

# Approaching an Area Classification

Presented by: Pratheer Ramkaran



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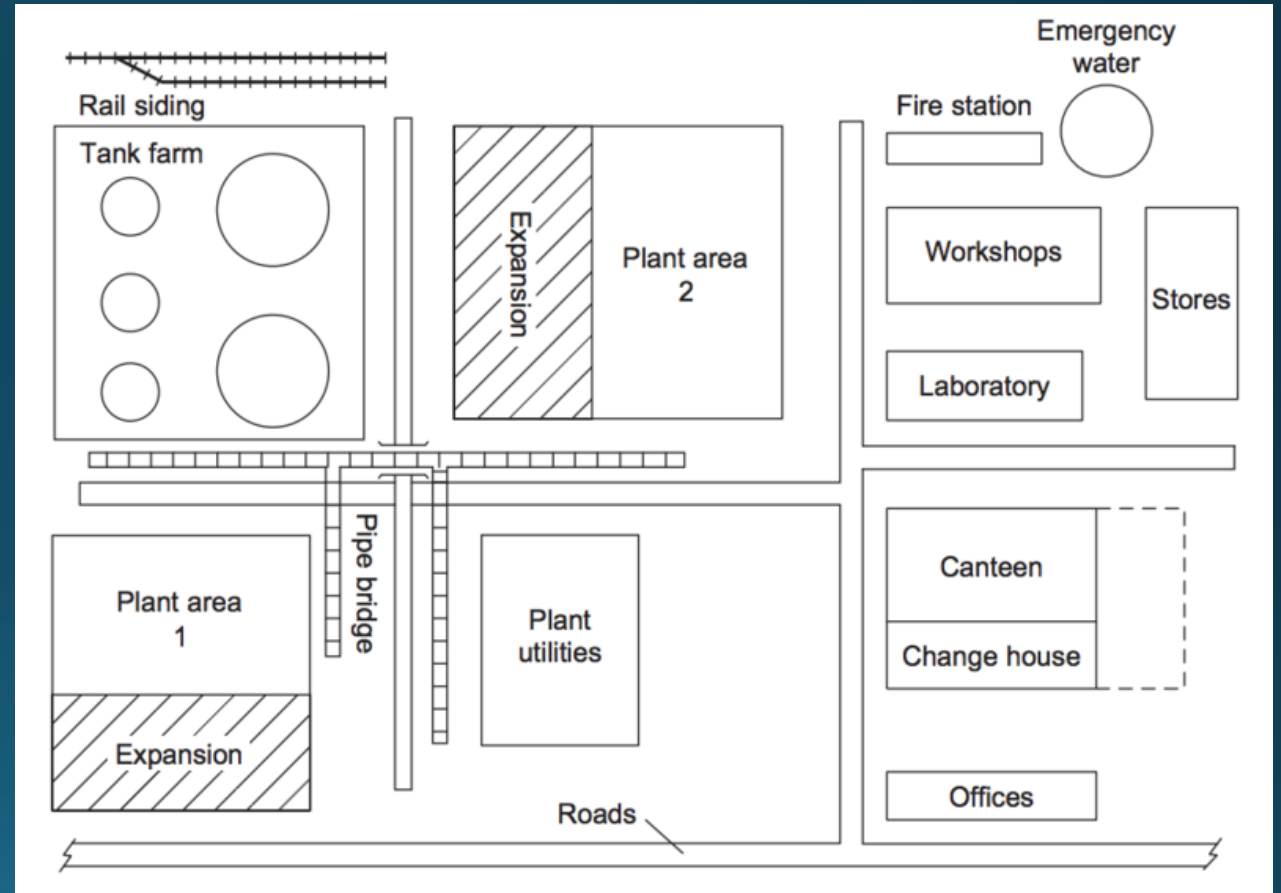
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## Reference:

EI Model code of safe practice – Part 15: Area Classification code for installations handling flammable fluids (EI15, formerly referred to as IP15)

