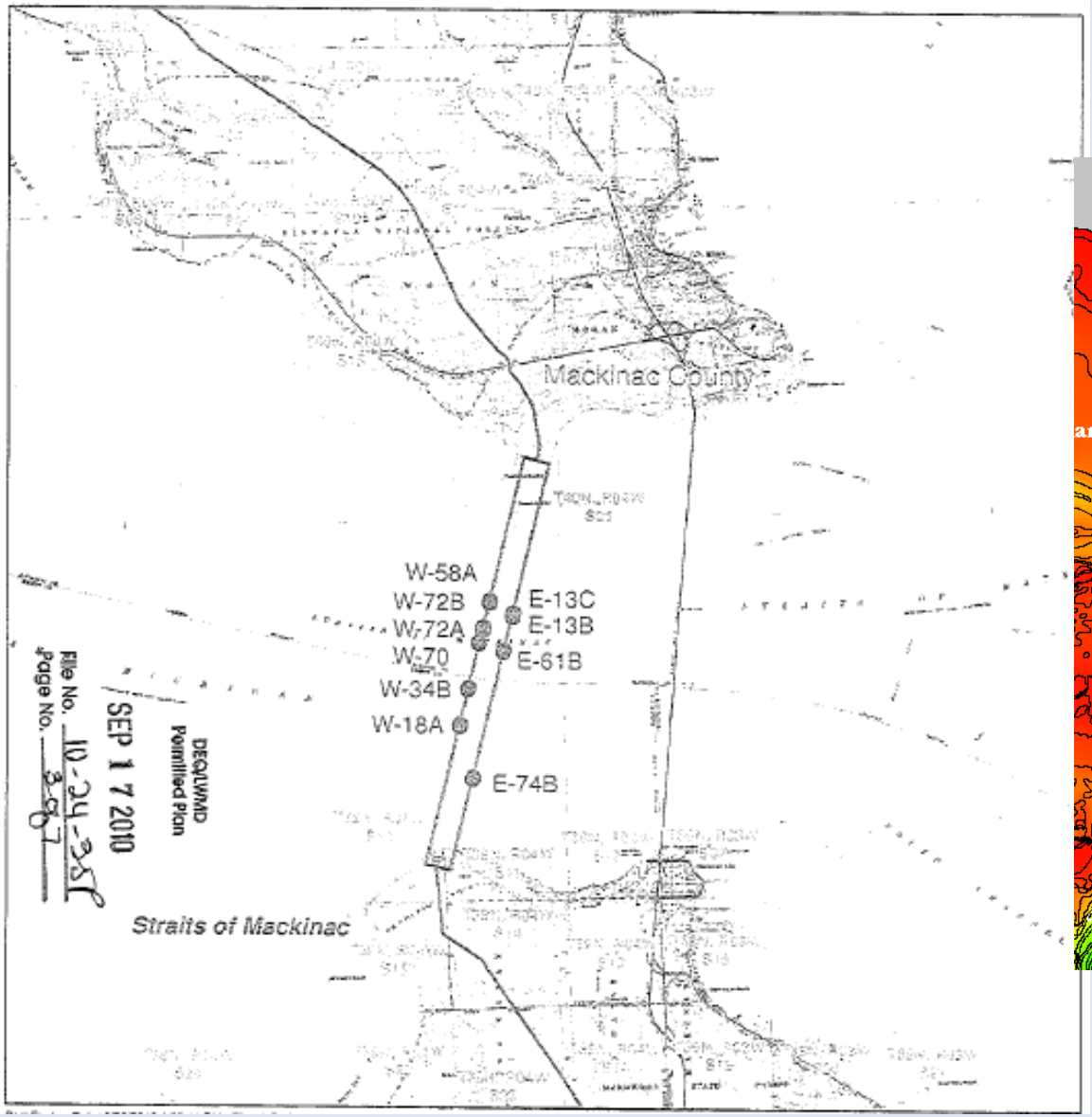
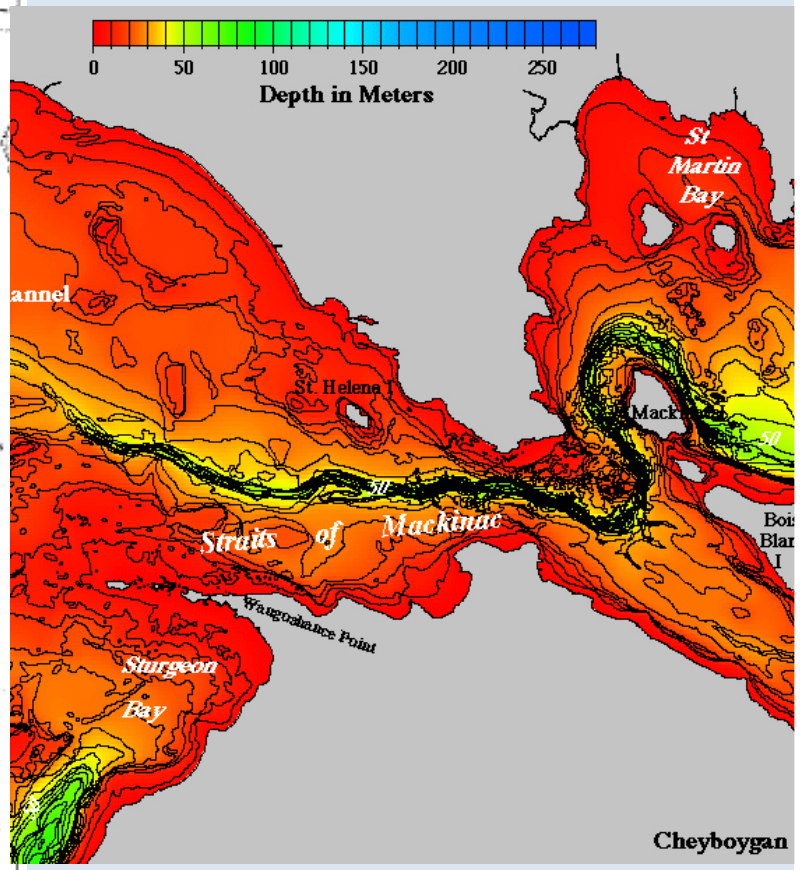
Pipelines and oil transportation in the Great Lakes

