicles and important to first responders.<sup>4</sup>

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<sup>4</sup> 29 CFR §1910.1200(g): Safety data sheets.

## MESA REFINERY WATCH ISSUE PAPER – PHILLIPS 66 RAIL SPUR FINAL EIR

- API gravity is calculated when SG (or RD) is known by using the following formula:

$$\text{API gravity} = [141.5/(\text{SG in grams per cm}^3)] - 131.5$$

The result of the calculation is an inverse measure of a liquid's density: lower API gravity equates to higher density, and higher API gravity equates to lower density – where the density of pure water at 60°F is 10° on the API gravity scale.

- Mitigation HM-2d, the current Final EIR condition on the Rail Spur project that no crude oil with API gravity greater than 30° is permitted, would indeed preclude Bakken-like light crude oils implicated in many train derailment explosions, fires, and spills.

However, these same volatile crudes can equivalently be identified as Class 3 flammable liquids assigned to PG I (great danger) or PG II (medium danger) for rail transport.

- **Referencing PG I and PG II instead of API gravity is preferable. It links a necessary mitigation to established regulatory authority, and to standardized Safety Data Sheets for hazard communication, rather than tying it to an industry standard.**
- February 2015, when CAL FIRE/COUNTY FIRE's "*Summary of Information and Actions*" was developed, Bakken-like light crudes assigned to PG I and PG II were implicated in several spectacular rail accidents. Diluted bitumen (dilbit) blended heavy crudes were usually assigned to PG III (minor danger). Before the Final HHFT Rule was issued, a project condition that excluded PG I and PG II would *not* have necessarily excluded dilbit sourced from northern Alberta oil sands regions and often misidentified as PG III.<sup>5</sup>
- Phillips 66's original project called for importing primarily Bakken region crude oil. Consequently, CAL FIRE/COUNTY FIRE's "*Summary...*" was focused on "developing a condition that light crude similar to Bakken Oil, also known as sweet crude, regardless of where it comes from shall not be allowed to unload at the Santa Maria Refinery."
- Things have changed for bitumen shippers, carriers, and regulators since last February...

Two separate unit train derailments transporting Canadian diluted bitumen (then considered PG III) caused explosions and long-lasting fires just like PG I and PG II Bakken-like crudes.<sup>6</sup>

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<sup>5</sup> Dilbit variations that were also misidentified as PG III materials include "railbit", which has a lower concentration of diluent; and "synbit", which uses a partially refined synthetic crude diluent. There are other terms for different categories of blended unconventional bitumen-based crudes.

<sup>6</sup> Derailments: On February 14, near Timmons, Ontario, 29 CPC-1232 tank cars burned. On March 7, at Gogama, Ontario, 39 CPC-1232 tank cars burned.

## MESA REFINERY WATCH ISSUE PAPER – PHILLIPS 66 RAIL SPUR FINAL EIR

- Laboratory analysis revealed “the flash point of fresh dilbit is initially lower than that found in other oil types and comparable to a diluent.”<sup>7</sup>
- Prior to these two accidents, PHMSA, which was drafting the proposed HHFT rules, had planned to use older DOT-111 tank cars for PG III Canadian oil sands (dilbit) service. Many comments received on the proposed rules recommended against this. For example:

The Independent Petroleum Association of America (IPAA) stated in its comments, “PHMSA's timeline for DOT-111 railcars is predicated on the assumption that DOT-111s now in use for PG I or PG II hazmat will be moved into PG III service. Even heavy Canadian crudes, once mixed with diluents and shipped as ‘dilbit’ or ‘railbit’, are not expected to qualify as PG III materials...”

Also, Exxon Mobil Corporation commented: “[t]he DOT proposal to move DOT-111 tank cars to oil sands service is not feasible as the diluted bitumen to be shipped is PG I or II and carried predominantly in unit trains.”

For the Final HHFT Rule, PHMSA and the Federal Railroad Administration (FRA) ordered “retirements as opposed to shifting of [DOT-111] tank cars to tar sand service.”

- For Packing Group assignment, the Final HHFT Rule states: “**In the case of a flammable liquid** (excluded from being defined as a gas per §171.8 of the HMR), **the proper classification is based on the flash point and initial boiling point.** See § 173.120 [Class 3 – Definitions] of the HMR. The offeror may additionally need to identify properties such as corrosivity, vapor pressure, specific gravity at loading and reference temperatures, and the presence and concentration of specific compounds (e.g. sulfur) to further comply with complete packaging requirements.” (Emphasis added.)

### Title 49 CFR §173.121

#### Class 3 Flammable Liquids—Assignment of Packing Group

Packing group	Flash point (closed-cup)	Initial boiling point
I		≤35 °C (95 °F)
II	<23 °C (73 °F)	>35 °C (95 °F)
III	≥23 °C, ≤60 °C (≥73 °F, ≤140 °F)	>35 °C (95 °F)

<sup>7</sup> Technical paper: “*Properties of Dilbit and Conventional Oils*”, Section 3.4, Alberta Innovates Energy and Environmental Solutions, February 2014. Diluents are essentially solvents – highly flammable, low carbon number hydrocarbons with very low flash point temperatures.

## MESA REFINERY WATCH ISSUE PAPER – PHILLIPS 66 RAIL SPUR FINAL EIR

- Dilbit from Canadian oil sands (also called tar sands) may mimic heavy California crude oil – like the San Ardo oil regularly transported to Los Angeles by train. However, Canadian dilbit and California heavy crude oils are not the same even though they exhibit similar physical characteristics, such as vapor pressure and API gravity.

The flash points and initial boiling points of these two materials could not be more different, and they act very differently with respect to fire hazard.

Dilbit has a low vapor pressure, but before weathering is defined as highly “flammable”, with a low flashpoint due almost entirely to volatile diluents added in processing for rail transport. The added diluent assigns these bitumen/solvent blends to PG I or PG II.

San Ardo crude also has a low vapor pressure, but on the other hand, has a high flashpoint over 200 ° F, which defines it as “combustible” and assigns it to PG III. San Ardo is typical of naturally occurring heavy crudes extracted from California’s Monterey Shale.<sup>8</sup>

Demonstrating this difference, Safety Data Sheets (included in Appendix B) compare crude oil from San Ardo oilfield, which is now transported through San Luis Obispo County and assigned to PG III (minor danger), to a potential Canadian diluted bitumen feedstock source identified in the Rail Spur project Final EIR and assigned to the PG I (great danger).<sup>9</sup>

San Ardo crude oil (March 2015):	Flash Point: 199 to 232 °F (93 to 111 °C) Boiling Point: 165 to 232 °F (74 to 111 °C) Assigned Packing Group: PG III
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Christina Lake Dilbit Blend (June 2015):	Flash Point: < negative 31 °F (negative 35 °C) Boiling Point: 82 °F (28 °C) Assigned Packing Group: PG I
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<sup>8</sup> Comparison of Central Coast crudes using flash point and boiling point is ideal, but this information is often generic, outdated, redacted, or not available. However, API gravity is available on county websites or even Wikipedia, and provides a gross comparison of regional crude oil: San Ardo oilfield (9 -13°); Price Canyon/Arroyo Grande oilfield (12 -16°); Cat Canyon (6-18°); Orcutt (14-17°), Point Arguello offshore (19°); Point Pedernales offshore (16°); Hondo offshore (12-18°), Sacate offshore (9-16°); Pescado offshore (10-18°). <http://www.sbcountyplanning.org/energy/projects.asp>. Also, search Wikipedia by oilfield.

<sup>9</sup> Cenovus Energy Corporation’s “Christina Lake Dilbit Blend” is produced 10 miles from MEG Energy Corporation’s “Access Western Blend”. Both share the same geologic formation, and produce very similar products. Sections 14 of the SDS’s assign both products to Packing Group I. An SDS for “Christina Lake Dilbit” is provided because “Access Western Blend” – which is one of two potential crude-by-rail sources cited in the Phillips 66 Rail Spur project Final EIR – has only an incomplete, four-year old SDS in public record.

## MESA REFINERY WATCH ISSUE PAPER – PHILLIPS 66 RAIL SPUR FINAL EIR

Access Western Blend (August 2011):

Flash Point: “not available”

Boiling Point: 94.8 to 1,328 °F (34.9 to 720 °C)

Assigned Packing Group: PG I

- The Rail Spur project identifies impact group HM.2 (HM-2a through HM-2d) as a Class I impact – significant impacts that may not be mitigated to less than significant levels. For the Rail Spur project to be approved, the California Environmental Quality Act (CEQA) requires a “statement of overriding considerations... supported by substantial evidence in the record.”<sup>10</sup>

HM.2: “The potential for a crude oil unit train derailment would increase the risk to the public in the vicinity of the UPRR right-of-way”

By revising HM-2d as recommended here, HM.2 can be further mitigated to reduce degree of danger to the public. Prohibiting unloading of high volume, great and medium danger PG I and PG II materials would indeed reduce potential impacts associated with carriage by rail – whether or not it also reduces the Class of impact or need for a statement of overriding considerations.

### 5. SIGNIFICANCE OF PREEMPTION.

San Luis Obispo County, as project Lead Agency, has a duty to: “Review commercial projects which use, store, or transport hazardous materials to ensure necessary measures are taken to protect public health and safety.”<sup>11</sup>

Regulation of hazardous raw materials brought into the county is considered within the scope of San Luis Obispo County’s jurisdictional authority. As Lead Agency for the Rail Spur project, the county can exercise control over the categories and quantities of hazardous materials to be delivered and unloaded under the project.

The project site is on private property, and there is currently only limited rail access. Before the proposed project is approved and constructed, the Rail Spur and crude oil unloading facility does not exist. Presumably, a non-existent private rail facility is not preempted under U.S. Code.

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<sup>10</sup> CEQA §15093

<sup>11</sup> San Luis Obispo General Plan, Safety Element, Policy S-26 (Hazardous Materials), Program S-68: <http://www.slocounty.ca.gov/Assets/PL/Elements/Safety+Element.pdf>

## MESA REFINERY WATCH ISSUE PAPER – PHILLIPS 66 RAIL SPUR FINAL EIR

Likewise, State and local control of the project review process under CEQA law and county ordinance would also not be preempted.<sup>12 13</sup>

The project Final EIR carefully describes train movements and the impact of federal preemption after the rail facility is constructed and becomes operational.

As described, once a train arrives at SMR and leaves the UPRR mainline tracks, operation of the train would be turned over to Phillips 66 personnel on property owned by Phillips 66. Therefore, activities performed within the SMR would not be preempted by federal law since they would not occur on UPRR property and would not be operated by UPRR employees.

A PHMSA's Final Agency Action last November (2015) provides support for this explanation. Once SMR receives the shipment and takes over operation of the train and unloading of tank cars, the UPRR has no further delivery responsibilities at the site. The shipment would no longer be held in commerce or preempted from meeting San Luis Obispo County project conditions.<sup>14 15</sup>

Thus, a revised project condition HM-2d prohibiting PG I and PG II materials from being accepted and unloaded at Santa Maria Refinery would not be subject to federal preemption.

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<sup>12</sup> 49 U.S.C. §§ 5101-5128; 49 U.S.C. 10501: Hazardous material transportation, and Jurisdiction. Other provisions codified as amended in scattered in sections of [49 U.S.C. - Transportation](#).

<sup>13</sup> This is an unsettled area of law, and federal agencies including the Surface Transportation Board (STB), and federal courts have interpreted the Interstate Commerce Commission Termination Act (ICCTA) in various ways that have challenged State and local jurisdiction, including the CEQA law.

For examples, see: University of Colorado Law Review (Spring 2004), "[Who's Driving the Train? Railroad Regulation and Local Control](#)" 75 U. Colo. L. Rev. 549, Maureen E. Eldridge.

Also: "[Index to Preemption of State and Local Laws and Regulations under the Federal Hazardous Material Transportation Law](#)".

<sup>14</sup> 80 FR 70879 - Doc. 2015-28924: <https://www.federalregister.gov/articles/2015/11/16/2015-28921/hazardous-materials-california-and-los-angeles-county-requirements-applicable-to-the-on-site>

"Federal hazardous material transportation law does not preempt California and Los Angeles County requirements on... the unloading of hazardous materials from rail tank cars by a consignee ... following delivery of the hazardous materials to their destination and departure of the carrier from the consignee's premises..."

<sup>15</sup> 49 CFR §171.1(d)(2) "*Functions not subject to the requirements of the HMR...* Unloading of a hazardous material from a transport vehicle or a bulk packaging performed by a person employed by or working under contract to the consignee following delivery of the hazardous material by the carrier to its destination and departure from the consignee's premises of the carrier's personnel or, in the case of a private carrier, departure of the driver from the unloading area."

## MESA REFINERY WATCH ISSUE PAPER – PHILLIPS 66 RAIL SPUR FINAL EIR

**6. CONCLUSION:** There have been major changes in federal regulations since 2015 and the comment period was open for the revised Phillips 66 Rail Spur project. These changes have been diligently incorporated in the Final EIR. However, mitigation measure HM-2d is considered inadequate to achieve CAL FIRE/COUNTY FIRE’s objective of prohibiting the most dangerous crude oil, regardless of origin, from unloading at the Santa Maria Refinery.

The railroad industry periodical, *Railway Age*, neatly summarized the situation in February and March editorials in 2015. They describe the backdrop under which the new rules were written:

“[T]he strategy for renewal of the tank car fleet is based upon an entirely erroneous premise. The whole schedule must be recalculated, based on the evidence that bitumen, diluted for transportation, is simply not an ordinary crude oil fit for carriage in general-purpose tank cars.”<sup>16</sup>

“This blend of bitumen and petroleum-based diluents, known as ‘dilbit’, has a low flash point. Thus, the widespread belief that bitumen from Alberta’s northern oil sands is far safer to transport by rail than Bakken crude is, for all intents and purposes, dead wrong.”<sup>17</sup>

Currently, a dedicated 79-tank car crude oil unit train is using the Union Pacific Railroad Coast Line to transport crude oil assigned to Packing Group III (minor danger) from San Ardo oilfield in Monterey County to refineries in Los Angeles two to three times a week.

The Rail Spur project under review proposes that Santa Maria Refinery receive up to five weekly 80-tank car unit trains including more dangerous Packing Group I (great danger) and Packing Group II (medium danger) diluted bitumen crude oil blends.