# 1. What is an Area Classification?

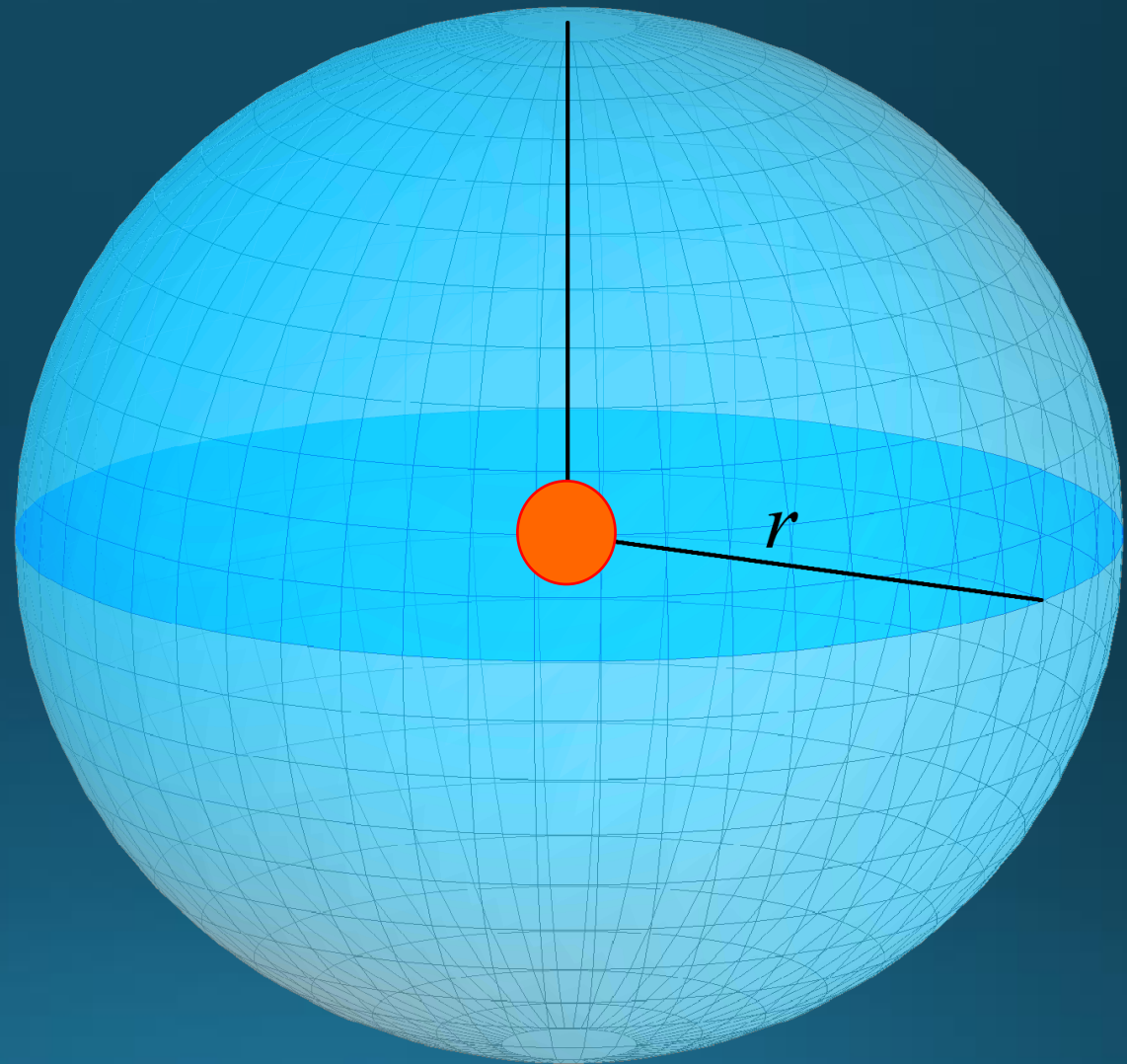
- A method of analysing an environment in order to determine the probability of an explosive atmosphere occurring.