Pipelines in the Midwest

Enbridge Lakehead System

Enbridge Pipeline (Line 5) in the Straits of Mackinac





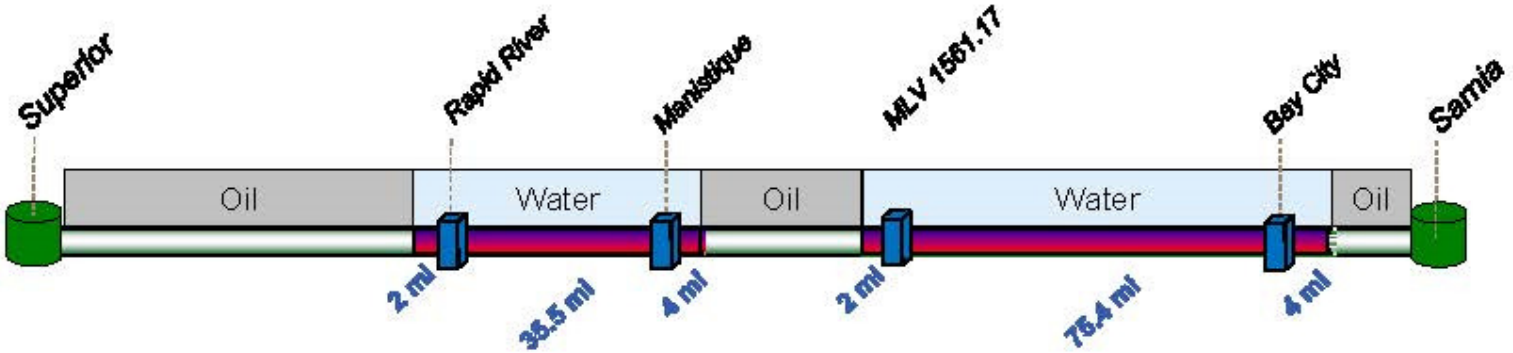
Line 5 can transport 22.7 million gallons/day. The Straits segment consists of the original pipe, laid 61 years ago.

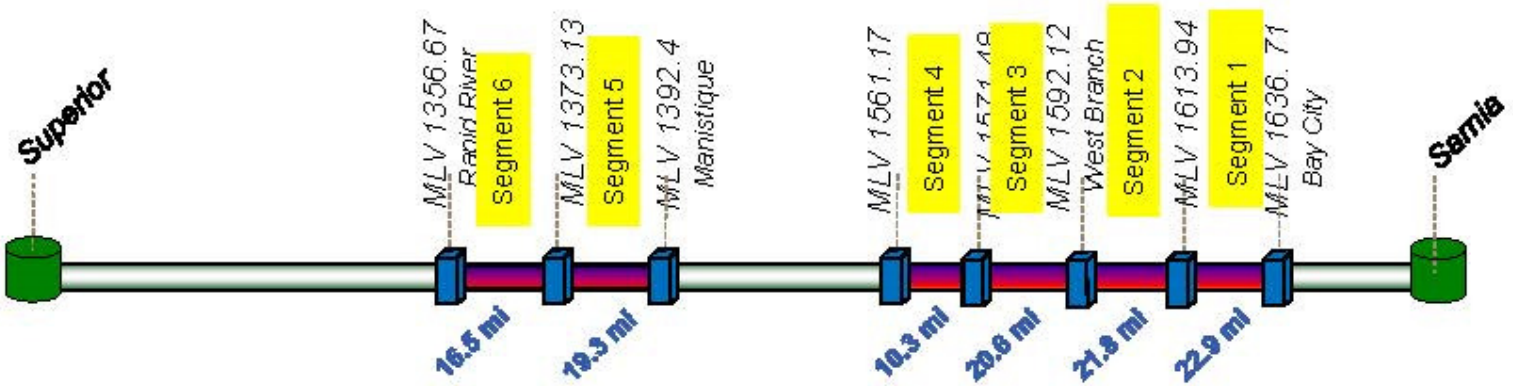
National Wildlife Federation dive team takes first public video of pipeline in 2013.