The Rail Spur project documentation provides data to illustrate that Santa Maria Refinery historically receives and processes crude oil by pipeline that is similar to blended crude oil proposed for delivery by rail under the project. Physical and chemical characteristics are compared, such as API gravity, vapor pressure, sulfur content, and fractional distribution of hydrocarbons.

However, the regulatory requirements for flammable liquids transported by pipeline (under 49 CFR §190-199 *Pipeline Safety*) are entirely different than those for the same product transported by rail (under 49 CFR §171-180 *Hazardous Material Regulations*). Unlike pipeline conveyance, flammable

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<sup>16</sup> “Bitumen fireballs wreck tank car transition scheme”: <http://www.railwayage.com/index.php/blogs/david-thomas/bitumen-fireballs-expose-shortcomings-of-tank-car-tweaks.html>

<sup>17</sup> “Why bitumen isn’t necessarily safer than Bakken”: <http://www.railwayage.com/index.php/safety/why-bitumen-isnt-necessarily-safer-than-bakken.html>,

## MESA REFINERY WATCH ISSUE PAPER – PHILLIPS 66 RAIL SPUR FINAL EIR

liquids transported by rail are uniquely identified by Packing Group, and Packing Group is uniquely determined by two values – flash point and initial boiling point.

**If one material is thus assigned to Packing Group III and another is assigned to Packing Group I, these materials have a different degree of danger for purposes of carriage by rail. It does not matter how many other ways the materials may be similar.**

**San Luis Obispo County has never experienced massive quantities of these more dangerous Packing Group I and II crude oil blends transported by rail, nor has the refinery received and unloaded crude oil from tank cars as proposed in this project.**

**This enterprise represents a new start.**

Construction of a rail terminal to receive and unload these hazardous materials is a transformative change for the county as well as for the region – a change that should be viewed through the prism of the County General Plan, the Safety Element of which begins:

“To make land use decisions that minimize the potential for loss of life, injury, and property damage from natural and human-caused hazards, it is necessary to have an understanding of the causes and potential effects of the hazards that may affect San Luis Obispo County.”<sup>18</sup>

This new initiative fundamentally changes refinery operations, and imposes several CEQA Class 1 impacts outlined in the Final EIR. The potential effects on the county and regional emergency response readiness would be significant. Incorporating the recommendation to prohibit PG I and PG II materials from unloading at Santa Maria Refinery can help diminish these potential effects.

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**Appendix A:** CAL FIRE/San Luis Obispo County Fire Department “*Summary of Information and Actions, Phillips 66 Refinery Rail Spur Project*”, dated February 20, 2015

**Appendix B:** Sample Safety Data Sheets for San Ardo Crude Oil (ExxonMobil), Christina Lake Dilbit Blend (Cenovus), and Access Western Blend (MEG Energy).

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<sup>18</sup> SLO County General Plan, Safety Element:  
<http://www.slocounty.ca.gov/Assets/PL/Elements/Safety+Element.pdf>

# A

## **APPENDIX A:**

CALFIRE/San Luis Obispo County Fire Department  
“Summary of Information and Actions,  
Phillips 66 Refinery Rail Spur Project”  
February 20, 2015



## **CAL FIRE/San Luis Obispo County Fire Department Summary of Information and Actions Phillips 66 Refinery Rail Spur Project**

### **Executive Summary**

CAL FIRE/San Luis Obispo County Fire Department is the Authority Having Jurisdiction (AHJ) for providing development conditions to the currently proposed rail spur project with an 80 rail car manifest unloading and conveyance facility at the Santa Maria oil refinery on the Nipomo Mesa. Our overall position is that we are conditioning the project to prevent an incident, and if one occurs to prevent the loss of life, and minimize the damage to the environment. We are doing this through requirements for on-site inspection programs, signed operational agreements, pre fire plans, refinery fire brigade standards and training, facility code compliance, off site responder training; including our interagency Haz Mat Team, US&R team, Emergency Operations Centers, other response agencies. Training will be scenario based with comprehensive exercises, involving all impacted jurisdictions.

We continue to look at issues associated with crude oil transported by rail, and are now moving forward on a new condition for the project. We are developing a condition that light crude similar to Bakken Oil, also known as sweet crude, regardless of where it comes from shall not be allowed to unload at the Santa Maria Refinery. The concern is that these types of crude have a known higher flammability, toxicity, volatility, corrosivity, hydrogen sulfide content and the composition or concentration of entrained gases inside the contents.

### **Facts we have compiled:**

- 1) San Luis Obispo County is currently impacted with crude by rail, regardless of this project approval; as crude oil transport is currently occurring on the rail line that transverses the County.
- 2) Regulations on crude traveling by rail is preempted by the Federal Government. Local government may not institute local regulations on railroads. The conditions we have requested have a direct nexus to the Phillips 66 project to avoid preemption.
  - a. Under the Commerce Clause of the United States Constitution, no state or local government may impose laws or regulations that unduly burden interstate commerce.
  - b. County has no authority to impose any mitigation on the railroad once a train has left the oil field or the Refinery.
  - c. Railroad funded crude by rail training is being provided to impacted jurisdictions, although enrollment is limited due to national demand. County fire has sent 4 personnel. Two from the Regional Haz Mat Team and two from the Mesa Fire Station 22 located next to the refinery. We intend to send more to this specific training.
- 3) There are three options that US Department of Transportation is considering for rail tank car design parameters as part of the new rule making in order to have safer tank cars. USDOT is not



## CAL FIRE/San Luis Obispo County Fire Department Summary of Information and Actions Phillips 66 Refinery Rail Spur Project

considering the CPC-1232 design, the type that exploded in West Virginia. The Revised Draft EIR recommends Option 1: PHMSA and FRA Designed Tank Car (new DOT 117) as a mitigation measure, which is the strongest tank car design.

- 4) SLO County is identified as a “high risk” of derailment in the OES document.  
<http://www.caloes.ca.gov/HazardousMaterials/Pages/Oil-By-Rail.aspx>
- 5) Voluntary compliance measures for the railroad are not required in our county - SLO is not a “high threat urban area”.  
<https://www.aar.org/newsandevents/Press-Releases/Pages/Freight-Railroads-Join-U-S-Transportation-Secretary-Foxx-in-Announcing-Industry-Crude-By-Rail-Safety-Initiative.aspx>

Below is a list of the voluntary compliance measures for high threat urban areas, they are **not** applied in San Luis Obispo County:

- a. Trains with 20 or more tank cars carrying crude that include at least one older DOT-111 car will travel no faster than 40 mph in 46 federally designated high-threat urban areas.
  - b. The industry currently voluntarily restricts speeds of trains with 20 or more carloads of hazardous materials, including crude oil, to 50 mph.
  - c. Railroads will also begin using the Rail Corridor Risk Management System to determine the safest routes for trains with 20 or more cars of crude. RCRMS, developed with the US Homeland Security Department and other federal agencies, is currently used for the routing of security-sensitive materials.
- 6) County Fire requested notification of railcar hazardous commodity flow in March 2014 and to date none have been received.
  - 7) County Fire has requested mitigations on behalf of adjacent impacted jurisdictions for additional training.
  - 8) The approved Phillips 66 through-put increase within existing infrastructure project has not yet met all conditions for final. We continue to work with Phillips 66 to ensure all the conditions are met prior to granting a final for that project. Many safety and training requirements were conditioned as part of that project.
  - 9) Continual facility code compliance is occurring. A reputable third party licensed fire protection engineer is conducting a hazard analysis of the facility in the following areas:
    - a. Fire Brigade training, equipment and staffing
    - b. Fire Protection Systems
    - c. Pre-fire plans to identify all the systems at the facility
    - d. Cooperative Operating Plan between County Fire and Phillips 66 during an emergency
  - 10) Phillips 66 Rodeo Refinery in Hercules and the Phillips 66 Nipomo Refinery are dependent facilities linked via pipeline.



**CAL FIRE/San Luis Obispo County Fire Department  
Summary of Information and Actions  
Phillips 66 Refinery Rail Spur Project**

- 11) The Draft Revised EIR states on page ES-5 that the refinery feed stock definition excludes Bakken crude oil. We are aware crude with similar characteristics are extracted from numerous foreign and domestic sources and are not excluded in the EIR.
- a. Light crude, also known as sweet crude, has a known higher flammability, toxicity volatility, corrosivity, hydrogen sulfide content and the composition or concentration of entrained gases inside the contents.
  - b. U.S. Pipeline and Hazardous Materials Safety Administration (PHMSA) is reinforcing the requirement to properly test, characterize, classify, and, where appropriate, sufficiently degasify hazardous materials prior to and during transportation.  
<https://www.hsd.org/?view&did=751042>

**CAL FIRE/COUNTY FIRE requested mitigations:**

**Class I Impact HM.2**

*The potential for a crude oil unit train derailment would increase the risk to the public in the vicinity of the UPRR right-of-way.*

1. *HM-2a Only rail cars designed to FRA, July 23, 2014 Proposed Rulemaking Option 1: PHMSA and FRA Designed Tank Car as listed in Table 4.7.8, shall be allowed to unload crude oil at the Santa Maria Refinery.*
2. *HM-2b For crude oil shipments via rail to the SMR a rail transportation route analysis shall be conducted annually. The rail transportation route analysis shall be prepared following the requirements in 49 CFR 172.820. The route with the lowest level of safety and security risk shall be used to transport the crude oil to the Santa Maria Refinery.*
3. *HM-2c The Applicant's contract with UPRR, shall include a provision to require that Positive Train Control (PTC) be in place for all mainline rail routes in California that could be used for transporting crude oil to the SMR.*

**Class I Impact PS.4**

*Operations of the crude oil train on the mainline UPRR tracks would increase demand for fire protection and emergency response services along the rail routes.*

1. *PS-4a As part of the Applicant's contract with UPRR, it shall require that quarterly hazardous commodity flow information documents are provided to all first response agencies along the mainline rail routes within California that could be used by trains carrying crude oil to the Santa Maria Refinery for the life of the project. Only first response agencies that are able to receive security sensitive information as identified pursuant to Section 15.5 of Part 15 of Title 49 of the Code of Federal Regulations, shall be provided this information. This contract provision shall be in place and verified by the County Department of Planning and Building prior to delivery of crude by rail to the Santa Maria Refinery.*



## **CAL FIRE/San Luis Obispo County Fire Department Summary of Information and Actions Phillips 66 Refinery Rail Spur Project**

2. *PS-4b Only rail cars designed to FRA, July 23, 2014 Proposed Rulemaking Option 1: PHMSA and FRA Designed Tank Car shall be allowed to unload crude oil at the Santa Maria Refinery. PS-4c As part of the Applicant's contract with UPRR, it shall require annual funding for first response agencies along the mainline rail routes within California that could be used by the trains carrying crude oil to the Santa Maria Refinery to attend certified offsite training for emergency responders to railcar emergencies, such as the 40 hour course offered by Security and Emergency Response Training Center Railroad Incident Coordination and Safety (RICS) meeting Department of Homeland security, NIIMS, OSHA 29CFR 1910.120 compliance. The contract shall require funding of a minimum of 20 annual slots per year for the life of the project. This contract provision shall be in place and verified by the Cal Fire/County Fire prior to delivery of crude by rail to the Santa Maria Refinery.*
3. *PS-4d As part of the Applicant's contract with UPRR, it shall require annual emergency responses scenario/field based training including Emergency Operations Center Training activations with local emergency response agencies along the mainline rail routes within California that could be used by the crude oil trains traveling to the Santa Maria Refinery for the life of the project. A total of four training sessions shall be conducted per year at various locations along the rail routes. This contract provision shall be in place and verified by the Cal Fire/County Fire prior to delivery of crude by rail to the Santa Maria Refinery.*
4. *PS-4e As part of the Applicant's contract with UPRR, it shall require that all first response agencies along the mainline rail routes within California that could be used by trains carrying crude oil traveling to the Santa Maria Refinery be provided with a contact number that can provide realtime information in the event of an oil train derailment or accident. The information that would need to be provided would include, but not be limited to crude oil shipping papers that detail the type of crude oil, and information that can assist in the safe containment and removal of any crude oil spill. This contract provision shall be in place and verified by the Cal Fire/County Fire prior to delivery of crude by rail to the Santa Maria Refinery.*

### **Class II Impact PS.3**

*The Rail Spur Project would increase demand for fire protection and emergency response services at the SMR.*

1. *PS-3A Prior to issuance of construction permits, the Applicant shall submit to Cal Fire/County Fire for review and approval a final Fire Protection Plan for the Rail Spur Project that meets all the applicable requirements of API, NFPA, UFC, and Cal Fire/County Fire.*
2. *PS-3b Prior to notice to proceed for the rail unloading facility, the Applicant shall update the SMR Emergency Response Plan to include the rail unloading facilities and operations.*
3. *PS-3c Prior to notice to proceed for the rail unloading facility, the Applicant shall update the existing SMR Spill Prevention Control and countermeasure Plan to include the rail unloading facilities and operations.*



**CAL FIRE/San Luis Obispo County Fire Department**  
**Summary of Information and Actions**  
**Phillips 66 Refinery Rail Spur Project**

4. *PS-3d Prior to notice to proceed for the rail unloading facilities, the Applicant shall assure that the existing SMR fire brigade meets all the requirements outlined in Occupational Safety and Health Administration 29 CFR 1910.156, and NFPA 600 & 1081.*
5. *PS-3e Prior to issuance of grading permits, the Applicant shall have an executed operational Memorandum of Understanding (MOU) with Cal Fire/County Fire that includes fire brigade staffing/training requirements and Cal Fire/County Fire funding requirements. This MOU shall be reviewed and updated annually by Cal Fire and the Applicant.*
6. *PS-3f Prior to issuance of grading permits, the Applicant shall have an agreement to reimburse Cal Fire/County Fire for time spent by a qualified fire inspector to conduct the annual fire inspections at the SMR including all structures, and support facilities consistent with Cal Fire/County Fire's authority and jurisdiction. The Applicant shall reimburse all costs associated with travel time, inspections, inspection training, and documentation completion. The reimbursement rate shall be according to the most recent fee schedule adopted by the San Luis County Board of Supervisors.*
7. *PS-3g Prior to issuance of grading permits, the Applicant shall have an agreement to reimburse Cal Fire/County Fire for offsite training for emergency responders to railcar emergencies, such as the 40 hour course offered by Security and Emergency Response Training Center Railroad Incident Coordination and Safety (RICS) meeting Department of Homeland security, NIIMS, OSHA 29CFR 1910.120 compliance. Initial training shall be two members of the Interagency Hazardous materials Response Team, two members of the interagency Urban Search and Rescue Team, and two members annually from Cal Fire/County Fire or fire districts in San Luis Obispo that have automatic aid agreements with Cal Fire/County Fire for a total of six slots per year for the life of the project.*
8. *PS-3h Prior to issuance of grading permits, the Applicant shall have an agreement to reimburse Cal Fire/County Fire for Fire Chief Officer attendance such as the 40 hour course offered by Security and Emergency Response Training Center; Leadership & Management of Surface Transportation Incidents. Funding shall be for two Fire Chief Officers annually for the life of the project.*
9. *PS-3i Prior to issuance of grading permits, the Applicant shall have an agreement with Cal Fire/County Fire to conduct annual emergency response scenario/field based training including Emergency Operations Center Training activations with the Applicant, Cal Fire/County Fire, UPRR, and other San Luis Obispo County First response agencies that have mutual aid agreements with Cal Fire/County Fire. These annual emergency response drills shall occur for the life of the project.*

# B

## **APPENDIX B:**

Sample Safety Data Sheets for:

San Ardo Crude Oil (ExxonMobil)  
Christina Lake Dilbit Blend (Cenovus)  
Access Western Blend (MEG Energy)

## SAFETY DATA SHEET

### SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

#### PRODUCT

**Product Name:** SAN ARDO CRUDE OIL  
**Product Description:** Petroleum Crude Oil  
**Product Code:** 940007-02  
**Intended Use:** Crude oil

#### COMPANY IDENTIFICATION

**Supplier:** EXXONMOBIL UPSTREAM PRODUCTION  
EXXONMOBIL BUILDING  
800 BELL STREET  
HOUSTON, TX. 77002 USA  
**24 Hour Health Emergency** 609-737-4411  
**ExxonMobil Transportation No.** 800-424-9300 or 703-527-3887 CHEMTREC

### SECTION 2 HAZARDS IDENTIFICATION

This material is hazardous according to regulatory guidelines (see (M)SDS Section 15).