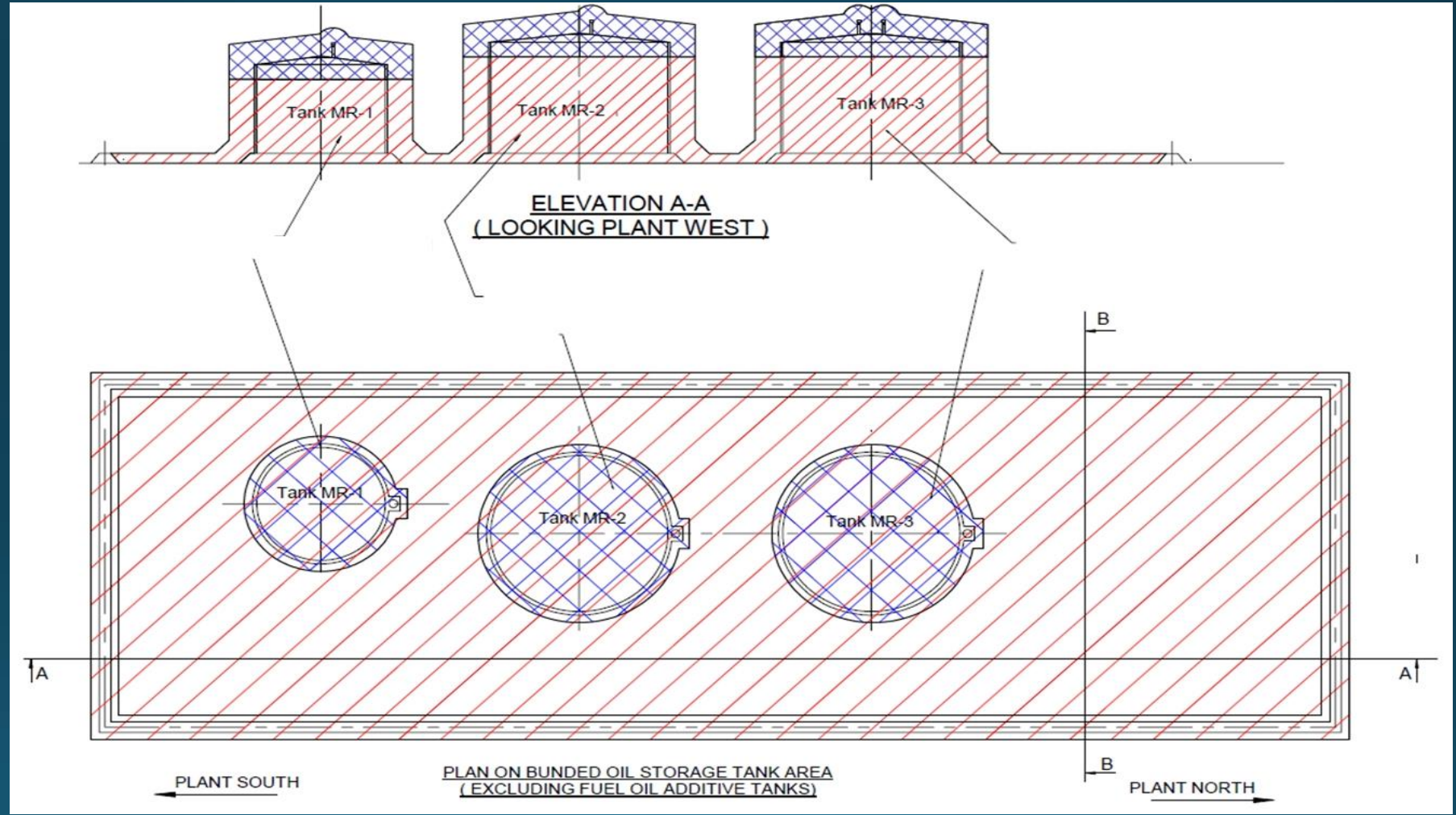


