

Fire Protection Concerns Applicable to Fixed Roof (Cone) Storage Tanks

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Table 5.2.5.2.2 Minimum Discharge Times and Application Rate for Type I and Type II Fixed foam Discharge Outlets on Fixed-Roof (Cone) Storage Tanks Containing Hydrocarbons

Hydrocarbon Type	Minimum Application Rate		Minimum Discharge Time (min)	
	L/min-m ²	Gpm /ft ²	Type I Foam Discharge Outlet	Type II Foam Discharge Outlet
Flash point between 37.8°C and 60°C (100°F and 140°F)	4.1	0.10	20	30
Flash point below 37.8°C (100°F) or liquids heated above their flash points	4.1	0.10	30	55
Crude Oil Petroleum	4.1	0.10	30	55

GASOLINE



95' Diameter Internal Floater, Gasoline Tank

Application Type	Minimum Application Rate	Number of Fixed Discharge outlets	Minimum Discharge Time	Total GPM of Water/Foam Solution	Total Gallons Of Foam Concentrate Required
II	0.10	2	55	709	1170











Foam blanket burning in the diked area.





28 7:39 PM











Issue I

Expected Life Of Foam Blanket



Parameters Of Incident

Vapor Pressure = 83.73 mm Hg (1.62 PSI) (Worst Case, Vapor Pressure Closed Cup @ 100°F)



4' Vapor Space + Void Under Cone
42528 FT³



Parameters Of Incident

Vapor Consumption 300 CFM (30/vent)

Flammable Vapor Duration 141 min. (2 hour 21 min).

55 Minute Foam Duration (NFPA 11)



Parameters Of Incident

Your Foam Blanket Ain't
Gonna Last That Long!



Issue II Fly By Night Foam Company

Initial Ignition UEL -100% O₂ - 0%

30 mins.

UEL -100% O₂ - 4.4%



Issue II Fly By Night Foam Company

60 mins.

UEL -100% O₂ - 8.8%

90 mins.

UEL -100% O₂ -13.3%

130 mins.

