



Line	Pipeline Sections	Begin Stationing	End Stationing	Miles	Pipeline Diameter	Product
4	Floodwood, MN Loop (MP1019.73 to MP1044.33)	1,299,654	(47,009)	24.6	48"	Crude Oil
4	Deer River, MN to Wrenshall, MN Loop	1,429,072	1,512,231	15.7	36"	Crude Oil
4	Wrenshall, MN Loop (MP1060.11 to MP1079.91)	1,512,091	1,616,806	20.0	48"	Crude Oil
4	Wrenshall, MN Loop to Superior, WI	1,616,840	1,712,760	19.8	36"	Crude Oil
SL 13	Gretna, Manitoba to Clearbrook, MN	0	715,074	135.4	18"	Diluent Condensate
SL 13	Clearbrook, MN to Superior, WI	0	1,003,300	190	20"	Diluent Condensate
AC 67	Gretna, Manitoba to Superior, WI	0	1,723,800	326.7	36"	Crude Oil
5	Superior, WI to Mackinaw, MI	0	1,993,306	377.5	30"	Crude Oil & Natural Gas
5	Straits of Mackinac East and West (*2)	1,993,306	2,015,016	8.2	20"	Crude Oil & Natural Gas
5	Straits of Mackinac to Lewiston Pump Station MP1544.3	2,015,016	2,378,371	68.8	30"	Crude Oil & Natural Gas
6A	Superior, WI to MP97.23 (Ladysmith, WI)	0	513,368	97.2	34"	Crude Oil
14	Superior, WI to MP97.23 (Ladysmith, WI)	0	512,719	97.1	24"	Crude Oil
61	Superior, WI to MP97.23 (Ladysmith WI)	0	523,170	99.08	42"	Crude Oil
LSr (65)	Gretna, Manitoba to Clearbrook, MN	0	721,140	136.6	20"	Crude Oil
	<b>Total Pipeline Miles</b>			<b>2838.38</b>		

(Number) Diversion Stationing)



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### 3. CONSISTENCY WITH NATIONAL AND AREA CONTINGENCY PLANS

#### National Contingency Plan

Enbridge (U.S.) Inc. has reviewed the National Contingency Plan to ensure our emergency response planning and structure is consistent. The Incident Command Structure established for Enbridge assumes Enbridge, as a "responsible party" will work in a "unified command structure" with local, state and/or federal agencies to manage the emergency.

The Enbridge Emergency Response Plan (ERP) adheres to all Federal, State and Local emergency response requirements for the crude oil pipeline transportation industry. This section of the appendix was developed to address specific protocol questions common to ERP requirements.

Enbridge identifies the technical training and qualification standards for operations employees in accordance with company policy, industry standards, and applicable government regulations. For the Liquid Pipeline side, these can be found in our Operations and Maintenance Procedures (O&MP) Book 1 Tab 5 – Training and Qualifications. For the Gathering Systems, this can be found in Gathering Systems O&MP Section 4. Specifically:

1. Characteristics and hazards of oil: This training is conducted annually during HAZWOPER refresher training, specifically in the hazardous materials and Material Safety Data Sheet (MSDS) training components.
2. Conditions that are likely to worsen emergencies, including the consequence of facility malfunctions or failures and appropriate corrective actions: These are covered in our O&MP Books 7 both General & Region Specific under the High Consequence Areas (HCA) identified On individual maps and covered as part of the Emergency Response Training.
3. Steps necessary to control an accidental discharge of oil: Training on general operations procedures cover the precautions to prevent discharges and reviewed during our annual table-top exercises, field exercises and HAZWOPER training.
4. Steps necessary to minimize the potential for fire, explosion, or environmental damage: Covered in annual ignition source, HAZWOPER and emergency response training.
5. Proper firefighting procedures and use of personal protective equipment (PPE), fire fighting procedures or extinguisher use is provided within three months of initial hire or before an individual is assigned to a specific response position and every three years thereafter. PPE training is covered in annual refresher training for all employees.