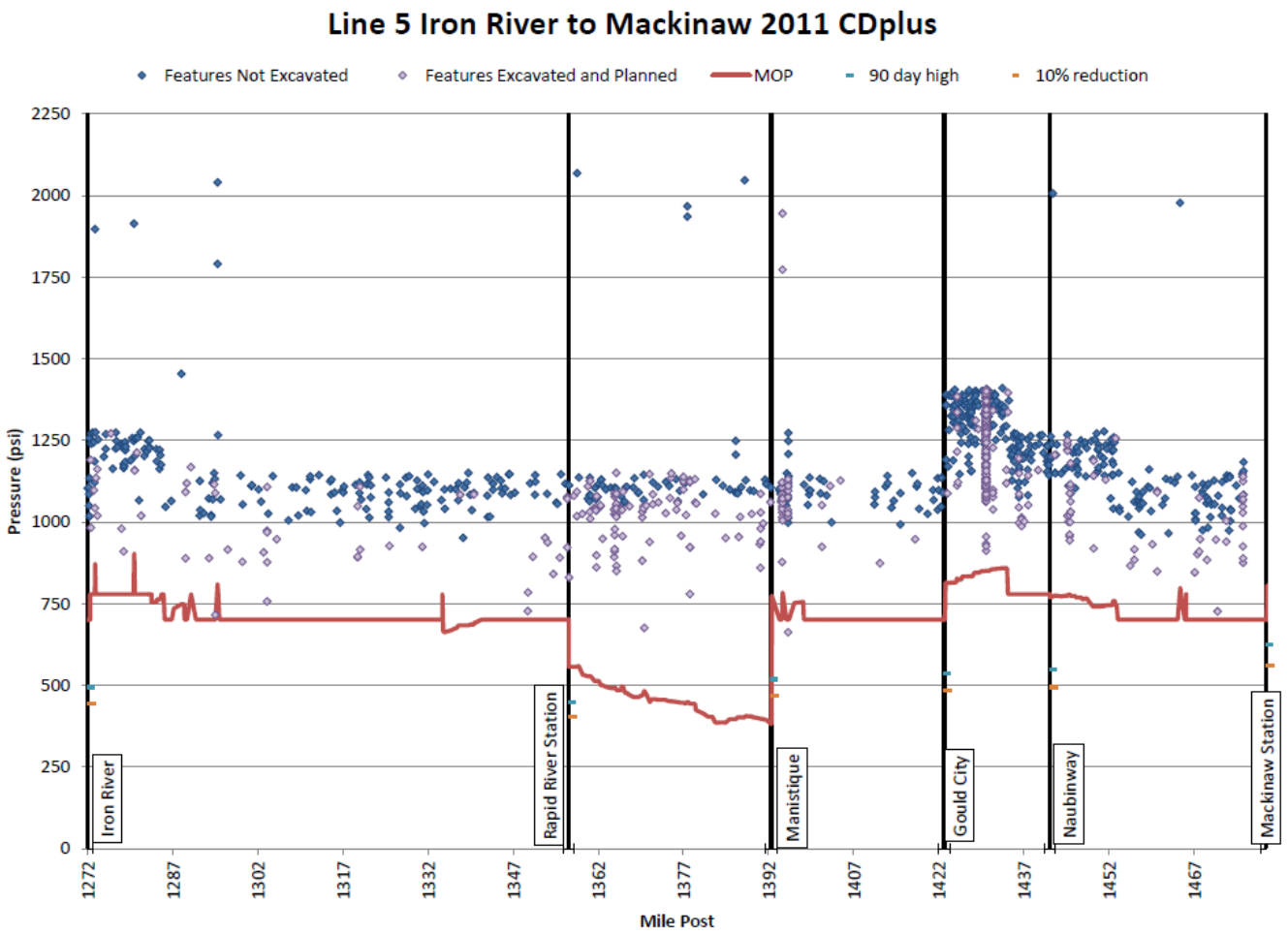
Portions of the pipeline in the Straits are suspended over the lakebed.

Line 5 Hydrostatic Test Overview

- **6 Test segments in 2 areas**
  1. 4 hour strength test at 100% SMYS (low point): 974 psi max pressure
  2. 4 hour 15 minute leak test at 110% MOP
  3. Water injected at Superior and positioned in test areas
  4. Water pumped to Sarnia after test for treatment and disposal. 4 miles "slop" water in front of each test section. 2 miles contingency water behind each test section.
  5. Tests performed against MLV's – Sealant Gel injected at each valve
  6. All 6 segments tested simultaneously







Enbridge's report of anomalies along a section of Line 5. Dark blue dots represent anomalies that were not excavated.

