

Kearl Heavy Dilbit (KDB) Pool Quality Specifications

| Quality Specifications for Component Streams to the Kearl Heavy Dilbit (KDB) Pool | | | | | | | |
|---|-------------------|------|---------------------|----------|--------------------------------------|----------------------------|--|
| Quality | Units | Min | Max | Typical* | Referee Test Method | Test Frequency | Enbridge Response to Crude Not Meeting Quality Specs |
| Existing Specifications | | | | | | | |
| Density (15C) | kg/m ³ | ≥904 | ≤940 | 911.7 | ASTM D4052 | Frequency: AR ² | Delayed shut-in ⁶ |
| Viscosity | cSt | ≥100 | ≤350 | | ASTM D7042 | Frequency: QR ⁴ | Delayed shut-in ⁶ |
| Olefins, total ¹ | wt% | | <1 | | H NMR | Frequency: R ⁷ | Immediate shut-in ⁵ |
| Vapour Pressure (VPCR _{4.1} @ 37.8 C) | kPa | | 95,103 ⁸ | 29 | ASTM D6377 | Frequency: QR ⁴ | Immediate shut-in ⁵ |
| S&W | vol% | | 0.5 | | ASTM D4007 | Frequency: AR ² | Immediate shut-in ⁵ |
| Organic Chlorides ¹ | wppm | | <1 | | ASTM D4929 | Frequency: QR ⁴ | Immediate shut-in ⁵ |
| Component Typicals | | | | | | | |
| MCR | wt% | | | 8.91 | ASTM D4530 | Frequency: MR ³ | Notification Process ⁶ |
| TAN | mgKOH/g | | | 1.9 | ASTM D664 & ASTM D664 CCQTA modified | Frequency: MR ³ | Notification Process ⁶ |
| Nickel | mg/L | | | 39.5 | ASTM D5708-05 | Frequency: MR ³ | Notification Process ⁶ |
| Vanadium | mg/L | | | 109.9 | ASTM D5708-05 | Frequency: MR ³ | Notification Process ⁶ |
| Other Requirements | | | | | | | |
| ● Production method: Mined | | | | | | | |

*The estimated crude quality of a pool is based on a limited number of random composite samples of batches ex-Superior, timeframe July 2014 – March 2015.

Notes

1. For these properties, blending should not occur.
2. AR: All Receipts of KDB component streams tested using weekly composite.
3. MR: Monthly Random testing of KDB component streams.
4. QR: Quarterly Random testing of KDB component streams. Upon violation perform probational testing at Enbridge discretion.
5. Immediate shut-in upon identifying violation. Request third party Certificate of Analysis prior to subsequent receipt.
6. Upon violation, notification to applicable party, increase monitoring. Consequence based on outcome of increased monitoring.
- 7.R: Random testing. 2015 – Twice per year; 2016 onwards – Annually.
- 8.Max 95kPa May 1st through Sept 15th
Max 103kPa Sept 16th through Apr 30th