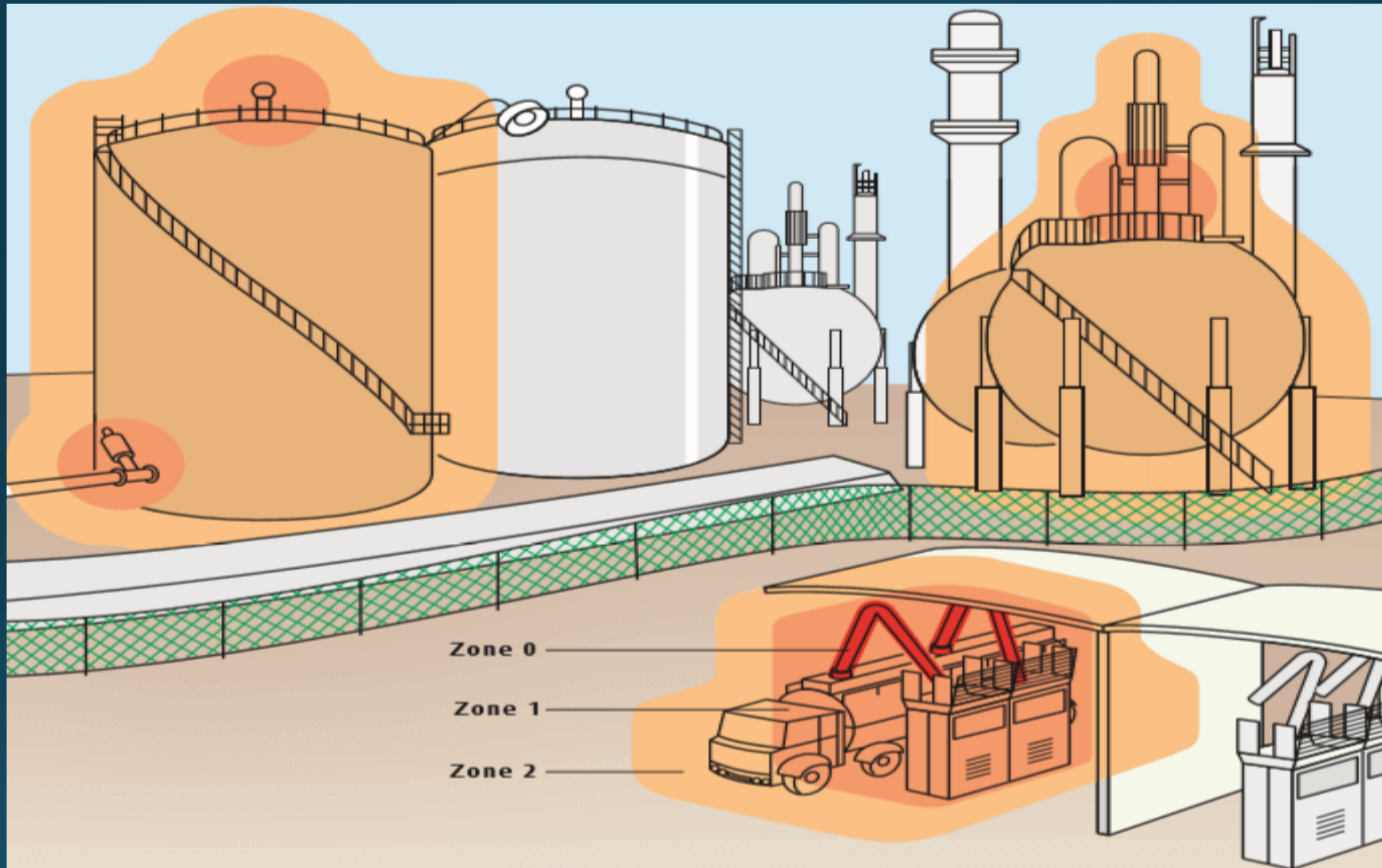
# the word 'area'