#### CLASSIFICATION:

Flammable liquid: Category 4.  
Eye irritation: Category 2A. Carcinogen: Category 1B. Specific target organ toxicant (central nervous system): Category 3. Specific target organ toxicant (repeated exposure): Category 2. Aspiration toxicant: Category 1.

#### LABEL:

##### Pictogram:



**Signal Word:** Danger

#### Hazard Statements:

H227: Combustible liquid. H304: May be fatal if swallowed and enters airways. H319: Causes serious eye irritation. H336: May cause drowsiness or dizziness. H350: May cause cancer. H373: May cause damage to organs through prolonged or repeated exposure. Blood, Liver, Spleen, Thymus

#### Precautionary Statements:

P201: Obtain special instructions before use. P202: Do not handle until all safety precautions have been read and understood. P210: Keep away from flames and hot surfaces. -- No smoking. P260: Do not breathe mist / vapours. P264: Wash skin thoroughly after handling. P271: Use only outdoors or in a well-ventilated area. P273: Avoid release to the environment. P280: Wear protective gloves and eye / face protection. P301 + P310: IF SWALLOWED:

Product Name: SAN ARDO CRUDE OIL

Revision Date: 17 Mar 2015

Page 2 of 16

Immediately call a POISON CENTER or doctor/physician. P304 + P340: IF INHALED: Remove person to fresh air and keep comfortable for breathing. P305 + P351 + P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. P308 + P313: IF exposed or concerned: Get medical advice/ attention. P312: Call a POISON CENTER or doctor/physician if you feel unwell. P331: Do NOT induce vomiting. P337 + P313: If eye irritation persists: Get medical advice/attention. P370 + P378: In case of fire: Use water fog, foam, dry chemical or carbon dioxide (CO2) to extinguish. P391: Collect spillage. P403 + P233: Store in a well-ventilated place. Keep container tightly closed. P403 + P235: Store in a well-ventilated place. Keep cool. P405: Store locked up. P501: Dispose of contents and container in accordance with local regulations.

**Contains:** PETROLEUM CRUDE OIL

**Other hazard information:**

**HAZARD NOT OTHERWISE CLASSIFIED (HNOC):** None as defined under 29 CFR 1910.1200.

**PHYSICAL / CHEMICAL HAZARDS**

Material can accumulate static charges which may cause an ignition. Material can release vapors that readily form flammable mixtures. Vapor accumulation could flash and/or explode if ignited. Combustible.

**HEALTH HAZARDS**

High-pressure injection under skin may cause serious damage. Hydrogen sulfide, a highly toxic gas, is expected to be present. Signs and symptoms of overexposure to hydrogen sulfide include respiratory and eye irritation, dizziness, nausea, coughing, a sensation of dryness and pain in the nose, and loss of consciousness. Odor does not provide a reliable indicator of the presence of hazardous levels in the atmosphere. Repeated exposure may cause skin dryness or cracking. May be irritating to nose, throat, and lungs. May cause central nervous system depression. Exposure to benzene is associated with cancer (acute myeloid leukemia and myelodysplastic syndrome), damage to the blood-producing system, and serious blood disorders (see Section 11).

**ENVIRONMENTAL HAZARDS**

Expected to be toxic to aquatic organisms. May cause long-term adverse effects in the aquatic environment.

<b>NFPA Hazard ID:</b>	Health: 2	Flammability: 2	Reactivity: 0
<b>HMIS Hazard ID:</b>	Health: 2*	Flammability: 2	Reactivity: 0

**NOTE:** This material should not be used for any other purpose than the intended use in Section 1 without expert advice. Health studies have shown that chemical exposure may cause potential human health risks which may vary from person to person.

<b>SECTION 3</b>	<b>COMPOSITION / INFORMATION ON INGREDIENTS</b>
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This material is defined as a complex substance.

**Hazardous Substance(s) or Complex Substance(s) required for disclosure**

Name	CAS#	Concentration*	GHS Hazard Codes
PETROLEUM CRUDE OIL	8002-05-9	100 %	H304, H336, H350(1B), H319(2A), H373, H401, H411

Product Name: SAN ARDO CRUDE OIL

Revision Date: 17 Mar 2015

Page 3 of 16

**Hazardous Constituent(s) Contained in Complex Substance(s) required for disclosure**

Name	CAS#	Concentration*	GHS Hazard Codes
BENZENE	71-43-2	1 - < 5%	H225, H303, H304, H340(1B), H350(1A), H315, H319(2A), H372, H401
CYCLOHEXANE	110-82-7	1 - < 5%	H225, H304, H336, H315, H400(M factor 1), H410(M factor 1)
ETHYL BENZENE	100-41-4	0.1 - < 1%	H225, H332, H351
HYDROGEN SULFIDE	7783-06-4	> 0.005 %	H220, H280, H330(2), H400(M factor 1)
N-HEXANE	110-54-3	1 - < 5%	H225, H304, H336, H361(F), H315, H373, H401, H411
NAPHTHALENE	91-20-3	1 - < 5%	H302, H351, H400(M factor 1), H410(M factor 1)
TOLUENE	108-88-3	1 - < 5%	H225, H304, H336, H361(D), H315, H373, H401, H412
XYLENES	1330-20-7	1 - < 5%	H226, H304, H312, H332, H335, H315, H320(2B), H373, H401

\* All concentrations are percent by weight unless material is a gas. Gas concentrations are in percent by volume.

As per paragraph (i) of 29 CFR 1910.1200, formulation is considered a trade secret and specific chemical identity and exact percentage (concentration) of composition may have been withheld. Specific chemical identity and exact percentage composition will be provided to health professionals, employees, or designated representatives in accordance with applicable provisions of paragraph (i).

**SECTION 4 FIRST AID MEASURES**

**INHALATION**

Immediately remove from further exposure. Get immediate medical assistance. For those providing assistance, avoid exposure to yourself or others. Use adequate respiratory protection. Give supplemental oxygen, if available. If breathing has stopped, assist ventilation with a mechanical device.

**SKIN CONTACT**

Remove contaminated clothing. Dry wipe exposed skin and cleanse with waterless hand cleaner and follow by washing thoroughly with soap and water. For those providing assistance, avoid further skin contact to yourself or others. Wear impervious gloves. Launder contaminated clothing separately before reuse. Discard contaminated articles that cannot be laundered. If product is injected into or under the skin, or into any part of the body, regardless of the appearance of the wound or its size, the individual should be evaluated immediately by a physician as a surgical emergency. Even though initial symptoms from high pressure injection may be minimal or absent, early surgical treatment within the first few hours may significantly reduce the ultimate extent of injury. For hot product: Immediately immerse in or flush affected area with large amounts of cold water to dissipate heat. Cover with clean cotton sheeting or gauze and get prompt medical attention.

**EYE CONTACT**

Flush thoroughly with water for at least 15 minutes. Get medical assistance.

Product Name: SAN ARDO CRUDE OIL

Revision Date: 17 Mar 2015

Page 4 of 16

## INGESTION

Seek immediate medical attention. Do not induce vomiting.

## NOTE TO PHYSICIAN

If ingested, material may be aspirated into the lungs and cause chemical pneumonitis. Treat appropriately. This light hydrocarbon material, or a component, may be associated with cardiac sensitization following very high exposures (well above occupational exposure limits) or with concurrent exposure to high stress levels or heart-stimulating substances like epinephrine. Administration of such substances should be avoided.

## SECTION 5 FIRE FIGHTING MEASURES

### EXTINGUISHING MEDIA

**Appropriate Extinguishing Media:** Use water fog, foam, dry chemical or carbon dioxide (CO<sub>2</sub>) to extinguish flames.

**Inappropriate Extinguishing Media:** Straight Streams of Water

### FIRE FIGHTING

**Fire Fighting Instructions:** Evacuate area. Prevent runoff from fire control or dilution from entering streams, sewers, or drinking water supply. Firefighters should use standard protective equipment and in enclosed spaces, self-contained breathing apparatus (SCBA). Use water spray to cool fire exposed surfaces and to protect personnel.

**Unusual Fire Hazards:** Combustible. Vapors are flammable and heavier than air. Vapors may travel across the ground and reach remote ignition sources causing a flashback fire danger. Exposure to fire can generate toxic fumes. Hazardous material. Firefighters should consider protective equipment indicated in Section 8.

**Hazardous Combustion Products:** Incomplete combustion products, Oxides of carbon, Smoke, Fume, Sulfur oxides, Hydrogen sulfide

### FLAMMABILITY PROPERTIES

**Flash Point [Method]:** 93°C (199°F) - 111°C (232°F) [ASTM D-93]

**Flammable Limits (Approximate volume % in air):** LEL: N/D UEL: N/D

**Autoignition Temperature:** N/D

## SECTION 6 ACCIDENTAL RELEASE MEASURES

### NOTIFICATION PROCEDURES

In the event of a spill or accidental release, notify relevant authorities in accordance with all applicable regulations. US regulations require reporting releases of this material to the environment which exceed the applicable reportable quantity or oil spills which could reach any waterway including intermittent dry creeks. The National Response Center can be reached at (800)424-8802.

### PROTECTIVE MEASURES

Avoid contact with spilled material. Warn or evacuate occupants in surrounding and downwind areas if required due to toxicity or flammability of the material. See Section 5 for fire fighting information. See the Hazard Identification Section for Significant Hazards. See Section 4 for First Aid Advice. See Section 8 for advice on the minimum requirements for personal protective equipment. Additional protective measures may be necessary, depending on the specific circumstances and/or the expert judgment of the emergency responders.

Product Name: SAN ARDO CRUDE OIL

Revision Date: 17 Mar 2015

Page 5 of 16

For emergency responders: Respiratory protection: half-face or full-face respirator with filter(s) for organic vapor and, when applicable, H<sub>2</sub>S, or Self Contained Breathing Apparatus (SCBA) can be used depending on the size of spill and potential level of exposure. If the exposure cannot be completely characterized or an oxygen deficient atmosphere is possible or anticipated, SCBA is recommended. Chemical goggles are recommended if splashes or contact with eyes is possible. Work gloves that are resistant to aromatic hydrocarbons are recommended. If contact with hot product is possible or anticipated, gloves should be heat-resistant and thermally insulated. Note: gloves made of PVA are not water-resistant, and are not suitable for emergency use. Small spills: normal antistatic work clothes are usually adequate. Large spills: full body suit of chemical resistant, antistatic and, if necessary, heat resistant and thermal insulated material is recommended.

## SPILL MANAGEMENT

**Land Spill:** Eliminate all ignition sources (no smoking, flares, sparks or flames in immediate area). Stop leak if you can do it without risk. All equipment used when handling the product must be grounded. Do not touch or walk through spilled material. Prevent entry into waterways, sewer, basements or confined areas. A vapor suppressing foam may be used to reduce vapors. Large Spills: Water spray may reduce vapor; but may not prevent ignition in closed spaces.

**Water Spill:** Stop leak if you can do it without risk. Confine the spill immediately with booms. Warn other shipping. Remove from the surface by skimming or with suitable absorbents. If permitted by regulatory authorities the use of suitable dispersants should be considered where indicated in local oil spill contingency plans. Seek the advice of a specialist before using dispersants.

Water spill and land spill recommendations are based on the most likely spill scenario for this material; however, geographic conditions, wind, temperature, (and in the case of a water spill) wave and current direction and speed may greatly influence the appropriate action to be taken. For this reason, local experts should be consulted. Note: Local regulations may prescribe or limit action to be taken.

## ENVIRONMENTAL PRECAUTIONS

Use booms as a barrier to protect shorelines. Use containment booms when the ambient temperature is below the flash point of the material. Large Spills: Dike far ahead of liquid spill for later recovery and disposal. Prevent entry into waterways, sewers, basements or confined areas.

## SECTION 7

## HANDLING AND STORAGE

### HANDLING

H<sub>2</sub>S is present. Avoid all personal contact. Crude oils can contain trace levels of natural impurities including heavy metals, such as mercury, nickel or lead, as well as naturally occurring radioactive material. As the impurity content may concentrate during refining/processing, process operations, including equipment, materials and products should be evaluated to identify and manage any potential risks to health, safety or the environment or regulatory concerns.

Potentially toxic/irritating fumes/vapors may be evolved from heated or agitated material. Use only with adequate ventilation. Do not enter storage areas or confined spaces unless adequately ventilated. The toxic and olfactory (sense of smell) fatigue properties of hydrogen sulfide require that air monitoring alarms and respiratory protection be used where the concentration might be expected to reach a harmful level, such as in an enclosed space, heated transport vessel, or in a spill or leak situation.

