Canadian and U.S. Crude Oil Pipelines and Refineries - 2017 ENBRIDGE NW UPGRADERS Syncrude (Fort McMurray)... Rainbow Lal Suncor (Fort McMurray) Sholl /Scotlands CNRL (Horizon)210 CANADA'S OIL & NATURAL GAS PRODUCERS 2016 CANADIAN CRUDE OIL PRODUCTION PRINCE GEORGE Fort McMurray 000 m³/d 000 b/d S.Korea - 4,600 miles **British Columbia** Prince George FOR INFORMATION CONTACT: (403) 267-1141 / CAPP.CA EDMONTON Imperial... Saskatchewan San Francisco - 800 miles Manitoba LLOYDMINSTER Northwest Territories Husky asphalt plant 25 Husky Upprader..... NEWFOUNDLAND & LABRADOR Western Canada Silver Range (Come by Chance) 115 **Total Canada** 3,850 VANCOUVER Theyron - sold to Parkland Fuel (Burnaby) 55 Co-op Refinery-Upgrader Come by Cha Complex PUGET SOUND Moose Jaw asphalt plant ... BP (Cherry Pf) 234 Phillips 66 (Ferndale) ... 101 Hebron Shell (Anacortes)......137 Terra Nova Tesoro (Anacortes)......120 TraiiStone (Tacoma)42 PIPELINE TOLLS FOR LIGHT OIL (USS PER BARREL) **GREAT FALLS** Great Falls Irving... Burnaby (Trans Mountain) BILLINGS Ouébec City MONTRÉAL/QUÉBEC Saint John CHS (Laurel) Samia (Enbridge) Surror Montréal (Enbridge) ExxonMobil... SARNIA Valero Imperial. Chicago (Enbridge) PADD IV Cushing (Enbridge) NANTICOKE Wood River (Enbridge/Mustang/Capwood) SAN FRANCISCO NORTH DAKOTA Tesorn (Mandan) 7/ USGC (Enbridge/Seaway) 6.301 - 8.856 Tesoro (Dickinson) 20 Phillips 66. **PADD V** Sinclair Oil (Sinclair)... ST. PAUL Guernsey (Express/Platte) Par Pacific (Newcastle) Flint Hills CHICAGO HollyFrontier (Cheyenne)... Tesoro Wood River (Express/Platte Wood River (Keystone) USGC (Keystone/Gulf Coast Ext.) 7.158 -11.55 San Francisco CA SALT LAKE CITY **PADD II** CHS (McPherson) PENNSYLVANIA Chevron... USEC to Montréal (Portland/Montréal) HallyFrontier (F) Dorado) HollyFrontier......45 DETROIT offeyville Res. (Coffeyville) ... DENVER/COMMERCE CITY Marathon St. James to Wood River (Capline/Capwood) Suncor..... Canton Newell Philadelphia NEWELL, WV PIPELINE TOLLS FOR HEAVY OIL (USS PER BARREL) **NEW JERSEY** Ergtn.......23 Philips 66 (Bayway)...... 241 lardisty to: Santa Maria Chicago (Enbridge) OKLAHOMA Axeon SP (Paulsboro)......74 BAKERSFIELD Catlettsburg Cushing (Enbridge Kern Oil Phillips 66 (Ponca City) DELAWARE Cushing (Keystone) San Joaquin... HollyFrontier (Tulsa) 129 PBF (Delaware City)....... 190 Los Angeles Coffeyville Res. (Wymnewood)70 RP-Husky (Toledo) Wood River (Enbridge/Mustang/Capwood) Valero (Ardmore) ... WOOD DIVED PRF (Toledo) Wood River (Keystone) 5.05**-6.00 LOS ANGELES Marathon (Canton).... BORGER/MCKEE Wood River (Express/Platte) Alon USA ... K Cushir Marathon (Catlettsburg). USGC (Enbridge/Seaway) 7.00† - 9.05 Tesoro (Carson/Wilmington) ... 380 MT VERNON Chevron .. USGC (Keystone/Gulf Coast Ext.) Countrymark. MEMPHIS **PADD III** PADD El Dorado herron (Pascagoula) NEW MEXICO/W. TEXAS Ergon (Vicksburg)..... Midland HollyFrontier (Artesia) Columet (Shrevecoorf) Alon (Big Spring)... TYLER Crude Refining Capacities as at June 1, 2017 ALABAMA Delek Tesoro (El Paso)... (thousand barrels per day) Hunt (Tuscaloosa) MISSISSIPPI RIVER Shell (Saraland) ExxonMobil (Baton Rouge) Petroleum Administration for PBF (Chalmette)... Defense District HOUSTON/TEXAS CITY Shell (Convent)... Shall Morrol THREE RIVERS Major Existing Crude Oil Pipelines carrying Valero (Nonco)... Marathon (Galveston)... 459 PORT ARTHUR/BEAUMONT LAKE CHARLES Valero (Meraux)... Canadian crude oil CORPUS CHRISTI Shell (Deer Park)......312 Corpus Christi FromMobil CITGO Phillips 66 (Belle Chasse). ExxonMobil ... Saudi Refining..... Phillins 66 Alon (Krotz Sorings) Selected Other Crude Oil Pipelines Phillips 66... LyondellBasell . Calcasieu..... Placid (Port Allen)... ... 275