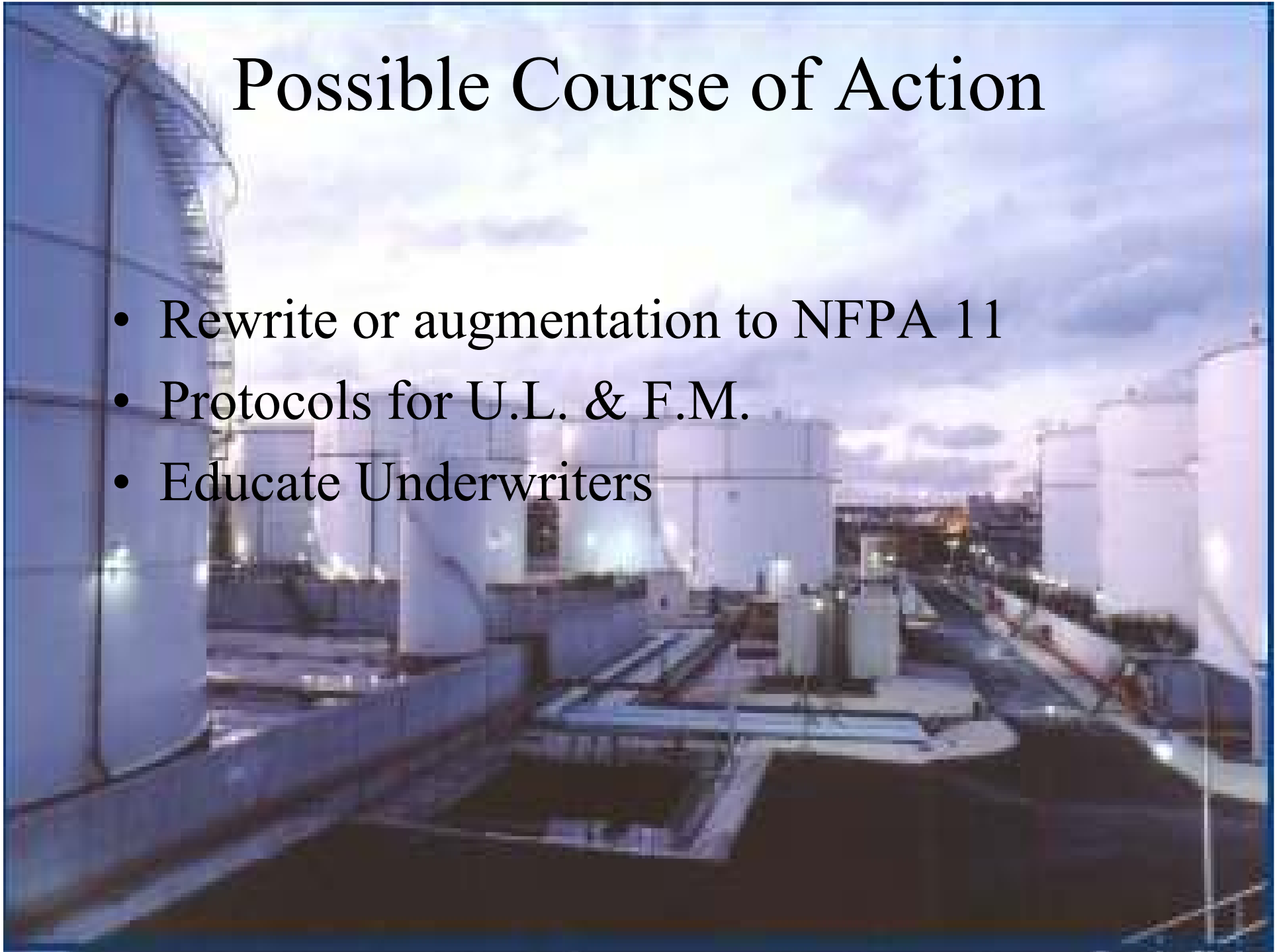
UEL -100% O₂ - 19.4%





Possible Course of Action

- Rewrite or augmentation to NFPA 11
- Protocols for U.L. & F.M.
- Educate Underwriters



Possible Solutions & Issues

Steam

- Availability

CO²

- Availability
- Cost - 400 FT³ System Bottle Cost \$600.00

Clean Agents (Intergen)

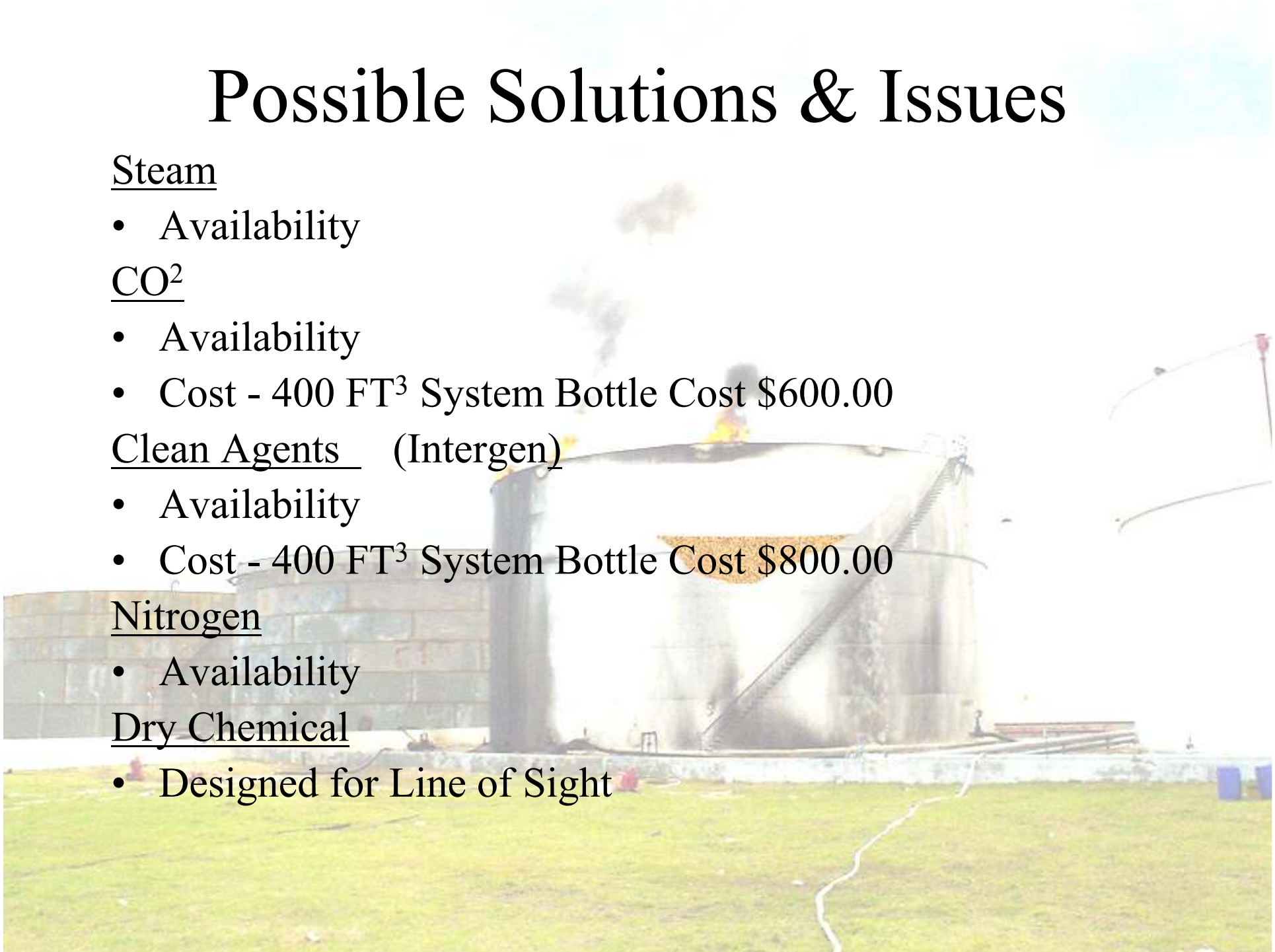
- Availability
- Cost - 400 FT³ System Bottle Cost \$800.00