Material may contain trace amounts of naturally occurring radioactive material (NORM), which will accumulate in process equipment and storage vessels. Prevent small spills and leakage to avoid slip hazard. Material can accumulate static charges which may cause an electrical spark (ignition source). When the material is handled in bulk, an electrical spark could ignite any flammable vapors from liquids or residues that may be present (e.g., during switch-loading operations). Use proper bonding and/or ground procedures. However, bonding and

Product Name: SAN ARDO CRUDE OIL

Revision Date: 17 Mar 2015

Page 6 of 16

grounds may not eliminate the hazard from static accumulation. Consult local applicable standards for guidance. Additional references include American Petroleum Institute 2003 (Protection Against Ignitions Arising out of Static, Lightning and Stray Currents) or National Fire Protection Agency 77 (Recommended Practice on Static Electricity) or CENELEC CLC/TR 50404 (Electrostatics - Code of practice for the avoidance of hazards due to static electricity).

**Static Accumulator:** This material is a static accumulator. A liquid is typically considered a nonconductive, static accumulator if its conductivity is below 100 pS/m (100x10E-12 Siemens per meter) and is considered a semiconductive, static accumulator if its conductivity is below 10,000 pS/m. Whether a liquid is nonconductive or semiconductive, the precautions are the same. A number of factors, for example liquid temperature, presence of contaminants, anti-static additives and filtration can greatly influence the conductivity of a liquid.

## STORAGE

The container choice, for example storage vessel, may effect static accumulation and dissipation. Keep container closed. Handle containers with care. Open slowly in order to control possible pressure release. Store in a cool, well-ventilated area. Storage containers should be grounded and bonded. Fixed storage containers, transfer containers and associated equipment should be grounded and bonded to prevent accumulation of static charge.

<b>SECTION 8</b>	<b>EXPOSURE CONTROLS / PERSONAL PROTECTION</b>
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## EXPOSURE LIMIT VALUES

Exposure limits/standards (Note: Exposure limits are not additive)

Substance Name	Form	Limit / Standard			NOTE	Source
BENZENE		OSHA Action level	0.5 ppm		N/A	OSHA Sp.Reg.
BENZENE		STEL	5 ppm		N/A	OSHA Sp.Reg.
BENZENE		TWA	1 ppm		N/A	OSHA Sp.Reg.
BENZENE		STEL	1 ppm		N/A	ExxonMobil
BENZENE		TWA	0.5 ppm		N/A	ExxonMobil
BENZENE		STEL	2.5 ppm		Skin	ACGIH
BENZENE		TWA	0.5 ppm		Skin	ACGIH
CYCLOHEXANE		TWA	1050 mg/m3	300 ppm	N/A	OSHA Z1
CYCLOHEXANE		TWA	100 ppm		N/A	ACGIH
ETHYL BENZENE		TWA	435 mg/m3	100 ppm	N/A	OSHA Z1
ETHYL BENZENE		TWA	20 ppm		N/A	ACGIH
HYDROGEN SULFIDE		Ceiling	20 ppm		N/A	OSHA Z2
HYDROGEN SULFIDE		Maximum concentration	50 ppm		N/A	OSHA Z2
HYDROGEN SULFIDE		STEL	14 mg/m3	10 ppm	N/A	ExxonMobil
HYDROGEN SULFIDE		TWA	7 mg/m3	5 ppm	N/A	ExxonMobil
HYDROGEN SULFIDE		STEL	5 ppm		N/A	ACGIH
HYDROGEN SULFIDE		TWA	1 ppm		N/A	ACGIH
N-HEXANE		TWA	1800 mg/m3	500 ppm	N/A	OSHA Z1
N-HEXANE		TWA	50 ppm		Skin	ACGIH
NAPHTHALENE		TWA	50 mg/m3	10 ppm	N/A	OSHA Z1

Product Name: SAN ARDO CRUDE OIL

Revision Date: 17 Mar 2015

Page 7 of 16

NAPHTHALENE		TWA	10 ppm		Skin	ACGIH
PETROLEUM CRUDE OIL		TWA	2000 mg/m <sup>3</sup>	500 ppm	N/A	OSHA Z1
TOLUENE		Ceiling	300 ppm		N/A	OSHA Z2
TOLUENE		Maximum concentration	500 ppm		N/A	OSHA Z2
TOLUENE		TWA	200 ppm		N/A	OSHA Z2
TOLUENE		TWA	20 ppm		N/A	ACGIH
XYLENES		TWA	435 mg/m <sup>3</sup>	100 ppm	N/A	OSHA Z1
XYLENES		STEL	150 ppm		N/A	ACGIH
XYLENES		TWA	100 ppm		N/A	ACGIH

NOTE: Limits/standards shown for guidance only. Follow applicable regulations.

### Biological limits

Substance	Specimen	Sampling Time	Limit	Determinant	Source
BENZENE	Creatinine in urine	End of shift	500 ug/g	t,t-Muconic acid	ACGIH BELs (BEIs)
BENZENE	Creatinine in urine	End of shift	25 ug/g	S-Phenylmercapturic acid	ACGIH BELs (BEIs)
ETHYL BENZENE	Creatinine in urine	End of shift	0.15 g/g	Sum of mandelic acid and phenylglyoxylic acid	ACGIH BELs (BEIs)
N-HEXANE	Urine	End of shift at end of work wk	0.4 mg/l	2,5-Hexanedion, without hydrolysis	ACGIH BELs (BEIs)
NAPHTHALENE	No Biological Specimen provided	End of shift	Not Assigned	1-Naphthol, with hydrolysis + 2-Naphthol, with hydrolysis	ACGIH BELs (BEIs)
PETROLEUM CRUDE OIL	Urine	End of shift at end of work wk	Not Assigned	1-Hydroxypyrene, with hydrolysis (1-HP)	ACGIH BELs (BEIs)
TOLUENE	Blood	Prior to last shift of work wk	0.02 mg/l	Toluene	ACGIH BELs (BEIs)
TOLUENE	Creatinine in urine	End of shift	0.3 mg/g	o-Cresol, with hydrolysis	ACGIH BELs (BEIs)
TOLUENE	Urine	End of shift	0.03 mg/l	Toluene	ACGIH BELs (BEIs)
XYLENES	Creatinine in urine	End of shift	1.5 g/g	Methylhippuric acids	ACGIH BELs (BEIs)

### ENGINEERING CONTROLS

The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Control measures to consider:

Use explosion-proof ventilation equipment to stay below exposure limits.

### PERSONAL PROTECTION

Personal protective equipment selections vary based on potential exposure conditions such as applications, handling practices, concentration and ventilation. Information on the selection of protective equipment for use with this material, as provided below, is based upon intended, normal usage.

**Respiratory Protection:** If engineering controls do not maintain airborne contaminant concentrations at a

Product Name: SAN ARDO CRUDE OIL

Revision Date: 17 Mar 2015

Page 8 of 16

level which is adequate to protect worker health, an approved respirator may be appropriate. Respirator selection, use, and maintenance must be in accordance with regulatory requirements, if applicable. Types of respirators to be considered for this material include:

Positive-pressure, air-supplied respirator in areas where H<sub>2</sub>S vapors may accumulate is recommended.

For high airborne concentrations, use an approved supplied-air respirator, operated in positive pressure mode. Supplied air respirators with an escape bottle may be appropriate when oxygen levels are inadequate, gas/vapor warning properties are poor, or if air purifying filter capacity/rating may be exceeded.

**Hand Protection:** Any specific glove information provided is based on published literature and glove manufacturer data. Glove suitability and breakthrough time will differ depending on the specific use conditions. Contact the glove manufacturer for specific advice on glove selection and breakthrough times for your use conditions. Inspect and replace worn or damaged gloves. The types of gloves to be considered for this material include:

Chemical resistant gloves are recommended. If product is hot, thermally protective, chemical resistant gloves are recommended. If contact with forearms is likely, wear gauntlet style gloves.

**Eye Protection:** Chemical goggles are recommended.

**Skin and Body Protection:** Any specific clothing information provided is based on published literature or manufacturer data. The types of clothing to be considered for this material include:

Chemical/oil resistant clothing is recommended. If product is hot, thermally protective, chemical resistant apron and long sleeves are recommended.

**Specific Hygiene Measures:** Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned. Practice good housekeeping.

## ENVIRONMENTAL CONTROLS

Comply with applicable environmental regulations limiting discharge to air, water and soil. Protect the environment by applying appropriate control measures to prevent or limit emissions.

## SECTION 9

## PHYSICAL AND CHEMICAL PROPERTIES

**Note:** Physical and chemical properties are provided for safety, health and environmental considerations only and may not fully represent product specifications. Contact the Supplier for additional information.

### GENERAL INFORMATION

**Physical State:** Liquid

**Color:** Black

**Odor:** Rotten Egg

**Odor Threshold:** N/D

### IMPORTANT HEALTH, SAFETY, AND ENVIRONMENTAL INFORMATION

**Relative Density (at 15 °C):** 0.661 - 1.013

**Flammability (Solid, Gas):** N/A

**Flash Point [Method]:** 93°C (199°F) - 111°C (232°F) [ASTM D-93]

**Flammable Limits (Approximate volume % in air):** LEL: N/D UEL: N/D

Product Name: SAN ARDO CRUDE OIL

Revision Date: 17 Mar 2015

Page 9 of 16

**Autoignition Temperature:** N/D

**Boiling Point / Range:** 74°C (165°F) - 111°C (232°F)

**Decomposition Temperature:** N/D

**Vapor Density (Air = 1):** N/D

**Vapor Pressure:** 0 kPa (0 mm Hg) at 20 °C - 106.4 kPa (800 mm Hg) at 20 °C

**Evaporation Rate (n-butyl acetate = 1):** N/D

**pH:** N/A

**Log Pow (n-Octanol/Water Partition Coefficient):** N/D

**Solubility in Water:** Negligible

**Viscosity:** >0.42 cSt (0.42 mm<sup>2</sup>/sec) at 40 °C

**Oxidizing Properties:** See Hazards Identification Section.

## OTHER INFORMATION

**Freezing Point:** N/D

**Melting Point:** N/A

**Pour Point:** -73°C (-100°F) - 48°C (118°F)

<b>SECTION 10</b>	<b>STABILITY AND REACTIVITY</b>
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**REACTIVITY:** See sub-sections below.

**STABILITY:** Material is stable under normal conditions.

**CONDITIONS TO AVOID:** Open flames and high energy ignition sources.

**MATERIALS TO AVOID:** Strong oxidizers

**HAZARDOUS DECOMPOSITION PRODUCTS:** Material does not decompose at ambient temperatures.

**POSSIBILITY OF HAZARDOUS REACTIONS:** Hazardous polymerization will not occur.

<b>SECTION 11</b>	<b>TOXICOLOGICAL INFORMATION</b>
-------------------	----------------------------------

### INFORMATION ON TOXICOLOGICAL EFFECTS

Hazard Class	Conclusion / Remarks
<b>Inhalation</b>	
Acute Toxicity: No end point data for material.	Not determined.
Irritation: No end point data for material.	Elevated temperatures or mechanical action may form vapors, mist, or fumes which may be irritating to the eyes, nose, throat, or lungs.
<b>Ingestion</b>	
Acute Toxicity (Rat): LD50 > 5000 mg/kg	Minimally Toxic. Based on test data for structurally similar materials. Test(s) equivalent or similar to OECD Guideline 401
<b>Skin</b>	
Acute Toxicity (Rabbit): LD50 > 2000 mg/kg	Minimally Toxic. Based on test data for structurally similar materials. Test(s) equivalent or similar to OECD Guideline 402
Skin Corrosion/Irritation (Rabbit): Data available.	May dry the skin leading to discomfort and dermatitis. Based on test data for structurally similar materials. Test(s) equivalent or similar to OECD Guideline 404
<b>Eye</b>	

Product Name: SAN ARDO CRUDE OIL

Revision Date: 17 Mar 2015

Page 10 of 16

Serious Eye Damage/Irritation (Rabbit): Data available.	Irritating and will injure eye tissue. Based on test data for structurally similar materials. Test(s) equivalent or similar to OECD Guideline 405
<b>Sensitization</b>	
Respiratory Sensitization: No end point data for material.	Not expected to be a respiratory sensitizer.
Skin Sensitization: Data available.	Not expected to be a skin sensitizer. Based on test data for structurally similar materials. Test(s) equivalent or similar to OECD Guideline 406
<b>Aspiration:</b> Data available.	May be fatal if swallowed and enters airways. Based on physico-chemical properties of the material.
<b>Germ Cell Mutagenicity:</b> Data available.	Not expected to be a germ cell mutagen. Based on test data for structurally similar materials. Test method unavailable.
<b>Carcinogenicity:</b> Data available.	Caused cancer in laboratory animals. Based on test data for structurally similar materials. Test(s) equivalent or similar to OECD Guideline 451
<b>Reproductive Toxicity:</b> Data available.	Not expected to be a reproductive toxicant. Based on test data for structurally similar materials. Test method unavailable.
<b>Lactation:</b> No end point data for material.	Not expected to cause harm to breast-fed children.
<b>Specific Target Organ Toxicity (STOT)</b>	
Single Exposure: Data available.	May cause drowsiness or dizziness. Based on test data for structurally similar materials. Test method unavailable.
Repeated Exposure: Data available.	Concentrated, prolonged or deliberate exposure may cause organ damage. Based on test data for structurally similar materials. Test method unavailable.

## TOXICITY FOR SUBSTANCES

NAME	ACUTE TOXICITY
ETHYL BENZENE	Inhalation Lethality: 4 hour(s) LC50 17.8 mg/l (Vapor) (Rat); Oral Lethality: LD50 3.5 g/kg (Rat)
HYDROGEN SULFIDE	Inhalation Lethality: 4 hour(s) LC50 444 ppm (Gas) (Rat)
NAPHTHALENE	Inhalation Lethality: 4 hour(s) LC50 > 0.4 mg/l (Max attainable vapor conc.) (Rat); Oral Lethality: LD50 533 mg/kg (Mouse)

## OTHER INFORMATION

### For the product itself:

Target Organs Repeated Exposure: Blood, Liver, Spleen, Thymus

Vapor/aerosol concentrations above recommended exposure levels are irritating to the eyes and respiratory tract, may cause headaches, dizziness, anesthesia, drowsiness, unconsciousness and other central nervous system effects including death.

