REA DSEAR ICoP

Alternative Methodology

Renewable Power Systems

CURRENT ICoP

- Creates a series of unrealistic zones on landfill sites
- Routinely ignored thus increasing risks where true zones occur
- Uses unrealistic gas volumes, pressure and un-referenced formulae to calculate zones
- If followed properly would make landfilling almost impossible (zone rated compactor? Use of mobile phones, etc)

BS EN 60079-10-1:2015 (Explosive Atmospheres. Classification of Areas. Explosive Gas Atmospheres)

- Provides equations and charts to calculate the extent of zones in the open air
- Three step process:
  1. Calculate the release characteristic and compare to ventilation velocity
  2. This provides the degree of dilution which determines if a zone is present
  3. If the zone is not of negligible extent then the size of the zone can be referenced

Degree of Dilution

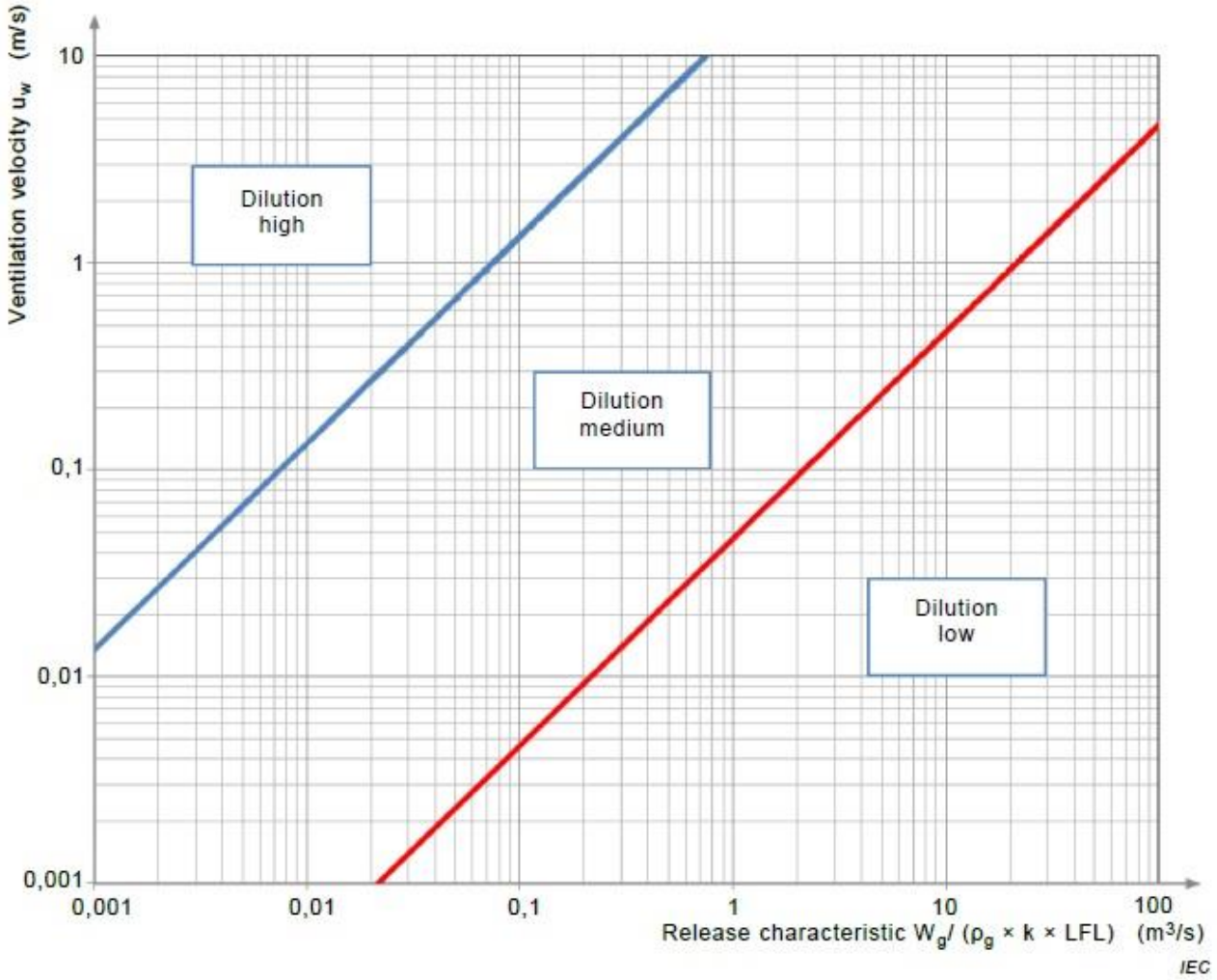

Figure C.1 – Chart for assessing the degree of dilution

- Release Characteristic:
  - Wg = mass release rate
  - Pg = Density
  - K = factor of safety
  - LFL = lower flammable limit
- Ventilation Velocity
  - 0.5 m/s in open situations
  - Or use wind speed data (>95% of time)

Typical Landfill gives release characteristic of 0.04 for High Dilution = 9 Nm3/hr

Zone

Table D.1 – Zones for grade of release and effectiveness of ventilation

Grade of release	Effectiveness of Ventilation						
	High Dilution			Medium Dilution			Low Dilution
	Availability of ventilation						
	Good	Fair	Poor	Good	Fair	Poor	Good, fair or poor
Continuous	Non-hazardous (Zone 0 NE)[a]	Zone 2 (Zone 0 NE)[a]	Zone 1 (Zone 0 NE)[a]	Zone 0	Zone 0 + Zone 2	Zone 0 + Zone 1	Zone 0
Primary	Non-hazardous (Zone 1 NE)[a]	Zone 2 (Zone 1 NE)[a]	Zone 2 (Zone 1 NE)[a]	Zone 1	Zone 1 + Zone 2	Zone 1 + Zone 2	Zone 1 or zone 0[c]
Secondary[b]	Non-hazardous (Zone 2 NE)[a]	Non-hazardous (Zone 2 NE)[a]	Zone 2	Zone 2	Zone 2	Zone 2	Zone 1 and even Zone 0[c]

[a] Zone 0 NE, 1 NE or 2 NE indicates a theoretical zone which would be of negligible extent under normal conditions.

