



Enbridge Operations In Northern Michigan Line 5



Enbridge: A Vital Link to Energy Supply



- Enbridge Energy has been delivering energy reliably **since 1949** on what was originally referred to as the Lakehead System.

About **15% of total U.S. petroleum imports** arrives via Enbridge's Lakehead System.

- Enbridge meets **more than 50%** of crude oil needs of all Great Lakes refineries.

Liquids Pipelines in Michigan



Line 6B:

Griffith, IN to Marysville, MI

- 235 miles in MI
- 30-36-inch pipe
- Capacity 500,000 bpd
- Medium & heavy crude

Line 79:

Stockbridge to Romulus, MI

- 64 miles in MI
- 16-20-inch pipe
- Capacity 80,000 bpd
- Light & heavy crude

Line 17:

Stockbridge, MI to Toledo, OH

- 77 miles in MI
- 16-inch pipe
- Capacity 100,000 bpd
- Heavy crude

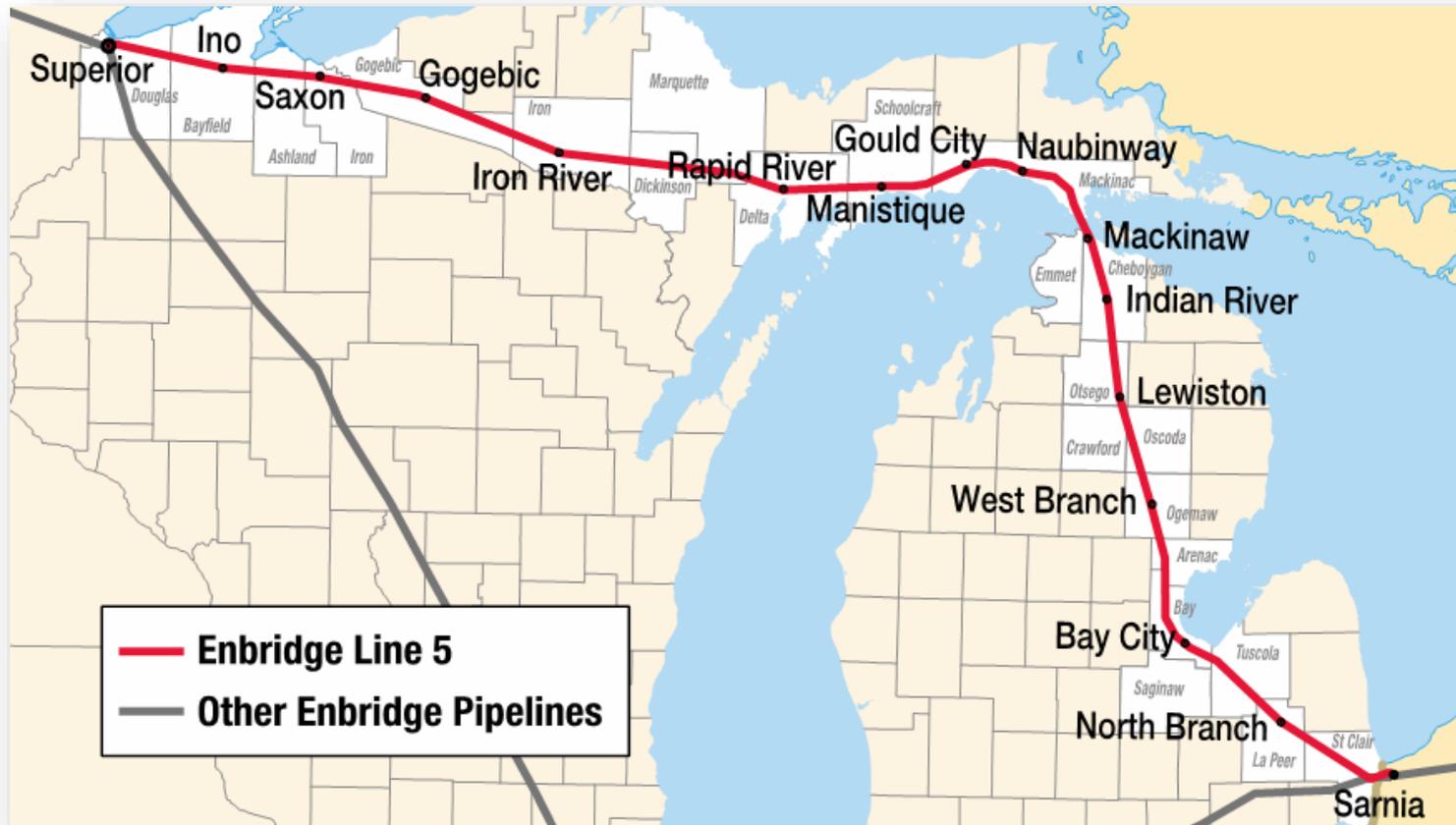


Line 5:

Superior, WI to Sarnia, ON, Canada

- 554 miles in MI

Line 5

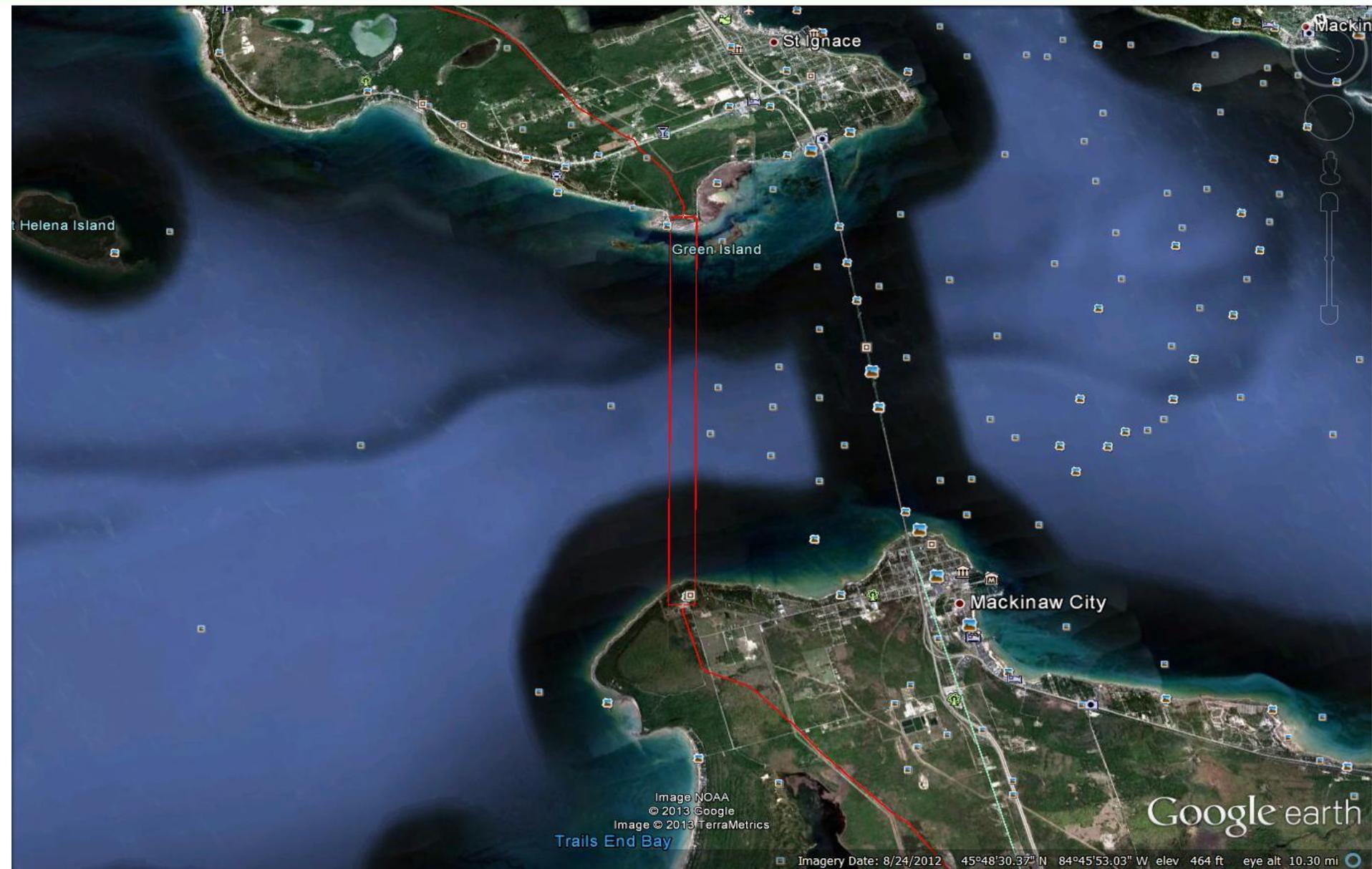


Line 5: Superior, WI to Sarnia, ON, Canada

- 645 miles (554 miles in MI)
- Capacity 540,000 bpd
- 30-inch pipe (2, 20-inch heavy-walled and seamless pipelines under Straits)
- Well functioning coating
- Light crude (also NGL & others)