May cause central nervous system disorder (e.g., narcosis involving a loss of coordination, weakness, fatigue, mental confusion and blurred vision) and/or damage.

Small amounts of liquid aspirated into the lungs during ingestion or from vomiting may cause chemical pneumonitis or pulmonary edema. Very high exposure (confined spaces / abuse) to light hydrocarbons may result in abnormal heart rhythm (arrhythmias). Concurrent high stress levels and/or co-exposure to high levels of hydrocarbons (above occupational exposure limits), and to heart-stimulating substances like epinephrine, nasal decongestants, asthma drugs, or cardiovascular drugs may initiate arrhythmias.

Crude oil: Contains polycyclic aromatic compounds (PACs). Prolonged and / or repeated exposure by skin or inhalation of certain PACs may cause cancer of the skin, lung, and of other sites of the body. In animal studies, some crudes produced skin tumors in mice, while other crudes produced no tumors. Developmental studies of crude oil in lab animals showed reduced fetal weight and increased fetal resorptions at maternally toxic levels. Repeated dermal exposure to crude oils in rats resulted in toxicity to the blood, liver, thymus, and bone marrow.

Product Name: SAN ARDO CRUDE OIL

Revision Date: 17 Mar 2015

Page 11 of 16

**Contains:**

**BENZENE:** Caused cancer (acute myeloid leukemia and myelodysplastic syndrome), damage to the blood-producing system, and serious blood disorders in human studies. Caused genetic effects and effects on the immune system in laboratory animal and some human studies. Caused toxicity to the fetus and cancer in laboratory animal studies.

**HYDROGEN SULFIDE :** Chronic health effects due to repeated exposures to low levels of H<sub>2</sub>S have not been established. High level (700 ppm) acute exposure can result in sudden death. High concentrations will lead to cardiopulmonary arrest due to nervous system toxicity and pulmonary edema. Lower levels (150 ppm) may overwhelm sense of smell, eliminating warning of exposure. Symptoms of overexposure to H<sub>2</sub>S include headache, fatigue, insomnia, irritability, and gastrointestinal problems. Repeated exposures to approximately 25 ppm will irritate mucous membranes and the respiratory system and have been implicated in some eye damage.

**NAPHTHALENE:** Exposure to high concentrations of naphthalene may cause destruction of red blood cells, anemia, and cataracts. Naphthalene caused cancer in laboratory animal studies, but the relevance of these findings to humans is uncertain.

**N-HEXANE:** Prolonged and/or repeated exposures to n-Hexane can cause progressive and potentially irreversible damage to the peripheral nervous system (e.g. fingers, feet, arms, legs, etc.). Simultaneous exposure to Methyl Ethyl Ketone (MEK) or Methyl Isobutyl Ketone (MIBK) and n-Hexane can potentiate the risk of adverse effects from n-Hexane on the peripheral nervous system. n-Hexane has been shown to cause testicular damage at high doses in male rats. The relevance of this effect for humans is unknown.

**TOLUENE :** Concentrated, prolonged or deliberate inhalation may cause brain and nervous system damage. Prolonged and repeated exposure of pregnant animals (> 1500 ppm) have been reported to cause adverse fetal developmental effects.

**ETHYLBENZENE:** Caused cancer in laboratory animal studies. The relevance of these findings to humans is uncertain.

**The following ingredients are cited on the lists below:**

Chemical Name	CAS Number	List Citations
NAPHTHALENE	91-20-3	2, 5
ETHYL BENZENE	100-41-4	5
BENZENE	71-43-2	1, 3, 6

--REGULATORY LISTS SEARCHED--

1 = NTP CARC  
2 = NTP SUS

3 = IARC 1  
4 = IARC 2A

5 = IARC 2B  
6 = OSHA CARC

**SECTION 12**

**ECOLOGICAL INFORMATION**

The information given is based on data available for the material, the components of the material, and similar materials.

**ECOTOXICITY**

Material -- Expected to be toxic to aquatic organisms. May cause long-term adverse effects in the aquatic environment.

**MOBILITY**

More volatile component -- Highly volatile, will partition rapidly to air. Not expected to partition to sediment and wastewater solids.

Less volatile component -- Low solubility and floats and is expected to migrate from water to the land.

Product Name: SAN ARDO CRUDE OIL

Revision Date: 17 Mar 2015

Page 12 of 16

Expected to partition to sediment and wastewater solids.

## PERSISTENCE AND DEGRADABILITY

### Biodegradation:

Low molecular wt. component -- Expected to be inherently biodegradable

High molecular wt. component -- Expected to biodegrade slowly.

### Photolysis:

More water soluble component -- Expected to degrade at a moderate rate in water when exposed to sunlight.

### Atmospheric Oxidation:

More volatile component -- Expected to degrade rapidly in air

## BIOACCUMULATION POTENTIAL

Components -- Has the potential to bioaccumulate.

## ECOLOGICAL DATA

### Ecotoxicity

Test	Duration	Organism Type	Test Results
Aquatic - Acute Toxicity	48 hour(s)	Invertebrate	EC50 10 - 100 mg/l: data for similar materials

## SECTION 13

## DISPOSAL CONSIDERATIONS

Disposal recommendations based on material as supplied. Disposal must be in accordance with current applicable laws and regulations, and material characteristics at time of disposal.

## DISPOSAL RECOMMENDATIONS

Product is suitable for burning in an enclosed controlled burner for fuel value or disposal by supervised incineration at very high temperatures to prevent formation of undesirable combustion products.

## REGULATORY DISPOSAL INFORMATION

RCRA Information: Disposal of unused product may be subject to RCRA regulations (40 CFR 261). Disposal of the used product may also be regulated due to ignitability, corrosivity, reactivity or toxicity as determined by the Toxicity Characteristic Leaching Procedure (TCLP). Potential RCRA characteristics:

TCLP (BENZENE)

**Empty Container Warning** Empty Container Warning (where applicable): Empty containers may contain residue and can be dangerous. Do not attempt to refill or clean containers without proper instructions. Empty drums should be completely drained and safely stored until appropriately reconditioned or disposed. Empty containers should be taken for recycling, recovery, or disposal through suitably qualified or licensed contractor and in accordance with governmental regulations. DO NOT PRESSURISE, 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.

## SECTION 14

## TRANSPORT INFORMATION

Product Name: SAN ARDO CRUDE OIL

Revision Date: 17 Mar 2015

Page 13 of 16

## LAND (DOT)

**Proper Shipping Name:** PETROLEUM SOUR CRUDE OIL, FLAMMABLE, TOXIC

**Hazard Class & Division:** 3

**ID Number:** 3494

**Packing Group:** III

**ERG Number:** 131

**Label(s):** 3 (6.1)

**Transport Document Name:** UN3494, PETROLEUM SOUR CRUDE OIL, FLAMMABLE, TOXIC, 3 (6.1), PG III

## LAND (TDG)

**Proper Shipping Name:** PETROLEUM SOUR CRUDE OIL, FLAMMABLE, TOXIC

**Hazard Class & Division:** 3 (6.1)

**UN Number:** 3494

**Packing Group:** III

Footnote: If shipped over water, product TDG classification as shown below for SEA (IMDG).

## SEA (IMDG)

**Proper Shipping Name:** PETROLEUM SOUR CRUDE OIL, FLAMMABLE, TOXIC

**Hazard Class & Division:** 3

**EMS Number:** F-E, S-E

**UN Number:** 3494

**Packing Group:** III

**Marine Pollutant:** Yes

**Label(s):** 3 (6.1)

**Transport Document Name:** UN3494, PETROLEUM SOUR CRUDE OIL, FLAMMABLE, TOXIC, 3 (6.1), PG III, MARINE POLLUTANT

## AIR (IATA)

**Proper Shipping Name:** PETROLEUM SOUR CRUDE OIL, FLAMMABLE, TOXIC

**Hazard Class & Division:** 3

**UN Number:** 3494

**Packing Group:** III

**Label(s) / Mark(s):** 3 (6.1)

**Transport Document Name:** UN3494, PETROLEUM SOUR CRUDE OIL, FLAMMABLE, TOXIC, 3, PG III, (6.1)

## SECTION 15

## REGULATORY INFORMATION

**OSHA HAZARD COMMUNICATION STANDARD:** This material is considered hazardous in accordance with OSHA HazCom 2012, 29 CFR 1910.1200.

**Listed or exempt from listing/notification on the following chemical inventories:** AICS, DSL, ENCS, IECSC, KECI, PICCS, TSCA

**EPCRA SECTION 302:** This material contains no extremely hazardous substances.

Product Name: SAN ARDO CRUDE OIL

Revision Date: 17 Mar 2015

Page 14 of 16

**CERCLA:** This material is not subject to any special reporting under the requirements of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). Contact local authorities to determine if other reporting requirements apply.

**SARA (311/312) REPORTABLE HAZARD CATEGORIES:** Fire. Immediate Health. Delayed Health.

**SARA (313) TOXIC RELEASE INVENTORY:**

Chemical Name	CAS Number	Typical Value
POLYNUCLEAR AROMATIC HYDROCARBONS		> 0.1%
ETHYL BENZENE	100-41-4	0.1 - < 1%
BENZENE	71-43-2	1 - < 5%
TOLUENE	108-88-3	1 - < 5%
NAPHTHALENE	91-20-3	1 - < 5%
N-HEXANE	110-54-3	1 - < 5%
CYCLOHEXANE	110-82-7	1 - < 5%
XYLENES	1330-20-7	1 - < 5%
PETROLEUM CRUDE OIL	8002-05-9	100 %

The following ingredients are cited on the lists below:

Chemical Name	CAS Number	List Citations
BENZENE	71-43-2	1, 2, 4, 10, 11, 13, 15, 16, 17, 18, 19
CYCLOHEXANE	110-82-7	1, 4, 13, 16, 17, 18, 19
ETHYL BENZENE	100-41-4	1, 4, 10, 17, 19
HYDROGEN SULFIDE	7783-06-4	1, 4
N-HEXANE	110-54-3	1, 4, 13, 16, 17, 18, 19
NAPHTHALENE	91-20-3	1, 4, 10, 13, 16, 17, 18, 19
PETROLEUM CRUDE OIL	8002-05-9	4, 13, 16, 17, 18, 19
POLYNUCLEAR AROMATIC HYDROCARBONS		18
TOLUENE	108-88-3	1, 4, 11, 13, 15, 16, 17, 18, 19
XYLENES	1330-20-7	1, 4, 13, 15, 16, 17, 18, 19

--REGULATORY LISTS SEARCHED--

- |               |                  |                   |             |
|---------------|------------------|-------------------|-------------|
| 1 = ACGIH ALL | 6 = TSCA 5a2     | 11 = CA P65 REPRO | 16 = MN RTK |
| 2 = ACGIH A1  | 7 = TSCA 5e      | 12 = CA RTK       | 17 = NJ RTK |
| 3 = ACGIH A2  | 8 = TSCA 6       | 13 = IL RTK       | 18 = PA RTK |
| 4 = OSHA Z    | 9 = TSCA 12b     | 14 = LA RTK       | 19 = RI RTK |
| 5 = TSCA 4    | 10 = CA P65 CARC | 15 = MI 293       |             |

Code key: CARC=Carcinogen; REPRO=Reproductive

**SECTION 16**

**OTHER INFORMATION**

This warning is given to comply with California Health and Safety Code 25249.6 and does not constitute an admission

Product Name: SAN ARDO CRUDE OIL

Revision Date: 17 Mar 2015

Page 15 of 16

or a waiver of rights. This product contains a chemical known to the State of California to cause cancer, birth defects, or other reproductive harm.

N/D = Not determined, N/A = Not applicable

**KEY TO THE H-CODES CONTAINED IN SECTION 3 OF THIS DOCUMENT (for information only):**

H220: Extremely flammable gas; Flammable Gas, Cat 1  
H225: Highly flammable liquid and vapor; Flammable Liquid, Cat 2  
H226: Flammable liquid and vapor; Flammable Liquid, Cat 3  
H280: Contains gas under pressure; may explode if heated; Pressurized Gas  
H302: Harmful if swallowed; Acute Tox Oral, Cat 4  
H303: May be harmful if swallowed; Acute Tox Oral, Cat 5  
H304: May be fatal if swallowed and enters airways; Aspiration, Cat 1  
H312: Harmful in contact with skin; Acute Tox Dermal, Cat 4  
H315: Causes skin irritation; Skin Corr/Irritation, Cat 2  
H319(2A): Causes serious eye irritation; Serious Eye Damage/Irr, Cat 2A  
H320(2B): Causes eye irritation; Serious Eye Damage/Irr, Cat 2B  
H330(2): Fatal if inhaled; Acute Tox Inh, Cat 2  
H332: Harmful if inhaled; Acute Tox Inh, Cat 4  
H335: May cause respiratory irritation; Target Organ Single, Resp Irr  
H336: May cause drowsiness or dizziness; Target Organ Single, Narcotic  
H340(1B): May cause genetic defects; Germ Cell Mutagenicity, Cat 1B  
H350(1A): May cause cancer; Carcinogenicity, Cat 1A  
H350(1B): May cause cancer; Carcinogenicity, Cat 1B  
H351: Suspected of causing cancer; GHS Carcinogenicity, Cat 2  
H361(D): Suspected of damaging the unborn child; Repro Tox, Cat 2 (Develop)  
H361(F): Suspected of damaging fertility; Repro Tox, Cat 2 (Fertility)  
H372: Causes damage to organs through prolonged or repeated exposure; Target Organ, Repeated, Cat 1  
H373: May cause damage to organs through prolonged or repeated exposure; Target Organ, Repeated, Cat 2  
H400: Very toxic to aquatic life; Acute Env Tox, Cat 1  
H401: Toxic to aquatic life; Acute Env Tox, Cat 2  
H410: Very toxic to aquatic life with long lasting effects; Chronic Env Tox, Cat 1  
H411: Toxic to aquatic life with long lasting effects; Chronic Env Tox, Cat 2

**THIS SAFETY DATA SHEET CONTAINS THE FOLLOWING REVISIONS:**

Updates made in accordance with implementation of GHS requirements.