Line 5 Program Summary

Dig Program Summary

Segment	Phase 1	Phase 2	Repair Method
PE-IR	44 (all complete)	36	20Recoat / 24Sleeve
IR-MA	32 (all complete)	70	7Recoat / 25Sleeve
MA-BC	29 (2 outstanding)	62	10Recoat / 17Sleeve
BC-RW	15 (all complete)	7	6Recoat / 9Sleeve

First Digs

Segment	Date of First Excavation
PE-IR	August 08, 2011
IR-MA	August 26, 2011
MA-BC	July 16, 2011
BC-RW	October 20, 2011

Reported ILI Features and Dig Program

Segment	# of Reported CF	# of Reported CL	# of CL in Dig program
PE-IR	268	576	95 (16%)
IR-MA	310	416	76 (18%)
MA-BC	73	327	91 (28%)
BC-RW	97	326	25 (8%)

Enbridge's report of Crack Features (CF) and Crack-Like Features (CL) for Line 5. Only 18% were slated for excavation in the segment from Iron River to Mackinaw City in the Lower Peninsula.

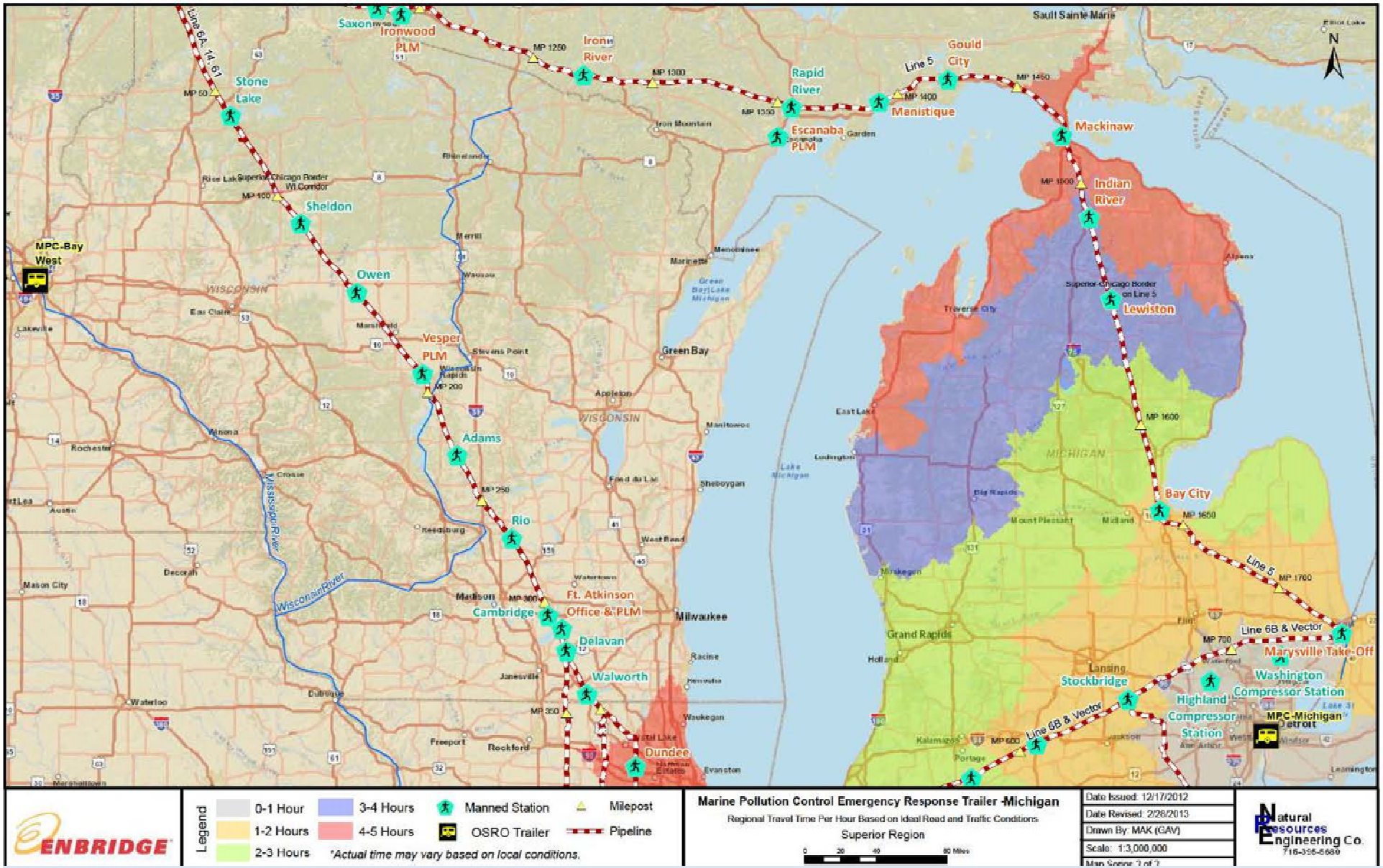
One Month's False Alarms on Line 5

Enbridge Records, 2012

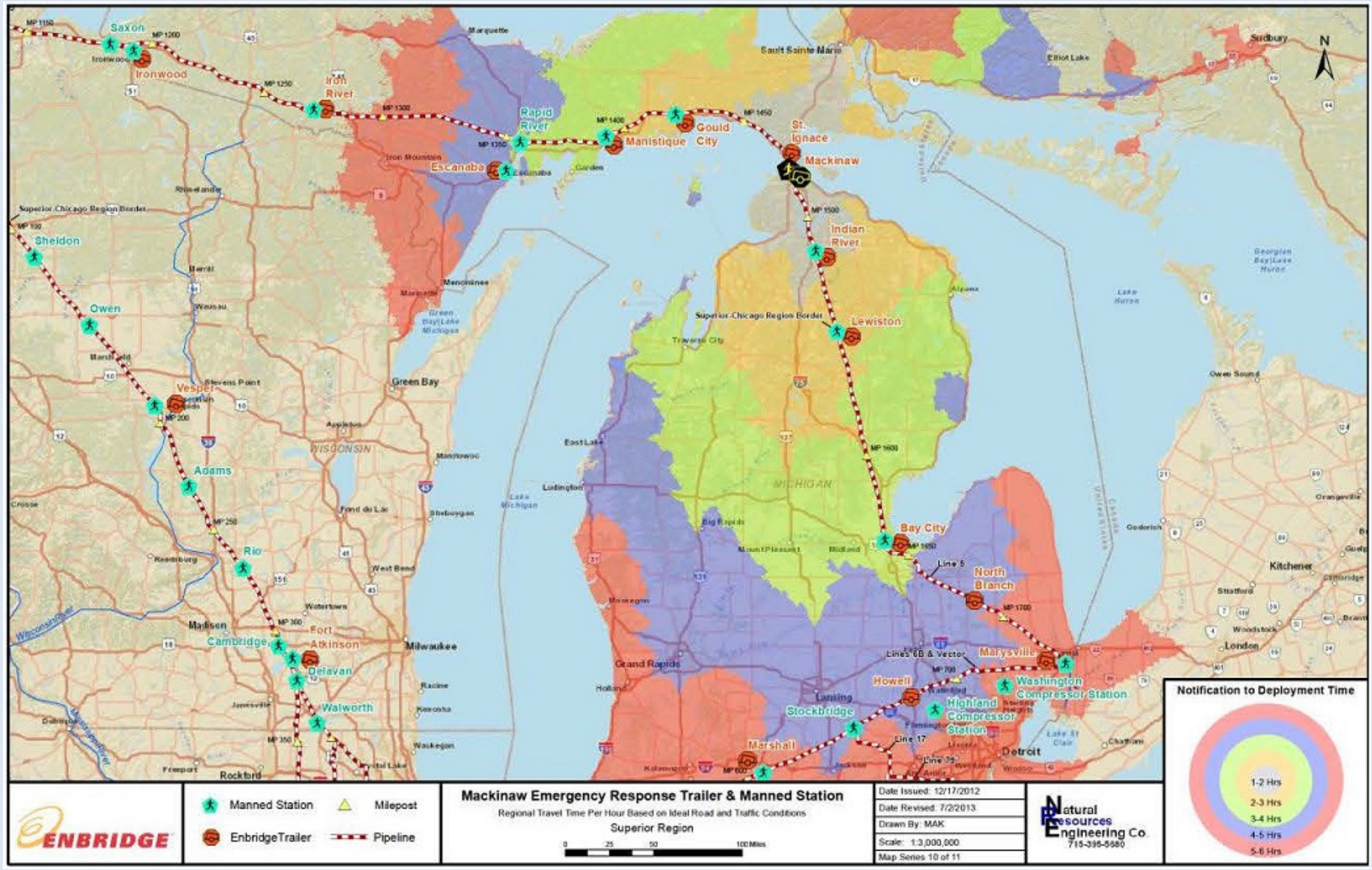
In 2010, the same "column separation" alarms were treated as false for 17 hours, resulting in a more than 800,000-gallon spill in the Kalamazoo River