- Is three-dimensional



# Layouts





## 2. Useful terms/definitions:

Common:

Flammable atmosphere: a mixture of flammable gases or vapours with air in such a proportion that it will burn when ignited

Ignition source: A source of energy in the form of a flame, arc, spark or heat that is capable of igniting an explosive atmosphere

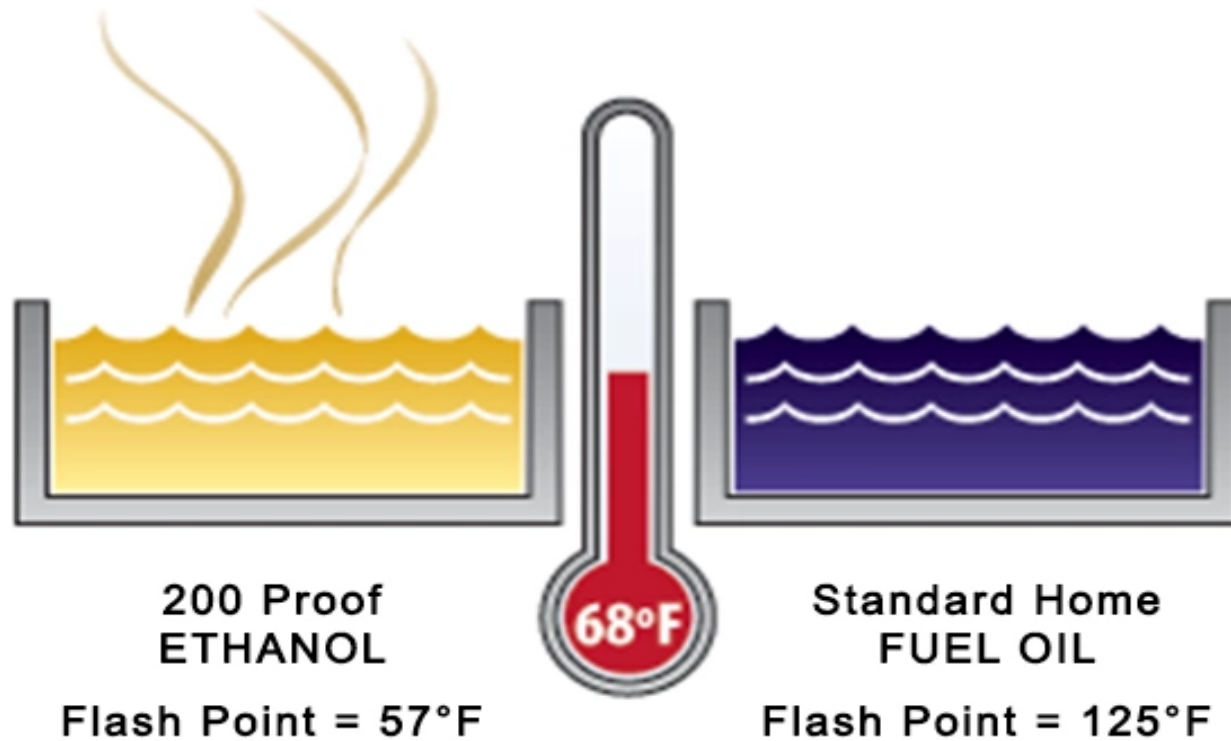


- Hazardous area and zone: A three dimensional space in which a flammable atmosphere is or may be expected to be present in such frequencies as to require special precautions for the construction and use of electrical apparatus. A hazardous area for gas/liquid environments consists of three types of zones (Zone 0, Zone 1, and Zone 2)

- Hazardous radius: The extent (in metres) of the hazardous area.
- Hole size: refers to the leak hole size diameter (in mm) of a pump/compressor seal or joints for examples. Used as a basis for calculating hazardous radii.
- Flash point: lowest temperature, under standardized conditions, a liquid gives off vapours in a quantity such as to be capable of forming an ignitable vapour/air mixture.