**THIS MSDS COVERS THE FOLLOWING MATERIALS:** CRUDE OIL SOUR ( "Sour" applied by definition of Society of Petroleum Engineers for oils containing sulfur compounds >1%)

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Product Name: SAN ARDO CRUDE OIL

Revision Date: 17 Mar 2015

Page 16 of 16

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Internal Use Only

MHC: 1A, 0, 0, 2, 1, 1

PPEC: DVF

DGN: 2018204VUS (1022045)

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**1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION**

**Product Identifier:** CHRISTINA LAKE DILBIT BLEND (CDB)  
**Chemical Description:** A naturally occurring mixture of paraffins, naphthalenes, aromatic hydrocarbons and small amounts of sulphur and nitrogen compounds mixed with condensate  
**Product Use:** Process stream, fuels and lubricants production  
**Manufacturer/Supplier:** CENOVUS ENERGY INC.  
 500 Centre Street SE, PO Box 766  
 Calgary, AB T2P 0M5  
**Prepared By:** Cenovus Energy Inc. Health and Safety  
**Phone Number:** 1-403-766-2000  
**Emergency Telephone:** Cenovus 1-877-458-8080, CANUTEC 1-613-996-6666 (Canada),  
 CHEMTREC 1-800-424-9300

**2. HAZARDS IDENTIFICATION**

**Hazard Classification:**

Flammable Liquids – Category 1	Carcinogenicity – Category 1
Acute Toxicity – Category 2	Specific Target Organ Toxicity Single Exposure – Category 3
Skin Irritation – Category 2	Specific Target Organ Toxicity Repeat Exposure – Category 2
Eye Irritation – Category 2A	Aquatic Toxicant – Category 3
Toxic to Reproduction – Category 2	
Germ Cell Mutagenicity – Category 2	

**Emergency Overview:** Danger. Extremely flammable liquid and vapour. Harmful if swallowed or inhaled. May cause respiratory and mild skin irritation. May cause serious eye irritation. May cause drowsiness or dizziness. May cause damage to organs (liver, kidneys, blood, nervous system and skin) through prolonged or repeated exposure. The benzene component of this material may cause cancer and is suspected of causing genetic effects. Harmful to aquatic life.

*Sulfur compounds in this material may decompose to release hydrogen sulfide gas which may accumulate to potentially lethal concentrations in enclosed air spaces.*



**Prevention:**

Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Keep container tightly closed. Keep cool. Keep away from heat, sparks, open flames and hot surfaces. No smoking. Take precautionary measures against static discharge. Ground/bond container and receiving equipment. Use explosion-proof equipment and non-sparking tools where conditions may generate an explosive atmosphere. Wash exposed skin thoroughly after handling. Do not eat, drink or smoke when using this product. Do not breathe vapours. Use only outdoors or in a well-ventilated area. Wear personal protective equipment appropriate for the task: gloves, eyewear, and clothing. In case of inadequate ventilation wear respiratory protection. Avoid release to the environment.

**Response:** IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a poison center or a doctor if you feel unwell.  
 IF exposed (benzene) or concerned: Get medical advice/attention.  
 IF IN EYES: Rinse caustiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists get medical advice/attention.  
 IF ON SKIN (or hair): Take off contaminated clothing immediately. Rinse skin with water/shower. Wash with plenty of soap and water. If skin irritation occurs, get medical advice/attention.  
 In case of fire: Use water spray, fog or fire-fighting foam to extinguish.

**Storage:** Store locked up, in a cool, well-ventilated place. Keep container tightly closed.

**Disposal:** Dispose of contents/container in accordance with local/regional/national/international regulations.

**3. COMPOSITION/INFORMATION ON INGREDIENTS**

Hazardous Ingredients	CAS Number	Approximate Concentration <sup>1</sup>
Crude Oil, Petroleum	8002-05-9	100
<b>Which contains:</b>		
Bitumen	8052-42-4	50 - 90
Hydrcarbon Diluent	64741-47-5	10 – 50
Benzene	71-43-2	0.03 – 0.3
Hydrogen Sulfide <sup>2</sup>	7783-06-04	<0.01

<sup>1</sup> Concentrations are percent by weight unless ingredient is a gas, which are percent by volume.

<sup>2</sup> Hydrogen Sulfide in the vapour phase may contain higher concentrations.

**4. FIRST AID MEASURES**

**Inhalation:** Remove person to fresh air. If person is not breathing, give artificial respiration. If necessary, give additional oxygen once breathing is restored if trained to do so. Get prompt medical attention.

**Eye Contact:** Remove contact lenses if present and easily done. Flush eyes with large amounts of lukewarm water for 15 minutes, lifting upper and lower lids at intervals. Seek medical attention if irritation, redness or swelling occurs.

**Skin Contact:** Remove contaminated clothing. Wash affected skin thoroughly with soap and water. Seek medical attention if irritation irritation, redness or swelling occurs or large area of contact.

**Ingestion:** DO NOT INDUCE VOMITING. Do not swallow liquids. Get prompt medical attention. If spontaneous vomiting occurs, lean person forward to reduce risk of aspiration. Monitor for breathing difficulties. Rinse product out of mouth.

**Most important symptoms and effects, both acute and delayed:** Effects of overexposure may include irritation of the respiratory tract, digestive tract, skin and eyes. May cause nausea, vomiting and signs of nervous system depression (e.g., headaches, drowsiness, dizziness, loss of coordination, disorientation and fatigue). Overexposure to hydrogen sulfide gas can induce immediate collapse, with loss of breathing and a high probability of death.

**5. FIRE FIGHTING MEASURES**

**General Fire Hazards:**

See [Section 9](#) for Physical and Chemical Properties related to flammability.

Vapours may be ignited rapidly when exposed to heat, spark, open flame or other source of ignition. When mixed with air and exposed to an ignition source, flammable vapours can burn in the open or explode in confined spaces. Being heavier than air, vapours may travel long distances to an ignition source and flash back. Runoff to sewer may cause fire or explosion hazard.

**Hazardous Combustion Products:**

Carbon monoxide, carbon dioxide, sulfur oxides, nitrogen oxides, smoke particles.

**Extinguishing Media:**

Foam, water fog or spray, carbon dioxide (CO<sub>2</sub>), dry chemical. Use water spray to cool fire-exposed containers, and to disperse vapours if spill has not ignited. Water fog or spray may not extinguish the fire. Cut off fuel and allow flame to burn out.

**Firefighting Equipment/Instructions:**

Small fires in the incipient (beginning) stage may typically be extinguished using handheld portable fire extinguishers and other firefighting equipment. Firefighting activities that may result in potential exposure to high heat, smoke or toxic by-products of combustion should require NIOSH/MSHA- approved pressure-demand self-contained breathing apparatus with full facepiece and full protective clothing. Isolate area around container involved in fire. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied firefighting foam.

**6. ACCIDENTAL RELEASE MEASURES**

**Notification Procedures**

In the event of a spill or accidental release, notify relevant authorities in accordance with applicable regulations.

**Personal precautions and Protective Equipment:**

Avoid direct contact with material. Stay upwind of release; isolate the immediate hazard area; and keep unnecessary and unprotected people away. Response and clean-up crews must be properly trained and must utilize proper protective equipment (see [Section 8](#)). Use water spray to cool containers. Eliminate all sources of ignition. Provide explosion-proof clearing ventilation, if possible.

**Environmental precautions:** Prevent material from entering soil, waterways, drains, sewers, or confined areas.

**Cleanup measures:** Stop leak if safe to do so. Dyke and vacuum or take up with sand or other oil absorbing materials. Carefully pump, shovel, scoop or sweep up into a waste container for recycling or disposal.

Contact appropriate regulatory authorities for disposal requirements (see [Section 13](#)). Notify the appropriate regulatory authorities of reportable releases (see [Section 15](#)).

**7. HANDLING AND STORAGE**

**Handling:** Handle as a flammable liquid. Keep away from heat, sparks, and open flame. Wear appropriate personal protective equipment. Avoid contact with liquid. Avoid inhalation. Do not enter storage areas or confined spaces unless adequately ventilated. Bond and ground all transfers. Avoid sparking conditions. Wash hands and face after handling and before eating, drinking or smoking.

**Storage:** Store material in a cool, well-ventilated area away from heat, hot metal surfaces and ignition sources. Use approved containers only. Empty product containers or vessels may contain explosive vapours. Do not pressurize, cut, heat, weld or expose such containers to sources of ignition. Separate from incompatible material (see [Section 10](#)).

**Caution:** Hydrogen sulfide may accumulate in headspaces of tanks and other equipment, even when concentrations in the liquid product are low. Factors increasing this hazard potential include heating, agitation and contact of the liquid with acid or acid salts. Assess the exposure risk by gas monitoring. Wear air supplying breathing apparatus if necessary. Overexposure to hydrogen sulfide may cause dizziness, headache, nausea and possibly unconsciousness and death.

**8. EXPOSURE CONTROLS/PERSONAL PROTECTION**
**Occupational Exposure Limits (8 Hour)**

Hazardous Ingredient	Alberta	Saskatchewan	OSHA PEL	ACGIH TLV
Petroleum Crude Oil	300 ppm; [as VM&P naphtha]	300 ppm 500 ppm (15min) [as VM&P naphtha]	500 ppm; [as petroleum distillates/naphtha]	--
Benzene	0.5 ppm; 2.5 ppm (15min), Skin	--	1 ppm; 5 ppm STEL; Petroleum Industry: 10 ppm; 25 ppm (C)	0.5 ppm; 2.5 ppm STEL Skin
Hydrogen Sulfide	10 ppm; 15 ppm (C)	10 ppm; 15 ppm (15min)	20 ppm (C)	1 ppm, 5 ppm STEL

**Engineering Controls:** Use only in well-ventilated areas. Local exhaust ventilation required in confined areas. Equipment must be explosion proof.

**Hygiene Measures:** Emergency eye wash capability should be available in the near proximity to operations presenting a potential splash exposure. Avoid repeated and/or prolonged skin exposure. Wash hands with soap and water before eating, drinking, smoking, or using toilet facilities. Waterless hand cleaners are effective. Promptly remove contaminated clothing and launder before reuse. Use care when laundering to prevent the formation of flammable vapours which could ignite via washer or dryer. Consider the need to discard contaminated leather shoes and gloves.

**Personal Protection**

**Respirator:** Where concentrations may exceed exposure limits, use full-face, positive pressure self-contained breathing apparatus; full-face, positive pressure supplied-air breathing apparatus; or cartridge air-purifying respirator approved for organic vapours (note: air-purifying respirator is not suitable for hydrogen sulfide, oxygen-deficient or IDLH situations).

**Gloves:** Chemical-resistant gloves: Viton (Nitrile or neoprene adequate for short exposure to liquid).

**Eyewear:** Chemical splash goggles. A face shield may also be necessary, depending on handling conditions.

**Footwear:** As per safety policy.

**Clothing:** As per fire protection policy.

**9. PHYSICAL AND CHEMICAL PROPERTIES**

<b>Physical State:</b>	Liquid	<b>Appearance:</b>	Brown/black liquid
<b>Odour:</b>	Hydrocarbon-like	<b>Odour Threshold (ppm):</b>	Not Available
<b>Specific Gravity:</b>	0.91-0.94	<b>pH:</b>	Not Available
<b>Vapour Pressure (mmHg):</b>	375-525@ 38°C	<b>RVP (kPa):</b>	50-70
<b>Vapour Density (air=1):</b>	2.5-5.0 (estimated)	<b>Evaporation Rate:</b>	Not Available
<b>Boiling Range (°C):</b>	-1-400+	<b>Initial Boiling Pt. (°C, D86):</b>	28
<b>Flash Point (°C) &amp; Method:</b>	<-35 (PMCC)	<b>Freezing Pt. (°C):</b>	<-60
<b>Upper Explosive Limit (% v/v):</b>	8 (estimated)	<b>Lower Explosive Limit (% v/v):</b>	0.8 (estimated)
<b>Auto-Ignition Temp. (°C):</b>	250 (estimated)	<b>Sensitivity to Static Discharge:</b>	Yes, at normal temperatures.
<b>Sensitivity to Impact:</b>	No	<b>Solubility in Water:</b>	Negligible
<b>Octanol/Water Coefficient:</b>	<0.1		

**10. STABILITY AND REACTIVITY**

**Chemical Stability:** Stable under normal, ambient conditions.

**Hazardous Reactions:** Not known to occur.

**Conditions to Avoid:** High temperatures, open flames, sparks, welding, smoking and other ignition sources.

**Incompatibility:** Incompatible with strong oxidizing agents (e.g. chlorine, peroxide).

**Hazardous Decomposition Products:** Carbon monoxide, carbon dioxide, sulfur oxides, smoke.

**11. TOXICOLOGICAL INFORMATION**
**Acute Exposure**

At concentrations above recommended exposure levels, vapour may cause irritation of eyes, nose and throat, dizziness and drowsiness. Contact with skin may cause irritation and possibly dermatitis. Contact of liquid with eyes may cause severe irritation or burns.

Ingestion may cause gastrointestinal disturbances, including irritation, nausea, vomiting and diarrhea, and central nervous system (brain) effects similar to alcohol intoxication.

In the case of over exposure to hydrogen sulfide by inhalation, tremors, convulsions, loss of consciousness, coma, respiratory arrest, and death may occur.

Hazardous Ingredients	Result	Species	Dose	Exposure
Petroleum	LD50 Oral	Rat	>4300 mg/kg	-
Crude Oil	LD50 Dermal	Rabbit	>2000 mg/kg	-
Benzene	LD50 Oral	Rat	1800 mg/kg	-
	LD50 Dermal	Rabbit	>8260 mg/kg	-
	LC50 Inhalation	Rat	14000 ppm	4 hours
Hydrogen Sulfide	LC50 Inhalation	Rat	444 ppm/ 0.701 mg/L	4 hours
	LC50 Inhalation	Mouse	335 ppm	4 hours

**Chronic Exposure**

May cause damage to organs (liver, kidneys, blood, nervous system and skin) through prolonged or repeated exposure. Due to presence of benzene, long term exposure may increase the risk of anemia and leukemia.

**Irritant:** Yes

**Skin Sensitization:** No

**Respiratory Sensitization:** No

**Carcinogenicity:** Yes

**Reproductive Toxicity:** Possibly

**Teratogenicity:** Possibly

**Mutagenicity:** Possibly

**Synergistic Materials/Products:** None reported

**Crude Oil**

IARC – Crude oil is not classifiable as to its carcinogenicity to humans (Group 3).

