

Attachment E – Oil Properties

Ranges of physical properties for example oil types.

| Property | Units | Oil Types | | | | | | | |
|---------------------|---------------------------|-----------|-----------|-------------|--|---|--------------|-----------------|------------------|
| | | Gasoline | Diesel | Light Crude | Bakken Crude | Dilbit ¹ | Heavy Crude | IFO | Bunker C |
| Density | Kg/m ³ at 15°C | 720 | 840 | 780 to 880 | 794 to 840 | 824 to 941 | 880 to 1000 | 940 to 990 | 960 to 1040 |
| API Gravity | | 65 | 35 | 30 to 50 | 36.7 to 46.3, Avg. 41 ^{*NDPC} | 18 to 39 | 10 to 30 | 10 to 20 | 5 to 15 |
| Viscosity | mPas at 15°C | 0.5 | 2 | 5 to 50 | 3.37 cSt ^{*MUS} | 270.5* to 265,263 ** | 50 to 50,000 | 1,000 to 15,000 | 10,000 to 50,000 |
| Flash point | 15°C | -35 | 45 | -30 to 30 | <-20°F (<-29°C) ^{*MSDS} | <-35 ^{**m} to 58 ^{*m} | -30 to 60 | 80 to 100 | >100 |
| Solubility in Water | ppm | 200 | 40 | 10 to 50 | Negligible ^{*MSDS} | - | 5 to 30 | 10 to 30 | 1 to 5 |
| Pour Point | °C | NR | -35 to -1 | -40 to 30 | -40 | -30 ^{**m} to 15 ^{**m} | -40 to 30 | -10 to 10 | 5 to 20 |
| Interfacial Tension | mN/m at 15°C | 27 | 27 | 10 to 30 | ND | 27 ^{*m} to 150 ^{*m} | 15 to 30 | 25 to 30 | 25 to 35 |

Modified from Fingas (2013)¹; Values provided include weathered dilbit from tests; NA= not relevant; * Calculated for AWB; ** Calculated value for CL; ^{*m} Measured value of AWB; ^{**m} Measured value of CL

^{*NDPC} North Dakota Petroleum Council, ND= Not determined (MSDS (CoP) or NDPC); ^{*MSDS} = ConocoPhillips MSDS

^{*MHA} Mandan Hidatsa Arikara Nation Clean Fuel Refinery's comparisons of Synthetic crude and Bakken submitted to EPA in April, 2010 ([https://yosemite.epa.gov/oa/eab_web_docket.nsf/Filings%20By%20Appeal%20Number/C288B68AA94008B48525796B004CC9CC/\\$File/Response%20to%20Petitions%20for%20Review%20Exhibit%207%20...19.07.pdf](https://yosemite.epa.gov/oa/eab_web_docket.nsf/Filings%20By%20Appeal%20Number/C288B68AA94008B48525796B004CC9CC/$File/Response%20to%20Petitions%20for%20Review%20Exhibit%207%20...19.07.pdf)) last visited on 4/18/16

^{*MUS} Bakken Crude SDS by Musket (<http://desmogblog.com/sites/beta.desmogblog.com/files/Northern%20Plains%20Bakken%20Safety%20Data%20Sheet.pdf>) last visited on 4/18/16

¹ A Comparison of the Properties of Diluted Bitumen Crudes with other Oils POLARIS Applied Sciences, Inc. (2013). https://crrc.unh.edu/sites/crrc.unh.edu/files/comparison_bitumen_other_oils_polaris_2014.pdf

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