# FLASH POINT

**FLASH POINT** - Lowest temperature at which a liquid gives off enough vapors to form an ignitable mixture with air.



# Zone Classification

- Zone 0: That part of a hazardous area in which a flammable atmosphere is continuously present or present for long periods.
- Zone 1: That part of a hazardous area in which a flammable atmosphere is likely to occur in normal operation
- Zone 2: That part of a hazardous area in which a flammable atmosphere is likely to occur in normal operation and, if it occurs, will exist only for a short period.
- Non-hazardous areas: Areas that do not fall into any of the above.



# Grade of release

- Continuous: A release occurs all the time or for long periods, or frequently for short periods
- Primary: Release that is likely to occur periodically or occasionally in normal operations
- Secondary: Release that is unlikely to occur in normal operation.

# Relationship between grade of release and zone classification

Grade of release	Zone
Continuous	0
Primary	1
Secondary	2

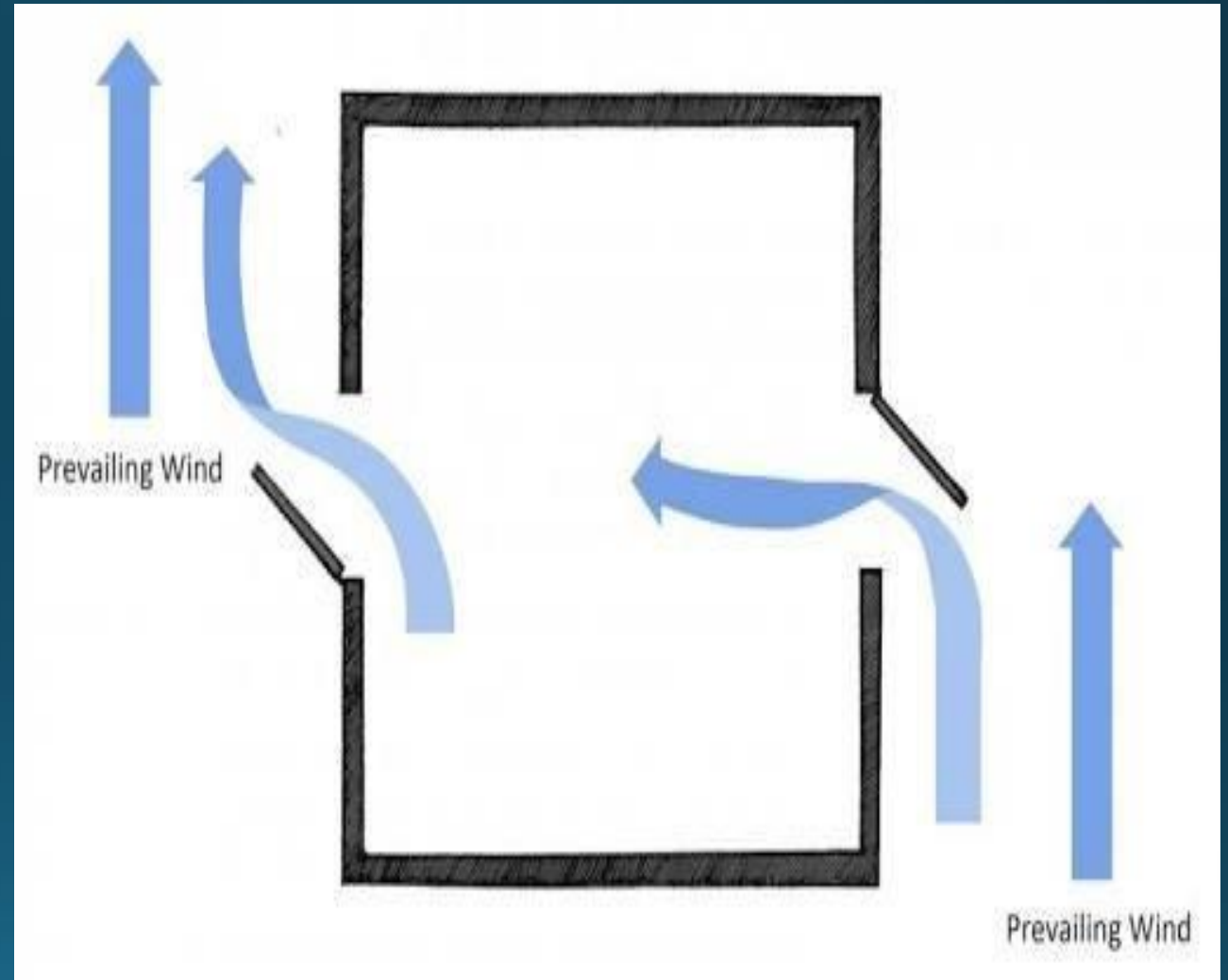
A direct relationship exists between grade of release and Zone, however, it is not always true.