ACGIH, OSHA, US NTP – not listed as a carcinogen.

**Benzene**

ACGIH A1-Confirmed Human Carcinogen

IARC, OSHA, US NTP – There is sufficient evidence that benzene is carcinogenic to man.

**Hydrogen Sulfide**

Hydrogen sulfide is not considered to be mutagenic or a reproductive or developmental toxicant.

ACGIH, IARC, OSHA, US NTP – Hydrogen sulfide is not listed as a carcinogen.

**12. ECOLOGICAL INFORMATION**
**Ecotoxicity:**

Expected to be harmful to aquatic organisms. May cause long-term adverse effects in the aquatic environment. Keep out of sewers, drainage areas and waterways. Report spills and releases, in accordance with current applicable laws and regulations

**Biodegradation:**

Low molecular weight component expected to be inherently biodegradable

High molecular weight component expected to biodegrade slowly.

**Bioaccumulation:** Has the potential to bioaccumulate.

**Atmospheric Oxidation:** More volatile component expected to degrade rapidly in air.

**Photolysis:**

More water soluble component expected to degrade at a moderate rate in water when exposed to sunlight.

**Mobility:**

More volatile component, highly volatile, will partition rapidly to air. Not expected to partition to sediment and wastewater solids.

Less volatile component, low solubility and floats and is expected to migrate from water to the land. Expected to partition to sediment and wastewater solids.

**13. DISPOSAL CONSIDERATIONS**

**Waste Disposal:** Disposal must be in accordance with current applicable laws and regulations, and material characteristics at time of disposal.

Empty containers or liners may retain a residue and can be dangerous. Do not attempt to refill or clean containers without proper instructions. Empty drums should be completely drained and safely stored until appropriately reconditioned or disposed. Empty containers should be taken for recycling, recovery, or disposal through suitably qualified or licensed contractor and in accordance with governmental regulations.

**US EPA Waste Numbers**

D001 – Ignitability characteristic, D018 – Toxicity characteristic (Benzene) (Regulatory Level = 0.5 mg/L)

**14. TRANSPORT INFORMATION**

Regulatory Information	UN Number	Proper Shipping Name	Class	PG	Label	Additional Information
TDG	UN1267	Petroleum Crude Oil	3	I	Flammable Liquids	
DOT	UN1267	Petroleum Crude Oil	3	I	Flammable Liquid	49 CFR 173.150; 173.201; 173.243
IMDG	UN1267	Petroleum Crude Oil	3	I	Flammable Liquid	12°C, P001 EmS:F-E, S-E MARPOL Annex I
ICAO/IATA	UN1267	Petroleum Crude Oil	3	I	Flammable Liquid	ERG Code: 3L

**North American Emergency Response Guide Number:** 128

**TDG Emergency Response Assistance Plan:** ERP2-1933-006; 1-800-265-0212

**Latest Proof of Classification:** refer to <http://www.cenovus.com/contractor/msds.html>

**15. REGULATORY INFORMATION**

**Canadian Classification**

This product has been classified in accordance with the hazard criteria of the Hazardous Products Regulation (HPR) and the SDS contains all of the information required by the HPR.

**WHMIS Ingredient Disclosure List:**

Meets criteria for disclosure at 0.1% or greater of benzene.

**CEPA Domestic Substance List:** All components are either listed or exempt.

**US Federal and State Regulations**

The contents of this MSDS comply with the OSHA Hazard Communication Standard 29 CFR 1910.1200.

**CERCLA/SARA – Section 302 Extremely Hazardous Substances:** Hydrogen sulfide: 500 lbs TPQ.

**CERCLA/SARA 311-312 (Title III Hazard Categories):**

Hydrogen Sulfide – Fire, Immediate (Acute),

Produced Hydrocarbons – Fire, Sudden Release of Pressure, Immediate (Acute), Delayed (Chronic).

**CERCLA/SARA 313, Reportable Quantity:** Hydrogen sulfide: 100 lbs ; Benzene: 10 lbs; RCRA Code U019.

**Clean Air Act Section 112(b) Hazardous Air Pollutants:** Exempt.

**United States National Chemical Inventory:** All components are listed or exempted.

**California 65:** This product contains benzene a chemical known to the State of California to cause cancer and developmental harm.

**NFPA 704 Rating:** Flammability:3, Instability/Reactivity:1, Health:2

**16. OTHER INFORMATION**

**Guide to Abbreviations:** 15min = 15 minutes; ACGIH = American Conference of Governmental Hygienists; C = Ceiling; CAS = Chemical Abstracts Service Registry; CEPA = Canadian Environmental Protection Act; CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act cSt = centistokes; DOT = Department of Transport; EmS = Environmental Management System; ERG = Emergency Response Guide IARC = International Agency for Research on Cancer; ICAO/IATA = International Civil Aviation Organization/International Air Transport Association; IMDG = International Marine Dangerous Goods; GHS = Globally Harmonized System of Classification and Labeling of Chemicals; lbs = pounds; MARPOL = The International Convention for the Prevention of Pollution from Ships; mm<sup>2</sup>/sec = millimeters squared per second; OEL = Occupational Exposure Limit; OSHA = Occupational Safety and Health Administration; PEL = Permissible Exposure Limit; PG = Packing Group; Skin = danger of skin absorption; SARA = Superfund Amendments and Reauthorization Act; SDS = Safety Data Sheet; STEL = Short Term Exposure Limit; TDG = Transportation of Dangerous Goods; TLV = Threshold Limit Value; TWA = Time-Weighted Average; TPQ = Threshold Planning Quantity; US NTP = United States National Toxicology Program; WHMIS = Workplace Hazardous Materials Information System

**Section 1: PRODUCT AND COMPANY IDENTIFICATION**

**Product Name:** Dilbit  
**Synonyms:** Diluted Bitumen; AWB – Access Western Blend; Pipeline Sales Oil.  
**Product Use:** Base product for Petroleum Refining.  
**Manufacturer/Supplier:** MEG Energy Corp.  
 Christina Lake Regional Project  
 P.O Box 21008  
 Fort McMurray, AB  
 T9H 5B2  
**Phone Number:** 403-770-5596  
**Emergency Phone:** MEG Emergency Number: 1-800-575-1400  
 FOR EMERGENCIES INVOLVING DANGEROUS GOODS Call CANUTEC's  
 24-hr Number: 613-996-6666  
**Date of Preparation:** August 31, 2011

**Section 2: HAZARDS IDENTIFICATION**
**EMERGENCY OVERVIEW**

**DANGER**  
 HARMFUL OR FATAL IF SWALLOWED. CAN ENTER  
 LUNGS AND CAUSE DAMAGE. CANCER HAZARD – CAN  
 CAUSE CANCER. IRRITATING TO EYES AND SKIN.

**Colour:** Light to dark brown.  
**Physical State:** Liquid.  
**Odour:** Hydrocarbon.

WHMIS	Personal Protection Equipment	TDG (Ground)
		

**Potential Health Effects:** See Section 11 for more information.

**Likely Routes of Exposure:** Eye contact. Skin contact. Inhalation. Ingestion. Skin absorption.

**Eye:** Irritating to eyes. Signs/symptoms may include redness, swelling, pain, tearing, and blurred or hazy vision. Hydrogen sulphide may cause eye irritation at 1-20 ppm and acute conjunctivitis at higher concentrations. Above 50 ppm H<sub>2</sub>S, eye irritation may include symptoms of redness, severe swelling, tearing, sensitivity to light and the appearance of 'Halos' around lights.

**Skin:** Irritating to skin. Signs/symptoms may include localized redness, swelling, and itching.

**Ingestion:** Harmful or fatal: may cause lung damage if swallowed. Swallowing the liquid may cause aspiration into the lungs with the risk of chemical pneumonitis. May cause gastrointestinal irritation. Signs/symptoms may include abdominal pain, stomach upset, nausea, vomiting and diarrhea.

**Inhalation:** May cause respiratory tract irritation. Signs/symptoms may include cough, sneezing, nasal discharge, headache, hoarseness, and nose and throat pain. May cause headache, dizziness, confusion, loss of appetite and loss of consciousness. Inhalation of Toluene may result in peculiar skin sensations (e. g. pins and needles) or numbness. Hydrogen sulphide

may cause symptoms such as digestive upset and loss of appetite, loss of sense of smell and pulmonary edema. At 500-1000 ppm Hydrogen sulphide may cause respiratory paralysis, collapse and death without rescue.

**Chronic Effects:** See Section 11 for more information.

**Medical Conditions Aggravated By Exposure:** Not available.

**Target Organs:** Skin. Eyes. Gastrointestinal tract. Respiratory system. Lungs. Blood. Cardiovascular system. Bone marrow. Liver. Reproductive system. Nervous system.

**Potential Environmental Effects:** See Section 12 for more information.

This material is considered hazardous by the OSHA Hazard Communication Standard, (29 CFR 1910.1200).

### Section 3: COMPOSITION / INFORMATION ON INGREDIENTS

Component	CAS No.	Wt. %
Petroleum	8002-05-9	60 - 100
Hexane	110-54-3	5 - 10
Benzene	71-43-2	1 - 5
Toluene	108-88-3	1 - 5
Xylenes	1330-20-7	0.5 - 1.5
Benzene, ethyl-	100-41-4	0.1 - 1
Hydrogen sulfide (H <sub>2</sub> S)	7783-06-4	< 0.1

### Section 4: FIRST AID MEASURES

- Eye Contact:** Flush eyes with plenty of water for at least 15 minutes. If signs/symptoms persist, get medical attention.
- Skin Contact:** Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. If signs/symptoms develop, get medical attention.
- Ingestion:** Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention immediately.
- Inhalation:** Remove person to fresh air. If breathing has stopped apply artificial respiration. If signs/symptoms develop, get medical attention.
- General Advice:** In case of accident or if you feel unwell, seek medical advice immediately (show the label or MSDS where possible).
- Note to Physicians:** Symptoms may not appear immediately. For inhalation of Hydrogen Sulphide, consider oxygen.

### Section 5: FIRE FIGHTING MEASURES

**Flammability:** Flammable liquid by WHMIS criteria. Flammable liquid by OSHA criteria. Released vapours may form flammable/explosive mixtures. Vapours may travel considerable distances to ignition sources and cause a flash fire. Cool containing vessels with water jet in order to prevent pressure build-up, auto-ignition or explosion.

**Means of Extinction**

**Suitable Extinguishing Media:** Dry chemical, foam, water fog, carbon dioxide.

<b>Unsuitable Extinguishing Media:</b>	Do not use water except as a fog.
<b>Products of Combustion:</b>	Oxides of carbon. Oxides of sulphur. Aldehydes.
<b>Protection of Firefighters:</b>	Keep upwind of fire. Wear full fire fighting turn-out gear (full Bunker gear) and respiratory protection (SCBA). Hydrogen sulphide is heavier than air and may collect in low lying areas and confined spaces.
<b>Explosion Data</b>	
<b>Sensitivity to Mechanical Impact:</b>	This material is not sensitive to mechanical impact.
<b>Sensitivity to Static Discharge:</b>	This material is sensitive to static discharge at temperatures above the flash point.

**Section 6: ACCIDENTAL RELEASE MEASURES**

<b>Personal Precautions:</b>	Evacuate all unnecessary personnel. Stay upwind. Eliminate all ignition sources. Use personal protection recommended in Section 8. Isolate the hazard area and deny entry to unnecessary and unprotected personnel. Don full-face, positive pressure, self-contained breathing apparatus.
<b>Environmental Precautions:</b>	Keep out of drains, sewers, ditches, and waterways.
<b>Methods for Containment:</b>	Stop leak if without risk. Contain spill and absorb with inert absorbent. Large pools may be covered with foam to prevent vapour evolution. Do not flush to sewer or allow to enter waterways.
<b>Methods for Clean-Up:</b>	Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. Use clean non-sparking tools to collect absorbed material. Large spills should be removed with explosion proof vacuum equipment.
<b>Other Information:</b>	Dispose of in accordance with all federal, provincial and local regulations. Comply with federal, provincial, and local requirements for spill and/or release notification.

**Section 7: HANDLING AND STORAGE****Handling:**

Do not swallow. Do not get in eyes, or on skin. All equipment used when handling the product must be grounded. Handle and open container with care. When using do not eat or drink. Wash hands before eating, drinking, or smoking. Harmful concentrations of hydrogen sulfide (H<sub>2</sub>S) gas can accumulate in excavations and low-lying areas as well as the vapour space of storage and bulk transport compartments. See Section 8 for information on Personal Protective Equipment.

**Storage:**

Store in cool, dry, well-ventilated area away from incompatible materials, heat, and sources of ignition. All storage containers and pumping equipment should be grounded. Keep out of the reach of children. Head spaces in storage containers may contain toxic hydrogen sulphide gas. Structural materials and lighting and ventilation systems should be corrosion resistant.

**Section 8: EXPOSURE CONTROLS / PERSONAL PROTECTION****Exposure Guidelines****Component****Petroleum**

- (8002-05-9) **ACGIH:** Exposure by all routes should be carefully controlled to levels as low as possible (2009); For Mineral oil, excluding metal working fluids; Poorly and mildly refined  
(8002-05-9) **OSHA:** 500 ppm (TWA), 2000 mg/m<sup>3</sup> (TWA);  
400 ppm (TWA) [Vacated]

**Hexane**

- (110-54-3) **ACGIH:** 50 ppm (TWA); Skin, BEI (1996)  
(110-54-3) **OSHA:** 500 ppm (TWA), 1800 mg/m<sup>3</sup> (TWA); Skin.  
50 ppm (TWA) [Vacated]

**Benzene**

- (71-43-2) **ACGIH:** 0.5 ppm (TWA); 2.5 ppm (STEL); Skin; A1; BEI (1996)  
(71-43-2) **OSHA:** 1 ppm (TWA); 5 ppm (STEL);

**Toluene**

- (108-88-3) **ACGIH:** 20 ppm (TWA); A4; BEI (2006)  
(108-88-3) **OSHA:** 200 ppm (TWA); 300 ppm (C); 500 ppm (Peak) (Maximum duration: 10 minutes.)  
100 ppm (TWA); 150 ppm (STEL) [Vacated]

**Xylenes**

- (1330-20-7) **ACGIH:** 100 ppm (TWA); 150 ppm (STEL); A4; BEI (1992)  
(1330-20-7) **OSHA:** 100 ppm (TWA), 435 mg/m<sup>3</sup> (TWA);  
150 ppm (STEL) [Vacated]

**Benzene, ethyl-**

- (100-41-4) **ACGIH:** 20 ppm (TWA); A3; BEI (2010)  
(100-41-4) **OSHA:** 100 ppm (TWA), 435 mg/m<sup>3</sup> (TWA);  
125 ppm (STEL) [Vacated]

**Hydrogen sulfide (H<sub>2</sub>S)**

- (7783-06-4) **ACGIH:** 1 ppm (TWA); 5 ppm (STEL); (2009)  
(7783-06-4) **OSHA:** 20 ppm (C); 50 ppm (Peak) (Maximum duration: 10 mins. once only if no other meas. exp. occurs.)  
10 ppm (TWA); 15 ppm (STEL) [Vacated]

**PEL:** Permissible Exposure Limit  
**TLV:** Threshold Limit Value  
**TWA:** Time-Weighted Average  
**STEL:** Short-Term Exposure Limit  
**C:** Ceiling

**Engineering Controls:**

Use ventilation adequate to keep exposures (airborne levels of dust, fume, vapour, gas, etc.) below recommended exposure limits. Use explosion-proof ventilation equipment.