Additional Comments:

The Enbridge O&MP Book 2 section 15-02-01, which covers specific duties in the Emergency Response Training Matrix (Table 2), and O&MP Book 7 section 02-01-01 Overview of Emergency Response Actions, address the appropriate levels of training and the requirements specified in OSHA 29 CFR 1910.120.

The O&MP Book 2 section 04 describes the company's procedures for maintenance of response training records for response personnel.

The O&MP Book 2 section 05-02-02 describes the requirements for maintaining drill documentation for three years and ensuring the availability of such records for inspectors.

**Area Contingency Plan**

Enbridge has reviewed the applicable Area Contingency Plans and established communication, where necessary, with the appropriate Area Contingency Plan coordinator to ensure that Enbridge information is accurate. Enbridge will, on an on-going basis, continue to review these plans, provide input as necessary and participate in the Area Committees as appropriate. The identification of environmentally sensitive (high consequence areas) will be reviewed with Area Contingency Plans in order to establish consistency.

The Area Contingency Plans that must be considered within Enbridge's Emergency Response Plan have been identified and are listed below according to the response zone affected.

Superior Response Zone

USCG		EPA	
<i>National Response Center</i> <a href="http://www.nrc.uscg.mil/nrchp.html">http://www.nrc.uscg.mil/nrchp.html</a>	800-424-8802	<i>EPA Region V</i> 77 W. Jackson Blvd. Chicago, IL 60604	312-886-3000
<i>USCG Ninth District</i> 1240 E. 9 <sup>th</sup> Street Cleveland, OH 44199	216-902-2045	<i>EPA Region VIII</i> 999 – 18 <sup>th</sup> St., Ste. 300 Denver, CO 80202-2466	303-312-6312
<i>USCG Marine Safety Office</i> 600 S. Lake Ave. Duluth, MN 55802-2352	218-720-5286		
<i>USCG Marine Safety Office</i> 337 Water Street Sault Ste. Marie, MI 49783	906-635-3233		

15-02-01  
**Safety Training Matrix**

**Table 2**  
**Safety Training Participants—USA**

Type of Training	Reference	Completed From Time of Hire	Ongoing Frequency	Operations Employees <sup>1</sup>	PLM Employees	Inspectors	Mechanical Employees <sup>2</sup>	Electrical Employees	Field Office Employees <sup>3</sup>
arc hazard	company policy	before task using 5 Kv equipment	3 yrs	◇	◇	◇	√	√	◇
asbestos awareness	29CFR 1910.1001	1 yr	annual	√	√	◇	√	√	◇
back care	company policy	6 mos	2 yrs	√	√	◇	√	√	◇
bloodborne pathogens	29CFR 1910.1030	1 yr	annual	√	√	◇	√	√	◇
confined space entry	29CFR 1910.146	before entry or 1 yr	3 yrs	√	√	√	√	√	◇
CPR – refresher	29CFR 1910.151	1 yr	@ expiry	√	√	√	√	√	◇
contractor safety management			3 yrs	◇	◇	√	◇	◇	◇
driver training – new hire orientation	company policy	before driving	—	√	√	◇	√	√	√
driver training – core (with driver observation)		before driving <sup>4</sup>	3 yrs	√	√	√	√	√	√
driver training – refresher		—	annual <sup>5</sup>	√	√	◇	√	√	√
driver training – advanced		—	3 yrs after core	√	√	◇	√	√	√
electrical safety	29CFR 1910.332	before task or 1 yr	2 yrs	√	√	◇	√	√	◇
			annual	◇	◇	◇	◇	√	◇