- Line 5 transports light crude oil, light synthetic crude and natural gas liquids.
- From secure North American resources in western Canada and North Dakota. Does not transport heavy crude. Nor are there any plans to transport heavy crudes.

Straits Crossing



Safety is the Cornerstone of our Business



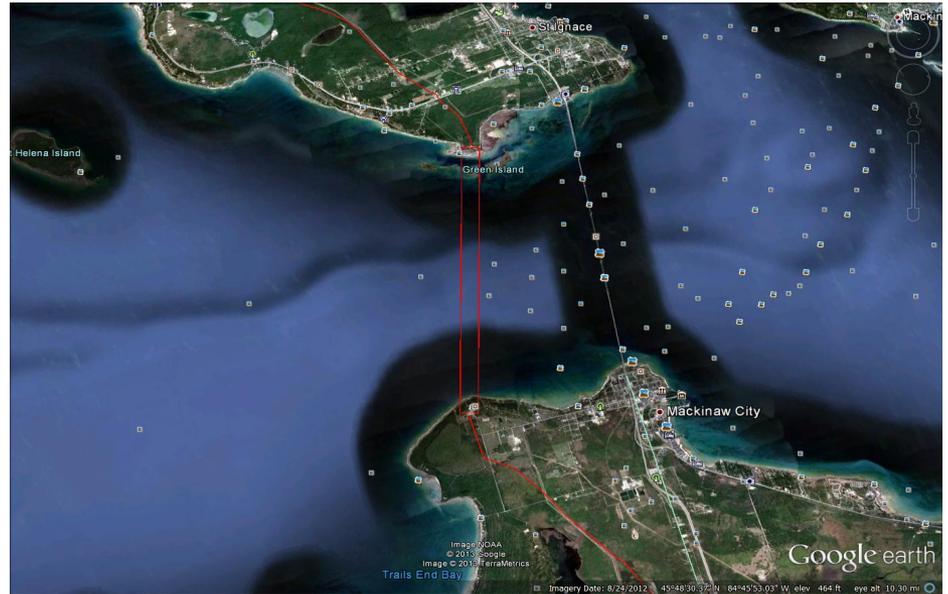
- Number 1 priority is to operate **safely and reliably**
 - No incident is ever considered acceptable.
- Since 2012, invested **\$4.4 billion** in new technologies and training to further enhance pipelines and facilities.
- During the past 10 years, delivered nearly **13 billion barrels** of crude oil and liquids.



