

The **Protective Action Zone** defines an area DOWNWIND from the incident in which persons may become incapacitated and unable to take protective action and/or incur serious or irreversible health effects (see Figure G-1).

The ERG 2016 provides general guidance on initial isolation zones and protective action zones.

Crude oil (UN 1267) is classified as a flammable liquid (Water-Immiscible). Guide 128 suggests that for large spills (greater than 208 litres) an initial downwind evacuation for at least 300 metres be considered. If a tank, rail car, or tank truck is involved in a **fire**, an isolation distance of

800 metres in all directions should be put in force and an initial evacuation for 800 metres in all directions considered.

Sour crude oil (UN 3494) is classified as a flammable liquid (Toxic). Guide 131 suggests that for a spill, the initial isolation distance and protective action distance given in ERG 2016 should be used (see Table G-1). It further states that if a tank, rail car, or tank truck is involved in a **fire**, an isolation distance of 800 metres in all directions be put in force and an initial evacuation for 800 metres in all directions be considered.

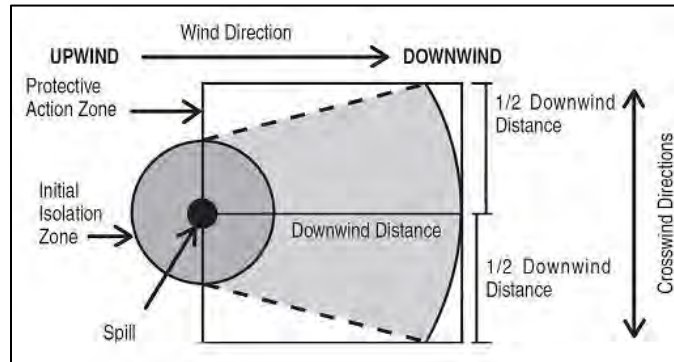


Figure G-1: Initial isolation zone and protective action distance

Table G-1: Initial Isolation Distances and Protective Action Distances for sour crude oil (UN 3494) spills [ERG2016]

SMALL SPILLS** (From a small package or small leak from a large package*)			LARGE SPILLS** (From a large package or from many small packages)		
First ISOLATE in all directions (metres)	Then PROTECT persons downwind during		First ISOLATE in all directions (metres)	Then PROTECT persons downwind during	
	Day (km)	Night (km)		Day (km)	Night (km)
30	0.1	0.2	60	0.5	0.7

* package = packaging plus contents
 ** Spills that involve releases of approximately 208 litres for liquids (55 US gallons) and 300 kg for solids (660 lbs) or less are considered Small Spills, while spills that involve greater quantities are considered Large Spills

The ERG 2016 notes that the following factors should be considered in determining protective action distances for crude oil release from ruptured pipelines (ERG, 2016):

1. type of crude oil (e.g., sour vs. sweet);
2. extent and type of spill (visual observations, e.g., geyser from ruptured pipe, slowly bubbling out of ground);
3. pressure and diameter of pipe;
4. timing of valve closure by utility (quickly for automated valves and longer for manually operated valves);
5. dissipation time of material in pipe once valves closed;
6. ability to conduct atmospheric monitoring and/or air sampling;
7. weather (wind direction, etc.)
8. local variables such as topography, population density, demographics, and fire suppression methods available;
9. nearby building construction material and density; and
10. natural and man-made barriers (highway).

In addition to factors 1, 6, 7, 8, 9, and 10, the following factors would be considered in the case of a derailment:

- has a fire or explosion occurred or does it appear to be imminent; and
- the number of tank cars derailed and their condition (e.g., do the cars appear to be leaking)

References

- Canadian Coast Guard (CCG, 2015) Report Marine Pollution [http://www.ccg-gcc.gc.ca/eng/CCG/ER_Reporting_Incident]
- Emergency Response Guidebook (ERG2016), U.S. Department of Transportation, Pipelines and Hazardous Materials Safety Administration, Transport Canada, Secretariat of Transport and Communications Mexico. [<https://www.tc.gc.ca/media/documents/tdg-eng/EnglishERGPDF.pdf>]
- NW Area Committee Federal and State Spill Response Agencies (NWAC) (2015) Bakken Crude Oil. [<http://www.rrt10nwac.com/Files/FactSheets/150213064220.pdf>]
- Transport Canada (TC) (2012) National Oil Spill Preparedness and Response Regime [<http://www.tc.gc.ca/eng/marinesafety/oep-ers-regime-menu-1780.htm>]
- Transport Canada (TC) (2016) Response Organizations. [<http://www.tc.gc.ca/eng/marinesafety/oep-ers-regime-ros-771.htm>]