2.85 million bpd

Barrels Per Day – one barrel = 42 US gallons

This is 119,700,000 gallons per day

One hundred and nineteen million, seven hundred thousand gallons per day

Construction History – upstream of Superior

- Line 1 is an 18 to 20 inch diameter light crude, refined products, and natural gas liquids pipeline installed in 1950 (construction started in 1949). 237,000 bpd.
- Line 2 is a 24 to 26 inch diameter light crude pipeline that was installed in 1957. 442,000 bpd.
- Line 3 was a 34 inch diameter crude oil pipeline that was originally installed in 1967; it was rebuilt in a new trench between 2020 and 2021 and is now 36 inches for most of its run and referred to as Line 93. It carries light, medium, and heavy crude. 760,000 bpd.
- Line 4 is a 36 to 48 inch diameter light, medium, and heavy crude oil pipeline that was installed in 2002. 796,000 bpd.
- Line 65 is a 20-inch diameter crude oil pipeline that was completed in 2010.
- The Alberta Clipper (Line 67) and Southern Lights (Line 13) pipelines are collocated 36- and 20-inch-diameter crude oil pipelines, respectively, that were co-constructed in 2009 and 2010. The Alberta Clipper was expanded twice through pressure increases and pumping station additions.

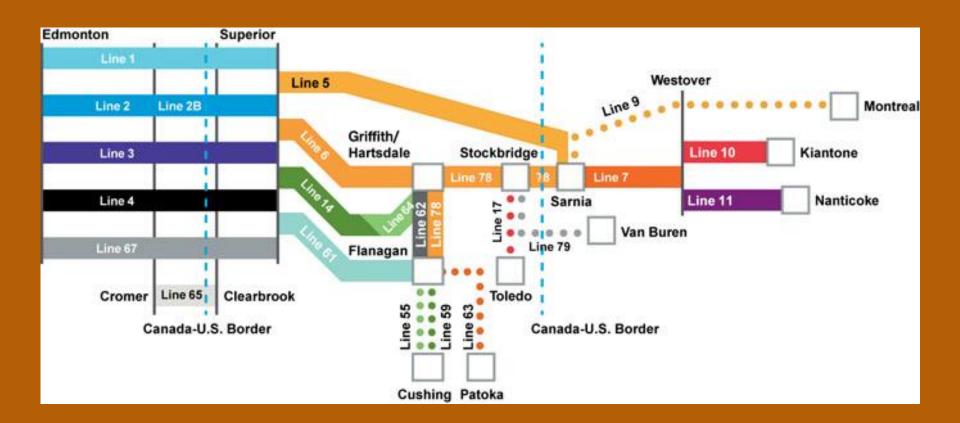
Construction History – downstream of Superior, northern route