Title	Time Paged	Line Number	Alarm Window	Alarm Cause	Backup Support Required?	Line Down Due To MBS?
Line 05 - MBS Alarm - 2/16/2012 11:35:00 AM	2/16/2012 11:35	05	5 Minute;#20 Minute	;#Field Maintenance;#	FALSE	FALSE
Line 05 - MBS Alarm - 2/14/2012 11:00:00 PM	2/14/2012 23:00	05	5 Minute	;#Instrumentation Error;#	FALSE	FALSE
Line 05 - MBS Alarm - 2/11/2012 11:15:00 PM	2/11/2012 23:15	05	5 Minute;#20 Minute;#2 Hour	;#Station Bypass;#	FALSE	FALSE
Line 05 - MBS Alarm - 2/11/2012 6:20:00 PM	2/11/2012 18:20	05	20 Minute	;#Instrumentation Error;#	FALSE	FALSE
Line 05 - MBS Alarm - 2/11/2012 11:40:00 AM	2/11/2012 11:40	05	20 Minute	;#Time Skew;#	FALSE	FALSE
Line 05 - MBS Alarm - 2/9/2012 7:25:00 AM	2/9/2012 7:25	05	5 Minute;#20 Minute	;#Instrumentation Error;#	FALSE	FALSE
Line 05 - MBS Alarm - 2/7/2012 7:15:00 PM	2/7/2012 19:15	05	5 Minute;#20 Minute	;#Instrumentation Error;#	FALSE	FALSE
Line 05 - MBS Alarm - 2/6/2012 7:15:00 AM	2/6/2012 7:15	05	5 Minute	;#Time Skew;#	FALSE	FALSE
Line 05 - MBS Alarm - 2/2/2012 6:30:00 AM	2/2/2012 6:30	05	5 Minute;#20 Minute	;#Time Skew;#	FALSE	FALSE
Line 05 - MBS Alarm - 1/31/2012 12:45:00 PM	1/31/2012 12:45	05	5 Minute;#20 Minute	;#Instrumentation Error;#	FALSE	FALSE
Line 05 - MBS Alarm - 1/31/2012 7:05:00 AM	1/31/2012 7:05	05	5 Minute;#20 Minute	;#Instrumentation Error;#	FALSE	FALSE
Line 05 - MBS Alarm - 1/31/2012 4:10:00 AM	1/31/2012 4:10	05	5 Minute;#20 Minute	;#Column Separation;#	FALSE	FALSE
Line 05 - MBS Alarm - 1/26/2012 7:20:00 AM	1/26/2012 7:20	05	5 Minute;#20 Minute	;#Time Skew;#	FALSE	FALSE
Line 05 - MBS Alarm - 1/24/2012 7:30:00 AM	1/24/2012 7:30	05	20 Minute	;#Instrumentation Error;#	FALSE	FALSE
Line 05 - MBS Alarm - 1/21/2012 5:10:00 AM	1/21/2012 5:10	05	5 Minute;#20 Minute;#2 Hour	;#Power Outage;#	FALSE	FALSE
Line 05 - MBS Alarm - 1/20/2012 8:50:00 AM	1/20/2012 8:50	05	5 Minute;#20 Minute;#2 Hour	;#Column Separation;#	FALSE	FALSE

Up to 5 hours before experts can respond to a worst-case oil discharge in the Straits



Spill response equipment available locally



Inventory of response equipment in emergency response trailers at St. Ignace and Mackinaw Stations

SUPERIOR REGION RESPONSE ZONE, FACILITY & LOCALITY INFORMATION			
PRIMARY WATER RECOVERY EQUIPMENT	**St. Ignace**	**Mackinaw**	**Total**
24" Boom w/ Quick Latch (Ft.)		1,000	1,000
24" Boom w/ Quick Latch (Ft.) & 16" Skirt	1,000		1,000
Boom - Anchors - w/Chains & Rope	5		5
Sorbent Boom (20 Ft. Bale)		4	4
Sorbent Boom (6" x 10") (Bale)	2		2
Sorbent Boom (8" x 10") (Bale)	2		2
Sorbent Pads - (100/)		3	3
Sorbent Pads - (17" x 19") (100/)	1		1
Sorbent Roll 38" x 144' (Rolls)	1	2	3
Sorbent - Sweep/roll (20" x 100')	1	2	3
3" Air Operated Pump	1	1	2
Trailer Boom	1	1	2
Tow Bridle	1	1	2
Generator - 2500 watt			
Fast Tank Saddle Assembly	1	1	2
Buoy Markers w/Lights	5		5

University of Michigan Straits Oil Release Study

- Assumes a 12-hour release of just under 1 million gallons
- 12 hours includes release of oil in the Straits pipeline after a rupture event
- 6 different scenarios depending on time of year and location of spill
- https://www.youtube.com/watch?v=ELlWwTF9PDs&index=4&list=PLkpBjHvzRryqCzUAeLDxzgrRJOBbN-nBc