Nitrogen

- Availability

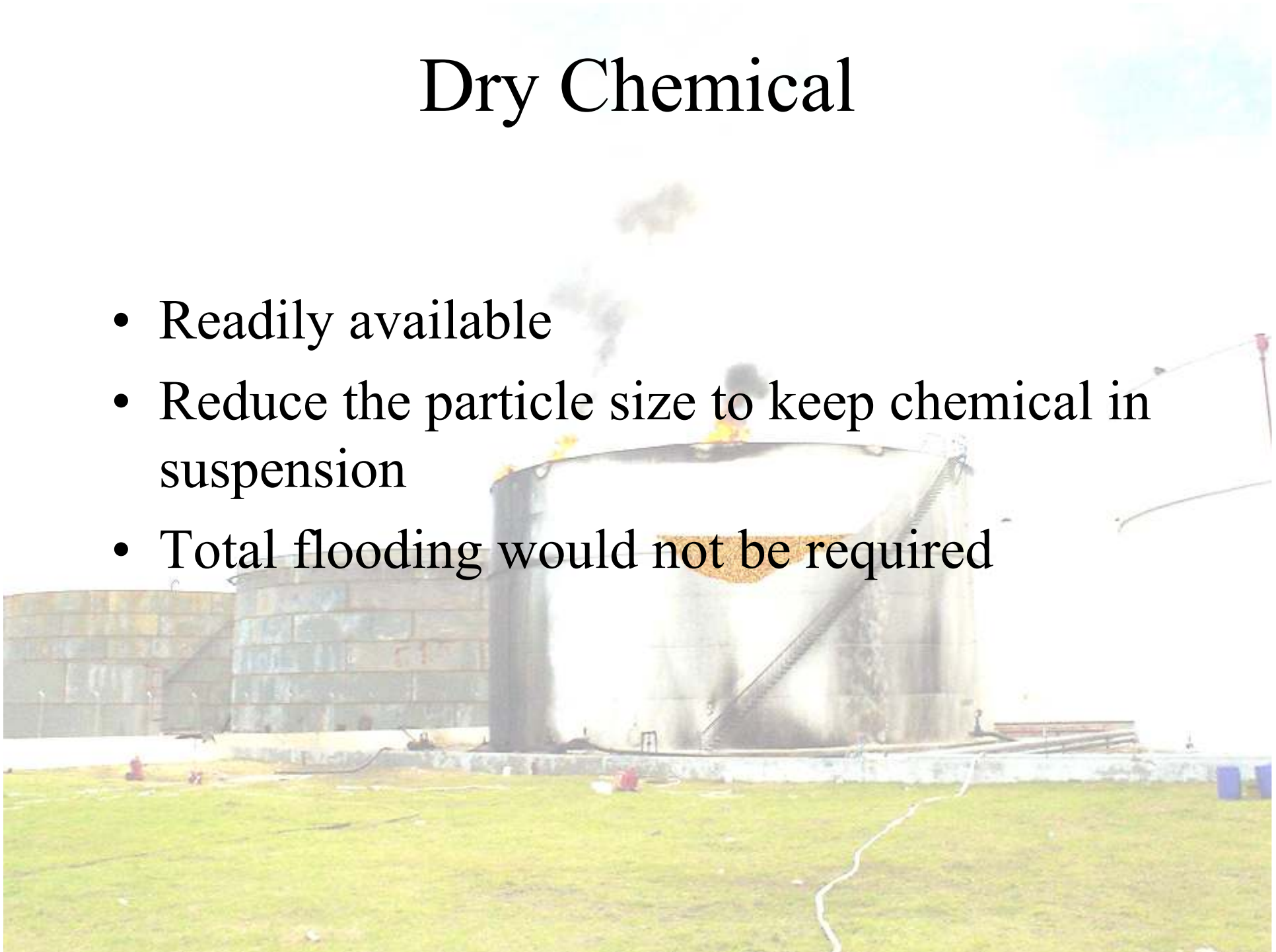
Dry Chemical

- Designed for Line of Sight



Dry Chemical

- Readily available
- Reduce the particle size to keep chemical in suspension
- Total flooding would not be required



Dry Chemical

Twin Agent Foam Chamber