[b] The zone 2 area created by a secondary grade of release may exceed that attributable to a primary or continuous grade of release; in this case, the greater distance should be taken.

[c] Will be zone 0 if the ventilation is so weak and the release is such that in practice an explosive gas atmosphere exists virtually continuously (i.e. approaching a 'no ventilation' condition).

'+' signifies 'surrounded by'.

Availability of ventilation in naturally ventilated enclosed spaces shall never be considered as good.

- Grade of release – usually secondary from sealed system
- Degree of Dilution from Step 1
- Availability of ventilation Good in open air
- = Zone of Negligible Extent

Zone Extent

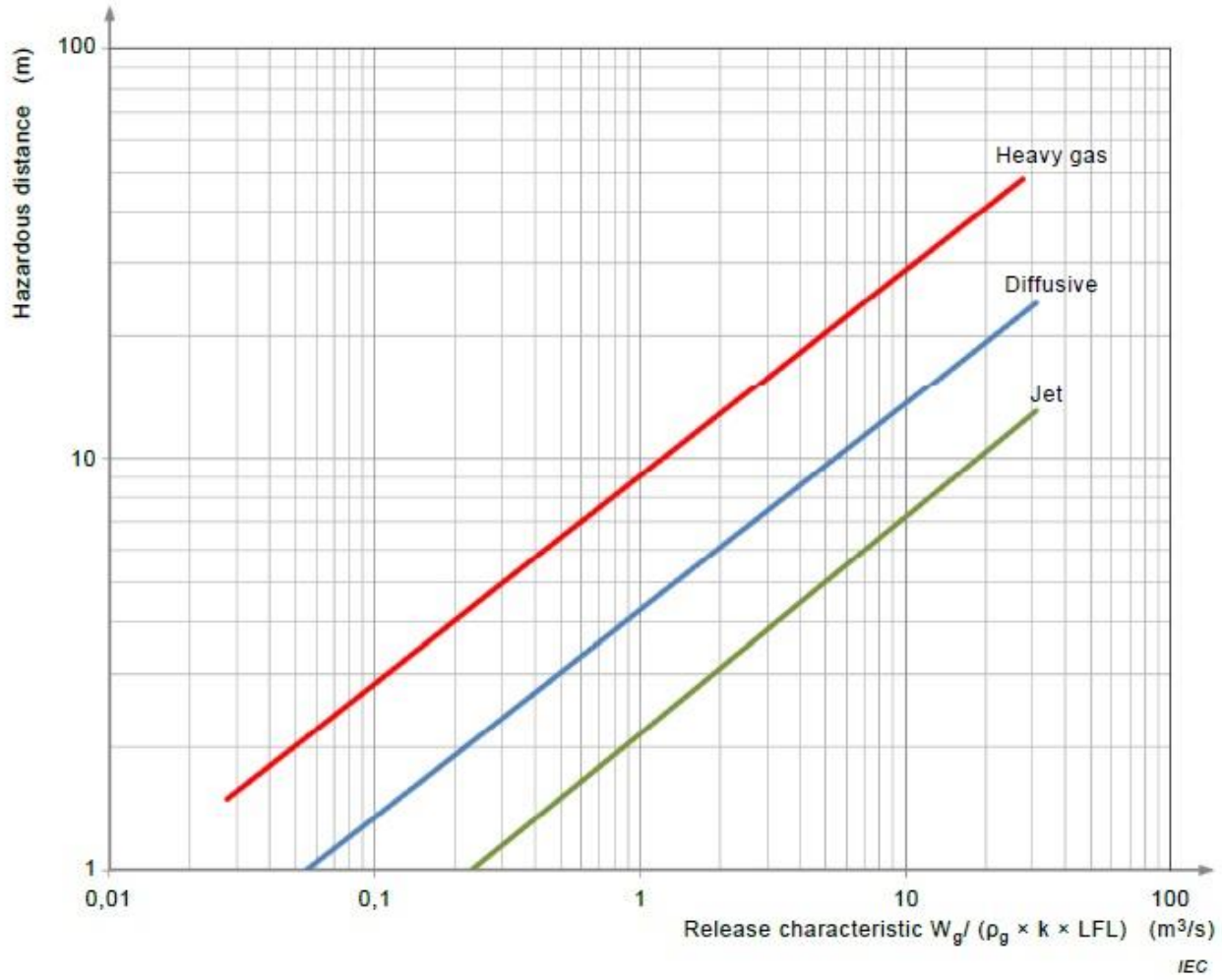

Figure D.1 – Chart for estimating hazardous area distances

- Release Characteristic (from gas mix)
- Gives hazardous distance
- Gas well would be typically diffusive

Implications

- Zone of Negligible extent max release at 0.5 m/s wind speed is 9 Nm3/hr
- Max hole size on a gas plant (350 mBar) is 15 mm2
- Therefore all flanges/joints/seals in open air should be unzoned
- Only if a wellhead or dip cap is removed may a zone occur.
- Wind speed of 3 m/s gives a zone of negligible extent for this.

Fundamental Question

- Can you have an explosion in an unconfined system in the open air?
- A landfill gas well has no reservoir to explode unlike a fuel tank or confined location
- Is there any sense in having zones externally around gas wells?