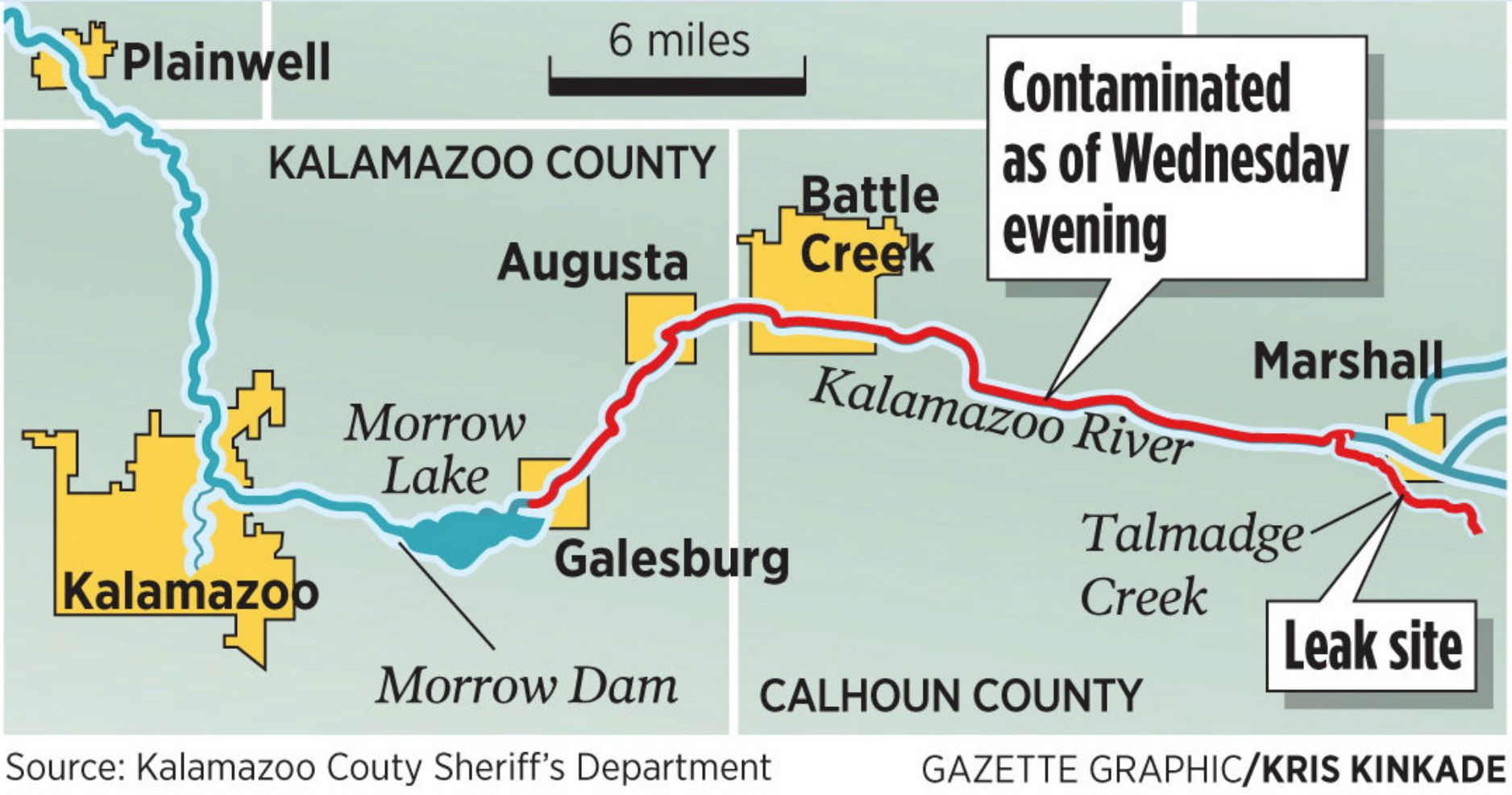
Enbridge Inc.'s operations in North America

The pipeline that leaked (called 6B) is a 30-inch, 8 million-gallons-per-day line transporting light synthetics, heavy and medium crude oil from Griffith, Ind., to Sarnia, Ontario. It is part of Enbridge Inc.'s Lakehead System. The 1,900-mile Lakehead System line is the U.S. portion of one of the world's longest petroleum pipelines and has operated for more than 60 years.

