

## Conventional Heavy (CHV) Pool Quality Specifications

Quality Specifications for Component Streams to the Conventional Heavy (CHV) Pool								
Quality	Units	Min	Max	Typical*	Pool Typical Ex- Superior**	Referee Test Method	Test Frequency	Enbridge Response to Crude Not Meeting Quality Specs
<b>Existing Specifications</b>								
Density (15C)	kg/m <sup>3</sup>	≥904	≤940		927	ASTM D4052	Frequency: AR <sup>2</sup>	Delayed shut-in <sup>6</sup>
Viscosity	cSt	≥100	≤350			ASTM D7042	Frequency: QR <sup>4</sup>	Delayed shut-in <sup>6</sup>
Olefins, total <sup>1</sup>	mass%		<1			H NMR	Frequency: R <sup>7</sup>	Immediate shut-in <sup>5</sup>
Vapour Pressure (VPCR <sub>4.1</sub> @ 37.8 C)	kPa		70/76 <sup>8</sup>			ASTM D6377	Frequency: QR <sup>4</sup>	Immediate shut-in <sup>5</sup>
S&W	vol%		0.5			ASTM D4007	Frequency: AR <sup>2</sup>	Immediate shut-in <sup>5</sup>
Organic Chlorides <sup>1</sup>	wppm		<1			ASTM D4929	Frequency: QR <sup>4</sup>	Immediate shut-in <sup>5</sup>
<b>Component Typical</b>								
Resid (+980F)	mass% recovered			>39	41	ASTM D7169	Frequency: MR <sup>3</sup>	Notification Process <sup>6</sup>
TAN <sup>9</sup>	mgKOH/g		≤1.1	<1.1	1.1	ASTM D664	Frequency: MR <sup>3</sup>	Reclassification Process <sup>6</sup>
Nickel	mg/L			<70	52	ASTM D5708-05	Frequency: MR <sup>3</sup>	Notification Process <sup>6</sup>
Vanadium	mg/L			<160	126	ASTM D5708-05	Frequency: MR <sup>3</sup>	Notification Process <sup>6</sup>
Deemed Butane	vol%			<3	1.9	ASTM D7169	Frequency: MR <sup>3</sup>	Notification Process <sup>6</sup>

\*The expected or anticipated crude quality of individual components, understanding the fact that there may be, on occasion, variability outside of the range of the typical.

\*\*The estimated crude quality of a pool is based on a limited number of random composite samples of batches ex-Superior, timeframe May 2019 – May 2020.

### Notes

- For these properties, blending should not occur.
- AR: All Receipts of CHV component streams tested using weekly composite.
- MR: Monthly Random testing of CHV component streams.
- QR: Quarterly Random testing of CHV component streams. Upon violation perform probational testing at Enbridge discretion.
- Immediate shut-in upon identifying violation. Request third party Certificate of Analysis prior to subsequent receipt.
- Upon violation, notification to applicable party, increase monitoring. Consequence based on outcome of increased monitoring.
- R: Annual Random testing.
- Max 70kPa May 1<sup>st</sup> through November 30<sup>th</sup>  
Max 76kPa December 1<sup>st</sup> through April 30<sup>th</sup>
- Heavy High TAN Crude: TAN > 1.1 mgKOH/g  
Heavy Crude: TAN ≤ 1.1 mgKOH/g