- Line 5 is a 30-inch diameter light crude, light synthetic crude, and natural gas liquids pipeline completed in 1953. It splits briefly into two smaller pipelines to cross under the Straits of Mackinac. 540,000 bpd.
- Line 7 is a 20 inch diameter light, medium, and heavy crude pipeline completed in 1957. 180,000 bpd.
- Line 11 is a 16 to 20 inch light, medium, and heavy crude pipeline. 117,000 bpd.

Construction History – downstream of Superior, southern route

- Line 6 is a 34-inch diameter light, medium, and heavy crude pipeline. It has two sections – 6A is 34 inches in diameter and 6B is 30 inches in diameter. It was completed in 1969.
- Line 14/64 is a 24-inch diameter light and medium crude pipeline completed in 1998. 343,000 bpd.
- Line 61 is a 42 inch diameter light, medium, and heavy crude pipeline completed in 2009. 996,000 bpd





Key Points on the Mainline

- Edmonton, Alberta: the Canadian Mainline receives western Canadian crude oil from feeder pipelines.
- Hardisty, Alberta: the Canadian Mainline receives western Canadian crude oil from feeder pipelines. Hardisty is also a delivery point for the Canadian Mainline.
- Kerrobert, Saskatchewan: receipt and delivery point for the Canadian Mainline.
- Milden, Saskatchewan: delivery point for the Canadian Mainline.
- Stony Beach, Saskatchewan: delivery point for the Canadian Mainline.
- Regina, Saskatchewan: the Canadian Mainline receives U.S. crude oil from the Wascana Pipeline and connects to the Cooperative Refinery Complex.
- Cromer, Manitoba: the Canadian Mainline receives U.S. crude oil from the Enbridge Bakken pipeline and Canadian oil from the Westspur Pipeline.
- Near Gretna, Manitoba: the pipeline crosses the Canada-U.S. border and joins with the Enbridge Lakehead system. Delivery point for the Canadian Mainline.

- Clearbrook, Minnesota: the U.S. Mainline receives U.S. crude oil from the Enbridge North Dakota pipeline and connects with the Minnesota Pipe Line that can deliver crude oil to refineries in Minnesota and Wood River, Illinois.
- Superior, Wisconsin: delivery point for the U.S. Mainline.
- Lockport, Illinois: delivery point for the U.S. Mainline.
- Mokena, Illinois: receipt and delivery point for the U.S. Mainline.
- Flanagan, Illinois: delivery point for the U.S. Mainline.
- Griffith, Indiana: receipt and delivery point for the U.S. Mainline.
- Stockbridge, Michigan: receipt and delivery point for the U.S. Mainline.
- Rapid River, Michigan: delivery point for the U.S. Mainline.
- Marysville, Michigan: delivery point for the U.S. Mainline.
- Lewiston, Michigan: receipt point for the U.S. Mainline.
- Corunna/Sarnia, Ontario: the Mainline connects with Line 9, which delivers crude oil to Montreal, Quebec.
 Also a delivery point for the Canadian Mainline and connection with the Sarnia refineries.
- Westover: receipt and delivery point for the Canadian Mainline.
- Nanticoke: delivery point for the Canadian Mainline and connection with the Imperial Oil Refinery.





MN+350 TAR SANDS OIL

21% higher greenhouse gas emissions.

A land area about the size of Florida.

Athabasca Chipewyan First Nation Territory.

2-4 barrels of water for each barrel of oil.

Nuclear plants to make steam to extract tar sands oil?!?



MN+350 TAR SANDS BY PIPE

Too thick to pump through pipelines – like peanut butter.

Expensive to move by truck & rail.

Pipelines are needed to make extraction profitable.

Sinks in water – see Kalamazoo spill.

Leaks are hard to detect.