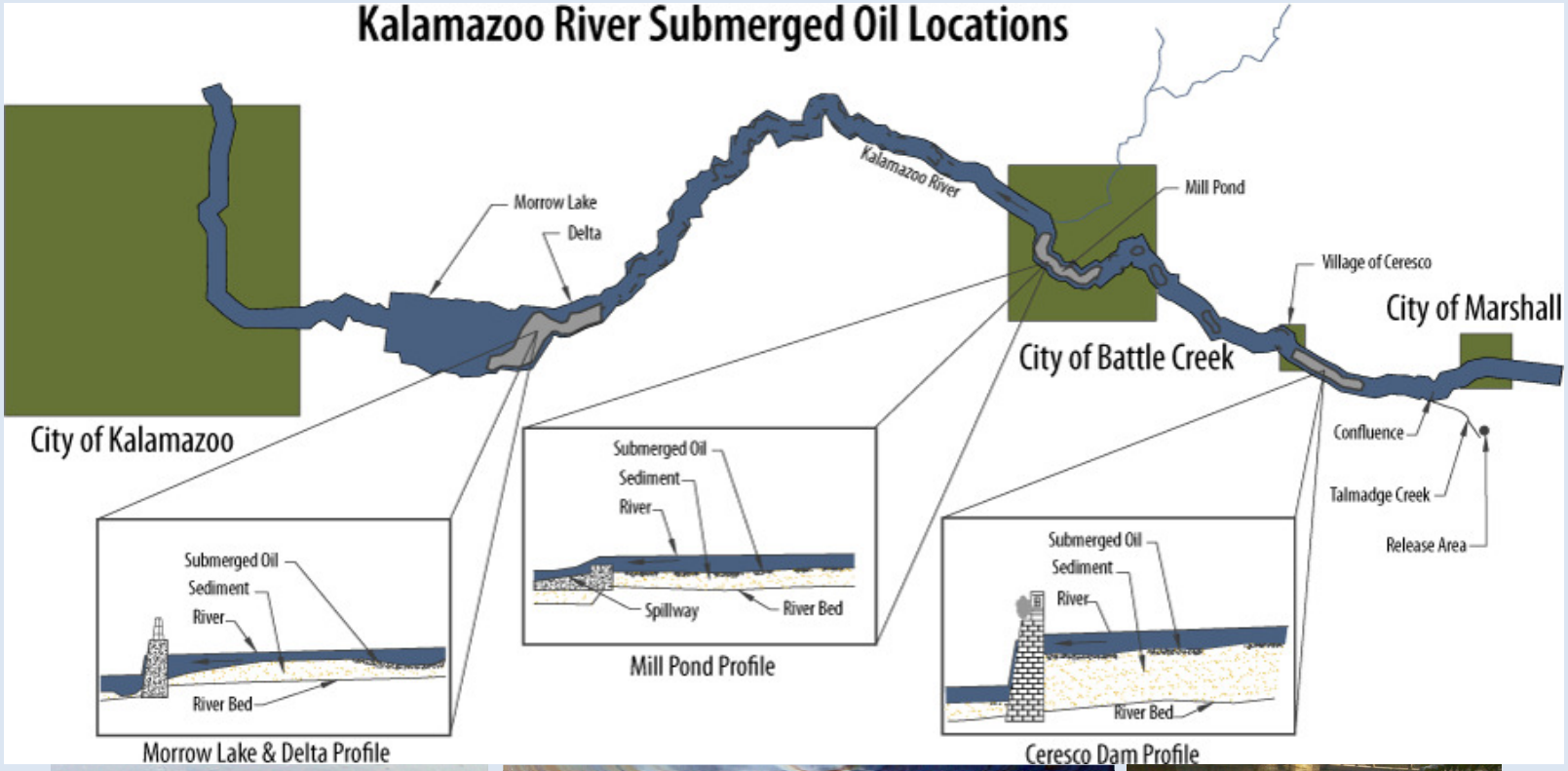
2010: 800,000+ gallon Enbridge oil spill into Kalamazoo River, 2010

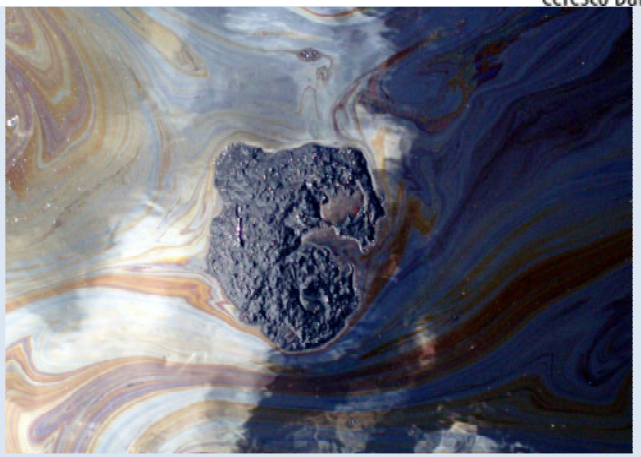
Closer view of the Kalamazoo River

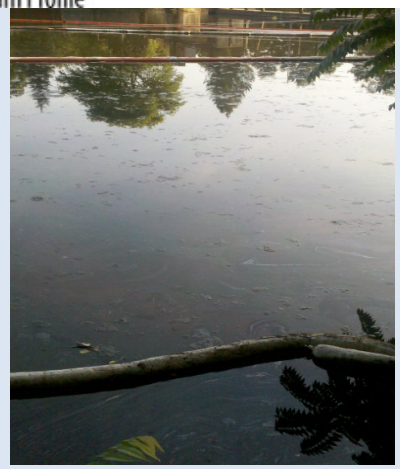
Ruptured Enbridge pipeline in Kalamazoo River spill



Oil slick quickly extended 40 miles downstream







Three years and over $1 billion later in cleanup costs, oil remains in the Kalamazoo River

Reducing the risks to the Straits:

- Provide video and other documentation of Mackinac Pipeline integrity
- Deploy procedures that shut down the line when there is an alarm until the alarm is investigated and cleared
- Release a schedule for Mackinac Pipeline maintenance and replacement
- Increase oversight over Mackinac Pipeline
- Establish a protective standard for acceptable risk of pipeline failure