# Fluid categories

Fluid Category	Description
<b>A</b>	A flammable liquid that, on release would vaporise rapidly. Example, LPG
<b>B</b>	A flammable liquid, not in category A, but at a temperature sufficient for boiling to occur on release
<b>C</b>	A flammable liquid, not in categories A or B, but which can, on release, be at a temperature above its flash point, or form a flammable mist or spray.
<b>G(i)</b>	A typical methane-rich natural gas
<b>G(ii)</b>	Refinery Hydrogen

# Ventilation

- Open Area
- Congested Area
- Stagnant Area
- Enclosed Area





# Area Classification Approaches

- Point Source Approach
- Risk Based Approach
- Direct Example Approach

The EI15 provides the tabulated values and formulas used for calculating the hazard radius.



### 3. When is an Area Classification needed?

- Is it always needed? No
- Non-flammable materials
- High Flash points



# Questions to ask...

- What are the material chemical properties?
- What are the operating conditions?
- Will an explosive atmosphere exist in such conditions?
- What is the Fluid Category?
- Quantity of flammable material released?
- What are the sources of release?
- What is the grade of release?
- Ventilation effectiveness?
- Determine hazardous zone, and zoning radius.

# 4. Examples

- A fluid of category C is handled above its flash point, and expected to vent to atmosphere in an open area, periodically during normal operation.