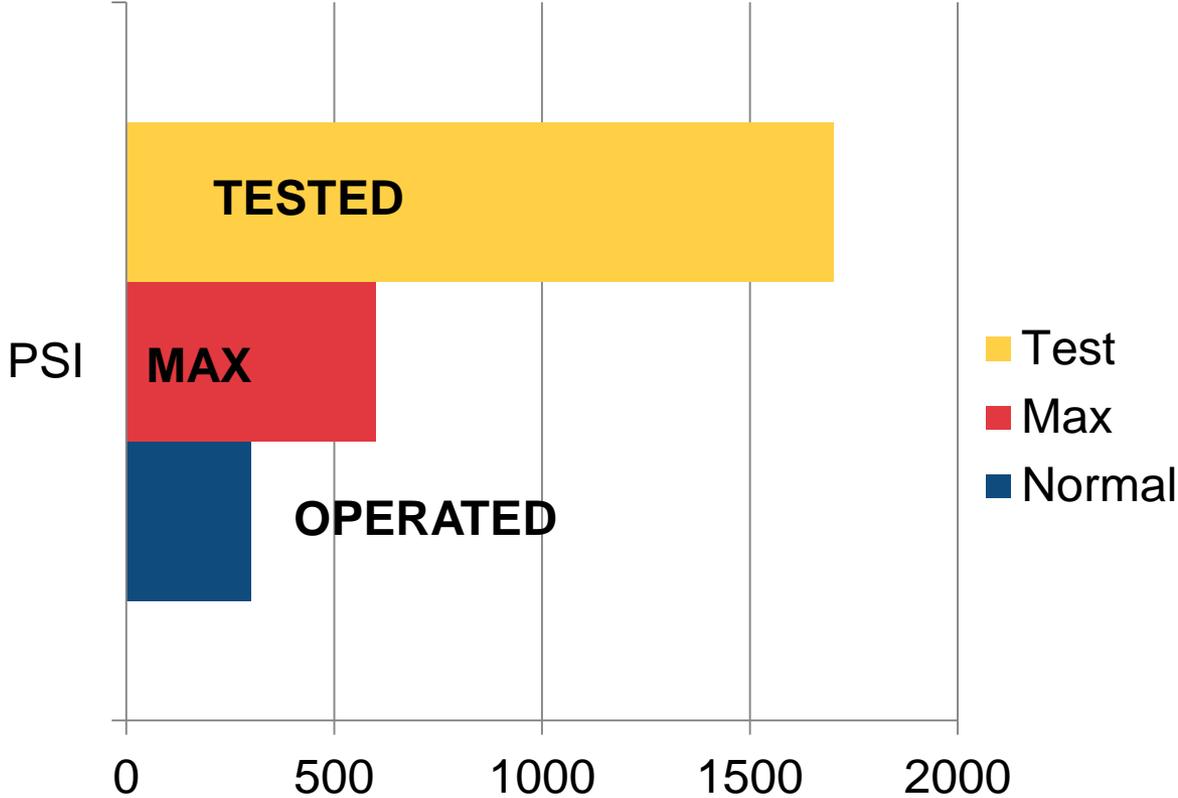
Goal to build and maintain pipelines with ZERO releases.

Safety in the Straits of Mackinac

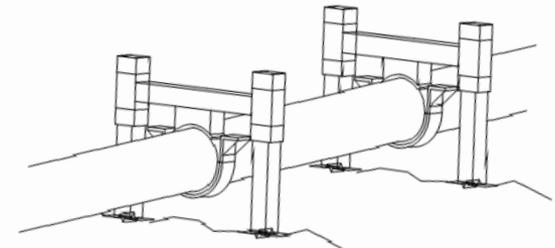
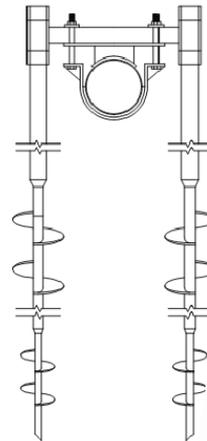
- Design
- Inspections
- Automatic shut-off valves
- Remotely operated Isolation Valves
- New leak detection equipment
- Electric back-up generator
- Valve yard containment system



Line 5 Straits Pressure



- Beyond 50 ft. depth secured in brackets screwed into the lake bottom
- Originally engineered for sand bag supports
- Enbridge began installing permanent steel screw anchors in 2002
- 40 supports installed this summer
124 total supports
- Program on-going





- Comprehensive maintenance and **integrity program**, including visual inspections.



Continuous Safety Improvements



Improvements since 2010:

- Pipeline and Facility Integrity
- Leak Detection
- Pipeline and Control Center Operations
- Public Awareness
- Emergency Response
- Safety Culture



- Tactical Response Plan specific for the Straits of Mackinac
- Integrated Contingency Plan (ICP) underwent extensive, first-ever PHMSA coordinated peer review. Approved July 2013
- Remotely operated shut-off valves at upstream and downstream shores of the Straits
- Isolated within approximately 3 minutes

Internal Inspections

Sophisticated electronic vehicles move inside the pipe along with the oil to obtain detailed measurements of the pipe condition including:

- internal corrosion
- external corrosion
- dents, buckles, gouges



External Inspections

- Frequent Underwater Autonomous Vehicle and Remote Operated Vehicle inspections.
- Routine aerial and right-of-way patrols are conducted for buried pipelines.
- Visually patrolled at least 26 times a year.



Supporting Michigan's Economy

In 2013, Enbridge paid nearly **\$21 million** in state property, sales, use and income taxes.

Employ approximately **250 employees & contractors** in **24 locations** – average annual salary: **\$82,000**



Conclusion



Thank You
www.enbridge.com