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ergonomics	OSHA 5 (a)(1)	—	2 yrs	◇	◇	◇	◇	◇	◇
fall protection – core	29CFR 1926.503	before task or 1 yr	3 yrs	◇	√	◇	√	√	◇
fall protection – refresher		—	annual	◇	◇	◇	◇	◇	◇
fire extinguisher maintenance	industry best practice	—	5 yrs	◇	◇	◇	◇	◇	◇
Fire extinguisher training NGL/ crude ignition	49CFR 195.403	3 months	annual alternating	√	√	√	√	√	◇
	29CFR 1910.157								
first aid – standard level	29CFR 1910.151	1 yr	@ expiry	√	√	√	√	√	◇
forklift operations	29CFR 1910.178	before task or 1 yr	3 yrs	◇	√	◇	◇	◇	◇
forklift – train the trainer certification	industry best practice	—	5 yrs	◇	◇	◇	◇	◇	◇
gas detector operation	29CFR 1910.120	before task or 1 wk	annual	√	√	√	√	√	◇
	49CFR 195.402								
ground disturbance (excavation) – core	29CFR 1926.651	before task or 1 yr	3 yrs	◇	√	√	√	√	◇
ground disturbance (excavation) – refresher		—	annual	◇	◇	√	◇	◇	◇

15-02-01  
**Safety Training Matrix**

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HAZCOM	29CFR 1910.1200	before exposure or 1 wk	annual	√	√	√	√	√	◇
HAZMAT	49CFR 172.704	before exposure or 1 yr	3 yrs	◇	√	◇	√	√	◇
hearing conservation	29CFR 1910.95	before exposure or 1 yr	annual	√	√	◇	√	√	◇
high voltage	company policy	1 yr	3 yrs	◇	◇	◇	◇	√	◇
hoisting/rigging	29CFR 1910.184, 1910.179	before task or 1 yr	5 yrs	◇	√	◇	√	◇	◇
ignition sources	49CFR 195.402	before task or 1 wk	annual	√	√	◇	√	√	◇
lockout procedures	29CFR 1910.147	before task or 3 mos	annual	√	√	√	√	√	◇
personal protective equipment	29CFR 1910.132	before task or 1 mo	annual	√	√	√	√	√	◇
radiation safety	NRC <sup>6</sup> 10 Part 30.33	before task or 1 yr	2 yrs	◇	—	◇	—	◇	—
respiratory protection – air purifying/supplied fit testing	29CFR 1910.134	before task or 1 yr	annual	√	√	◇	√	√	◇
respiratory fit testing – train the trainer		—	—	◇	◇	◇	◇	◇	◇



#### 4. CALCULATION OF WORST CASE DISCHARGE

##### **Worst Case Discharge Volume Calculation Methodology**

The approach for calculating Worst Case Discharge (WCD) volume utilizes American Innovation's Integrity Assessment Program (IAP) software. The IAP model performs two calculations to determine the total volume out at any given point along the pipeline in the event of a rupture; maximum initial and maximum stabilization loss.

The calculations used to determine the worst case discharge volume use:

- An assumption of a guillotine rupture (100% volume out)
- Design pipeline capacity to determine the amount of product released prior to a rupture being isolated by closure of remote-controlled mainline valves
- An assumption that all of the product in the pipe except that isolated by either elevation or the location of existing remote-controlled valves will be discharged at a rupture location.

This yields a conservative estimate of the worst case discharge volume regardless of weather conditions.

IAP software and data is in custody of, and maintained by the Enbridge Liquid Pipelines Operational Risk Management Group.

##### Maximum Initial Loss

Initial volume out is the amount of product that is released before a pipeline is shutdown and remote-controlled isolation valves closed in vicinity of the rupture.

Maximum Initial Loss

= pipeline flow rate x (time to recognize rupture and isolate the pipeline)

##### *Time to Recognize Rupture*

A full mainline rupture will show up as alarms on SCADA screens within 1 minute of its occurrence.

The Material Balance Leak Detection will recognize a rupture within 5 minutes of a rupture occurring (runs in a 5 minute cycle). The Material Balance Leak Detection is a backup to operator recognition.

The volume out calculation uses a time to recognize rupture of 5 minutes.