Vent diameter = 100mm

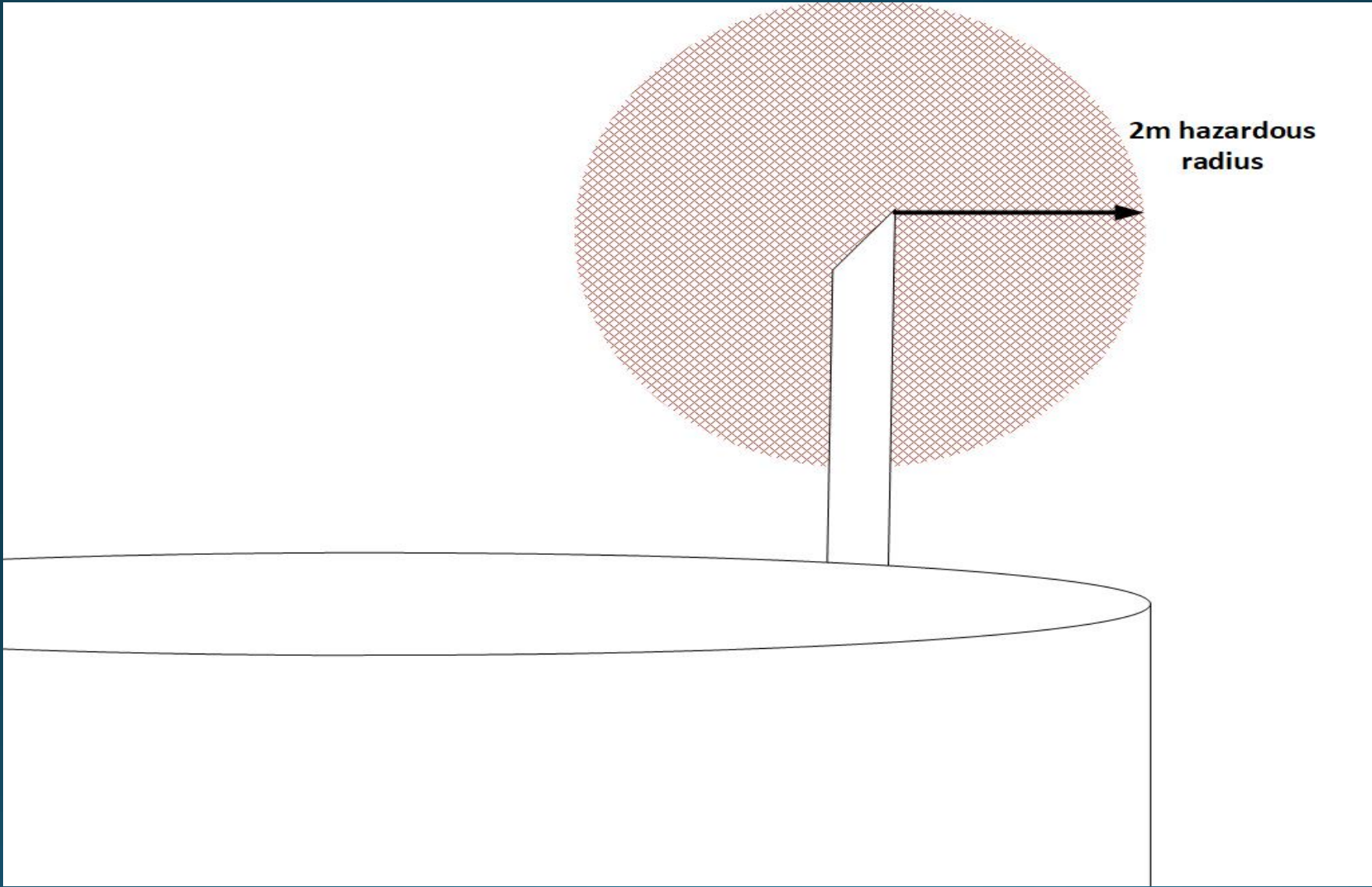
Vent rate = 300Nm<sup>3</sup>/hr



# Example table for Hazardous radius (m) for tank vents of Fluid Category C:

Vent rate (Nm <sup>3</sup> /hr)	Vent diameter (mm)		
	75	100	125
100	1	1	2
200	1	2	2
300	2	2	3

The above values are not exactly true and is used as an example for presentation purposes only.



## another example...

- Determine the hazardous radius around a flange on an LPG tank operated at 1 bar(a) pressure

<b>Fluid Category</b>	<b>Release Pressure (bar(a))</b>	<b>Hazardous Radius (m) for a 1mm hole diameter</b>
<b>A</b>	1	1
<b>B</b>	15	2
<b>C</b>	20	2

The above values are not exactly true and is used as an example for presentation purposes only.

# Small scale operations: Laboratories

- Assessment must still be done

Not usually zoned.

- Training,
- Good ventilation,
- Fume cupboards



# 5. Questions?

Pratheer Ramkaran

 081 262 5296

 [pratheer@sallab.co.za](mailto:pratheer@sallab.co.za)

 [www.sallab.co.za](http://www.sallab.co.za)