**Personal Protective Equipment****Eye/Face Protection:**

Wear safety glasses. Ensure that eyewash stations are close to the workstation location.

<b>Hand Protection:</b>	Wear impervious gloves. Consult manufacturer specifications for further information.
<b>Skin and Body Protection:</b>	Wear suitable protective clothing. Flame resistant clothing such as Nomex ® is recommended in areas where material is stored or handled.
<b>Respiratory Protection:</b>	If engineering controls and ventilation are not sufficient to control exposure to below the allowable limits then an appropriate NIOSH/MSHA approved air-purifying respirator or self-contained breathing apparatus (SCBA) should be used. Supplied air breathing apparatus must be used when oxygen concentrations are low or if airborne concentrations exceed the limits of the air-purifying respirators.
<b>General Hygiene Considerations:</b>	Handle according to established industrial hygiene and safety practices.

**Section 9: PHYSICAL AND CHEMICAL PROPERTIES**

<b>Appearance:</b>	Viscous liquid.
<b>Colour:</b>	Light to dark brown.
<b>Odour:</b>	Hydrocarbon.
<b>Odour Threshold:</b>	0.00047 ppm, (H <sub>2</sub> S)
<b>Physical State:</b>	Liquid.
<b>pH:</b>	Not available.
<b>Viscosity:</b>	60.7 cSt @ 40 °C
<b>Melting Point:</b>	Not available.
<b>Boiling Point:</b>	34.9 °C to 720 °C
<b>Flash Point:</b>	Not available.
<b>Evaporation Rate:</b>	Not available.
<b>Lower Flammability Limit:</b>	Not available.
<b>Upper Flammability Limit:</b>	Not available.
<b>Vapor Pressure:</b>	Not available.
<b>Vapor Density:</b>	> 1 (Air = 1)
<b>Specific Gravity:</b>	0.9178 (Water = 1) @ 15 °C
<b>Density:</b>	917.0 kg/m <sup>3</sup> @ 15 °C
<b>Solubility in Water:</b>	Insoluble.
<b>Coefficient of Water/Oil Distribution:</b>	Not measurable. Product is more soluble in oil.
<b>Auto-ignition Temperature:</b>	Not available.
<b>Percent Volatile, wt. %:</b>	Non-volatile.
<b>VOC content, wt. %:</b>	Not available.

**Section 10: STABILITY AND REACTIVITY**

- Stability:** Stable under normal storage conditions.
- Conditions of Reactivity:** Contact with incompatible materials. Sources of ignition. Exposure to heat.
- Incompatible Materials:** Strong oxidizers.
- Hazardous Decomposition Products:** Not available.
- Possibility of Hazardous Reactions:** None known.

**Section 11: TOXICOLOGICAL INFORMATION**
**EFFECTS OF ACUTE EXPOSURE**
**Component Toxicity**

Component	CAS No.	LD <sub>50</sub> oral	LD <sub>50</sub> dermal	LC <sub>50</sub>
Petroleum	8002-05-9	4300 mg/kg, (rat)	Not available.	Not available.
Hexane	110-54-3	25000 mg/kg, (rat)	Not available.	48000 ppm, (rat), 4H
Benzene	71-43-2	930 mg/kg, (rat)	>9400 µl/kg, (rabbit)	10000 ppm, (rat), 7H
Toluene	108-88-3	600 mg/kg, (rat)	14.1 mL/kg, (rabbit)	49000 mg/m <sup>3</sup> , 4H, (rat)
Xylenes	1330-20-7	>1700 mg/kg, (rat)	4300 mg/kg, (rabbit)	5000 ppm, (rat), 4H
Benzene, ethyl-	100-41-4	3500 mg/kg, (rat)	17800 µl/kg, (rabbit)	Not available.
Hydrogen sulfide (H <sub>2</sub> S)	7783-06-4	Not available.	Not available.	444 ppm, (rat),

**Eye:** Irritating to eyes. Signs/symptoms may include redness, swelling, pain, tearing, and blurred or hazy vision. Hydrogen sulphide may cause eye irritation at 1-20 ppm and acute conjunctivitis at higher concentrations. Above 50 ppm H<sub>2</sub>S, eye irritation may include symptoms of redness, severe swelling, tearing, sensitivity to light and the appearance of 'Halos' around lights.

**Skin:** Irritating to skin. Signs/symptoms may include localized redness, swelling, and itching.

**Ingestion:** Harmful or fatal: may cause lung damage if swallowed. Swallowing the liquid may cause aspiration into the lungs with the risk of chemical pneumonitis. May cause gastrointestinal irritation. Signs/symptoms may include abdominal pain, stomach upset, nausea, vomiting and diarrhea.

**Inhalation:** May cause respiratory tract irritation. Signs/symptoms may include cough, sneezing, nasal discharge, headache, hoarseness, and nose and throat pain. May cause headache, dizziness, confusion, loss of appetite and loss of consciousness. Inhalation of Toluene may result in peculiar skin sensations (e. g. pins and needles) or numbness. Hydrogen sulphide may cause symptoms such as digestive upset and loss of appetite, loss of sense of smell and pulmonary edema. At 500-1000 ppm Hydrogen sulphide may cause respiratory paralysis, collapse and death without rescue.

**Skin Sensitization:** Not hazardous by OSHA/WHMIS criteria.

**Respiratory Sensitization:** Not hazardous by OSHA/WHMIS criteria.

**EFFECTS OF CHRONIC EXPOSURE**

**Target Organs:** Skin. Eyes. Gastrointestinal tract. Respiratory system. Lungs. Blood. Cardiovascular system. Bone marrow. Liver. Kidneys. Reproductive system. Nervous system.

**Chronic Effects:** Hazardous by OSHA/WHMIS criteria. May cause chronic effects. Prolonged or repeated contact may dry skin and cause irritation. Repeated dermal application of crude oils in rats produced systemic toxicity in blood, liver, thymus and bone marrow. Chronic inhalation of n-Hexane may cause peripheral nerve disorders and central nervous system effects. Long term inhalation of Benzene, Toluene or Xylene vapours can result in bone marrow abnormalities with damage to blood forming tissues and may cause anemia and other blood cell abnormalities. Immunodepressive effects have also been reported. Repeated exposure of the eyes to high concentrations of Xylenes vapour may cause reversible eye damage. Hydrogen sulphide may reduce lung function; cause neurological effects such as headaches, nausea, depression and personality changes; eye and mucous membrane irritation; damage to cardiovascular system.

**Carcinogenicity:** Hazardous by OSHA/WHMIS criteria. May cause cancer. Lifetime skin painting studies in animals with whole crude oils and crude oil fractions have produced tumours in animals following prolonged and repeated skin contact. Chronic exposure to benzene has been associated with an increased incidence of leukemia and multiple myeloma (tumour composed of cells of the type normally found in the bone marrow).

**Component Carcinogenicity**

Component	ACGIH	IARC	NTP	OSHA	Prop 65
Petroleum	A2	Group 3	Not listed.	Not listed.	Not listed.
Hexane	Not listed.	Not listed.	Not listed.	Not listed.	Not listed.
Benzene	A1	Group 1	List 1	OSHA Carcinogen	Listed.
Toluene	A4	Group 3	Not listed.	Not listed.	Not listed.
Xylenes	A4	Group 3	Not listed.	Not listed.	Not listed.
Benzene, ethyl-	A3	Group 2B	Not listed.	OSHA Carcinogen	Listed.
Hydrogen sulfide (H <sub>2</sub> S)	Not listed.	Not listed.	Not listed.	Not listed.	Not listed.

**Mutagenicity:** Hazardous by OSHA/WHMIS criteria. May cause heritable genetic damage.

**Reproductive Effects:** Possible risk of impaired fertility. Studies exist which report a link to crude oil and reproductive effects including menstrual disorders.

**Developmental Effects**

**Teratogenicity:** Not hazardous by OSHA/WHMIS criteria.

**Embryotoxicity:** Hazardous by OSHA/WHMIS criteria. Possible risk of harm to the unborn child. Repeated dermal application of crude oils to pregnant rats produced maternal toxicity and fetal developmental toxicity and fetal tumours. Benzene and Xylene have caused adverse fetal effects in laboratory animals. Exposure to Toluene may affect the developing fetus.

**Toxicologically Synergistic Materials:** Not available.

**Section 12: ECOLOGICAL INFORMATION**

**Ecotoxicity:** 21 and 41 mg/l, 96 hr., Rainbow trout;  
2.7 and 4.1 mg/l, 96 hr., Mysid;  
122 and 528 ml/kg, 96 hr., Algae.

**Persistence / Degradability:** Not available.

**Bioaccumulation / Accumulation:** Not available.

**Mobility in Environment:** Not available.

**Section 13: DISPOSAL CONSIDERATIONS**

**Disposal Instructions:** Disposal should be in accordance with applicable regional, national and local laws and regulations. Local regulations may be more stringent than regional or national requirements.

**Section 14: TRANSPORTATION INFORMATION****CFR**

**Proper Shipping Name:** PETROLEUM CRUDE OIL, 3, UN 1267, I

**Class:** 3

**UN Number:** 1267

**Packing Group:** I

**Label Code:**

**TDG**

**Proper Shipping Name:** PETROLEUM CRUDE OIL, 3, UN 1267, I

**Class:** 3

**UN Number:** 1267

**Packing Group:** I

**Label Code:**

**Section 15: REGULATORY INFORMATION****Chemical Inventories****US (TSCA)**

The components of this product are in compliance with the chemical notification requirements of TSCA.

**Canada (DSL)**

The components of this product are in compliance with the chemical notification requirements of the NSN Regulations under CEPA, 1999.

**Federal Regulations**
**Canada**

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all the information required by the Controlled Products Regulations.

**WHMIS Classification:**

- Class B2 - Flammable Liquids.
- Class D2A - Carcinogenicity.
- Class D2A - Embryotoxicity.
- Class D2A - Mutagenicity.
- Class D2A - Chronic toxic effects.
- Class D2B - Skin irritant.
- Class D2B - Eye irritant.

**Hazard Symbols:**

**United States**

This MSDS has been prepared to meet the U.S. OSHA Hazard Communication Standard, 29 CFR 1910.1200.

**SARA Title III**

Component	Section 302 (EHS) TPQ (lbs.)	Section 304 EHS RQ (lbs.)	CERCLA RQ (lbs.)	Section 313	RCRA CODE	CAA 112( r ) TQ (lbs.)
Petroleum	Not listed.	Not listed.	Not listed.	Not listed.	Not listed.	Not listed.
Hexane	Not listed.	Not listed.	5000	313 & X	Not listed.	Not listed.
Benzene	Not listed.	Not listed.	10	313	U019	Not listed.
Toluene	Not listed.	Not listed.	1000	313	U220	Not listed.
Xylenes	Not listed.	Not listed.	100	313	U239	Not listed.
Benzene, ethyl-	Not listed.	Not listed.	1000	313	Not listed.	Not listed.
Hydrogen sulfide (H2S)	500	100	100	313s	U135	10000

**State Regulations**
**Massachusetts**

US Massachusetts Commonwealth's Right-to-Know Law (Appendix A to 105 Code of Massachusetts Regulations Section 670.000)

Component	CAS No.	RTK List
Petroleum	8002-05-9	Listed.
Hexane	110-54-3	Listed.
Benzene	71-43-2	E
Toluene	108-88-3	Listed.
Xylenes	1330-20-7	Listed.
Benzene, ethyl-	100-41-4	Listed.
Hydrogen sulfide (H2S)	7783-06-4	E

**Note:** E = Extraordinarily Hazardous Substance

**New Jersey**

US New Jersey Worker and Community Right-to-Know Act (New Jersey Statute Annotated Section 34:5A-5)

Component	CAS No.	RTK List
Petroleum	8002-05-9	SHHS
Hexane	110-54-3	SHHS
Benzene	71-43-2	SHHS
Toluene	108-88-3	SHHS
Xylenes	1330-20-7	SHHS
Benzene, ethyl-	100-41-4	SHHS
Hydrogen sulfide (H <sub>2</sub> S)	7783-06-4	SHHS

**Note:** SHHS = Special Health Hazard Substance

**Pennsylvania**

US Pennsylvania Worker and Community Right-to-Know Law (34 Pa. Code Chap. 301-323)

Component	CAS No.	RTK List
Petroleum	8002-05-9	Listed.
Hexane	110-54-3	Listed.
Benzene	71-43-2	ES
Toluene	108-88-3	E
Xylenes	1330-20-7	E
Benzene, ethyl-	100-41-4	E
Hydrogen sulfide (H <sub>2</sub> S)	7783-06-4	E

**Note:** E = Environmental Hazard; S = Special Hazardous Substance

**California**
**California Prop 65:** WARNING: This product contains chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

Component	Type of Toxicity
Benzene	developmental, male & cancer
Toluene	developmental & female
Benzene, ethyl-	cancer
Polycyclic Aromatic Hydrocarbons	cancer
Nickel	cancer

**Section 16: OTHER INFORMATION**
**Disclaimer:**

The information contained in this document applies to this specific material as supplied. It may not be valid for this material if it is used in combination with any other materials. It is the user's responsibility to satisfy oneself as to the suitability and completeness of this information for his own particular use.

**Expiry Date:** August 30, 2014

**Version:** 1.0

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