##### *Valve Closure Rate*

All motor operated valves in the Enbridge liquid mainline system close in three minutes or less. This is a design criteria requirement for motorized mainline valves used by Enbridge.



*Time to Isolate Line (Remote Controlled Valves Only)*

The time to isolate a line is the time it takes to recognize the rupture plus the time it takes to close the remote-controlled mainline valves. For the Enbridge liquid mainline system this time is 8 minutes.

Maximum Stabilization Loss

The maximum stabilization loss is a worst case calculation of the amount of oil that will escape to ground after isolation has occurred. The calculation takes into consideration the outer diameter and wall thickness of the pipe, the pipeline elevation profile, and the location of remote-controlled valves.

Worst Case Discharge Volume

Worst Case Discharge (WCD) Volume  
= Maximum Initial Loss + Maximum Stabilization Loss

Calculation of Worst Case Discharge for Mainline Piping

Line	"Design Flow Rate" Capacity (bbls/day)	Time to Isolate (min)	Worst Case Discharge (bbls)	Location (ft Stationing)	Location (~MP)
LSr (65)	186,000	8	8,312	216,820	814.8
1	235,176	8	14,207	1,710,200	1097
2	505,072	8	43,083	214,100	815
3	434,500	8	36,333	1,712,752	1098
4	859,176	8	83,527	295,200	829.8
5	525,687	8	36,263	2,843,834	1636.8
6A	727,335	8	34,109	29,900	5.8
MN 13	180,000	8	20,065	214,500	818
WI 13	180,000	8	5,143	214,434	40.5
67	450,000	8	40,488	1,665,700	315
14	398,774	8	16,979	16,100	3.1
61	400,000	8	45,023	27,750	5.5

Calculation of Worst Case Discharge for Tankage

Prevention Measure	Standard	Credit (percent)
Secondary containment > 100%	NFPA 30	50
Built/repaired to API standards	API STD 620/650/653	10
Overfill protection standards	API RP 2350	5
Testing/cathodic protection	API STD 650/651/653	5
Tertiary containment/drainage/treatment	NFPA 30	5
<b>Maximum allowable credit</b>		<b>75</b>

25% of largest tank in Superior Region Zone = 390,000 x 25% (75% RSPA credit) = 97,500 bbls



## **5. IDENTIFICATION OF ENVIRONMENTALLY SENSITIVE AREAS**

Enbridge utilizes the criteria described in its integrity management plan (HCA Management Plan) to identify and evaluate varying degrees of sensitivity to a number of public safety and environmental concerns along its right-of-way.

Spatial data regarding the HCA sites were derived from the National Pipeline Mapping System (NPMS) database maintained by PHMSA and mapped using the Geographic Information System (GIS) software ESRI (Environmental Systems Research Institute) ArcMap. In addition to the HCA's identified by PHMSA, Enbridge considered the following features in its Unusually Sensitive Area assessment:

- Rivers identified as high volume areas;
- Additional drinking water resources verified through state databases;
- Environmentally sensitive areas identified through regional or field knowledge.

In addition, HCA's were identified that may be affected by a release from Enbridge pipelines via transport mechanisms. The types of transport mechanisms considered were:

- Overland flow of crude oil to an HCA which is a function of topographic gradients, locations of ditches, and barriers to flow, in addition to stationing-specific volumes of crude oil that could be potentially released from an Enbridge pipeline;
- Flow of crude oil with/on water to an HCA from static lakes and ponds or perennial streams;
- Spray of crude oil from a potential rupture to an HCA.

The Enbridge HCA maps are an integral part of Enbridge emergency planning and response and are distributed to the Enbridge Regional Offices. The HCA maps are available upon request.

## **6. SIGNIFICANT AND SUBSTANTIAL HARM**

Enbridge has determined that the Superior Response Zone meets the criteria that requiring the zone to be considered as having the potential to cause "significant and substantial" harm.