

PUTTING DISASTERS INTO PERSPECTIVE, & PRACTICAL WAYS TO REDUCE RISK



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Calgary Alberta (GPAC November 2011)

OBJECTIVES:



1. Putting major disasters into perspectives

- 2.

- 3.

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1. Putting major disasters into perspectives

2. Fundamentals of Risk Analysis

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1. Putting major disasters into perspectives
2. Fundamentals of Risk Analysis

3. Demonstrate the utility of Risk Management Tools



Setting the stage

We live a privileged life



We live a privileged life



But we shouldn't expect these privileges ...

To be delivered to our doorstep without accepting some risk

BP's GULF of MEXICO BLOW-OUT



A disaster by any definition

This incident was **horrendous**
and **unacceptable!**





GAINING PERSPECTIVE ...

Comparison to other Environmental Disasters

Persian Gulf War 1991



Persian Gulf Fire and Oil Spill 1991



100 x Flow-rate



GAINING PERSPECTIVE ...

Comparison to another Disasters with many fatalities

Ocean Ranger 1982



All of the 84 Crew were lost at sea



Lessons were learned:

- ◆ **Better life boat launching procedures**
- ◆ **New standards for safety training & life suites**
- ◆ **Upgrades to preventative maintenance procedures**
- >> The likelihood of the Ocean Ranger Disaster happening again are much lower.**



GAINING PERSPECTIVE ...

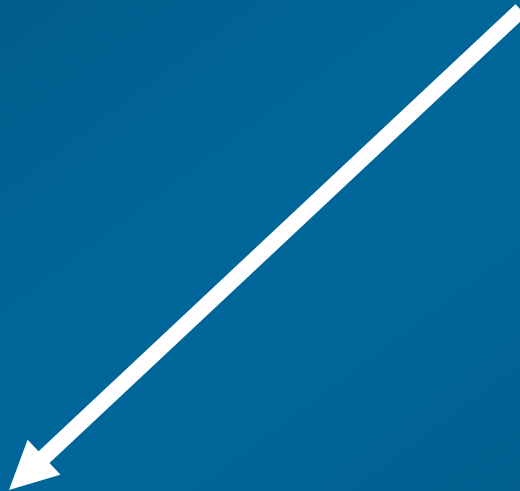
Relative Probabilities

Gaining Perspective ...

Event	Probability
Fatality - traffic accident in Canada	1.2 / 100,000
Fatality - Commercial Air travel	0.4 / 100,000
Fatality – Motor Boating	27.7 / 100,000
Large Spill - an Exploration Well	7.8 / 100,000

Risk Management

Severity



Probability

Tool # 1 - Project Risk Analysis Example

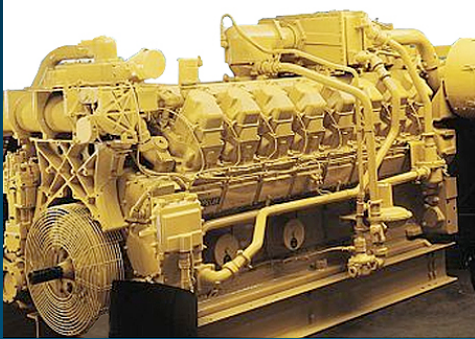


Pipeline River Boring

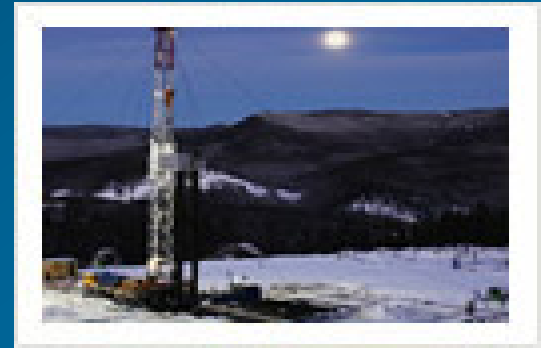
Threat	Probable Cause	Risk			Mitigation
		Severity	Probability	Rating	
Rig damaged or lost	Flooding river from extremely heavy rainfall	H	M	H x M	Build an elevated rig pad to protect rig from extreme heavy rainfall

Tool # 2 – Operational Risk Analysis Example

Gas Driven Generator



Causes	Consequence	Safeguards	Risk			Recommendations
			Severity	Probability	Rating	
Rupture of the glycol coolant hose	Overheating and engine damage	Regular servicing	M	M	M x M	Add a low coolant pressure alarm
		Operator rounds				



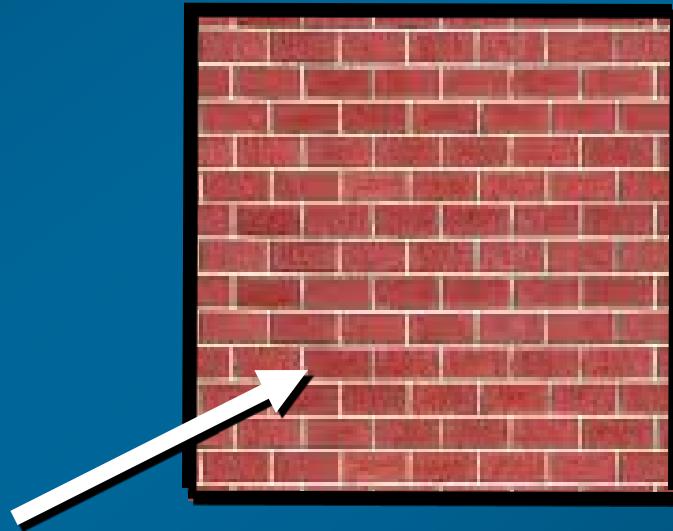
How many safeguards are likely in place to guard against a gas blowout on a typical Exploration Well in the Alberta foothills?

TYPICAL SAFEGUARDS for GAS BLOW-OUT:

- 1. Well Prognosis & Mud Design program**
- 2. Analysis of Mud cuttings**
- 3. High Pressure detection equipment**
- 4. Procedures to circulate gas kick back to formation**
- 5. Driller intervention to reduce loss of drilling fluids**
- 6. Gas detection at Mud Tank**
- 7. Gas detection at Rig floor**
- 8. Blow Out Prevention – Soft Seal Equipment**
- 9. Blow Out Prevention – Shear Rams**

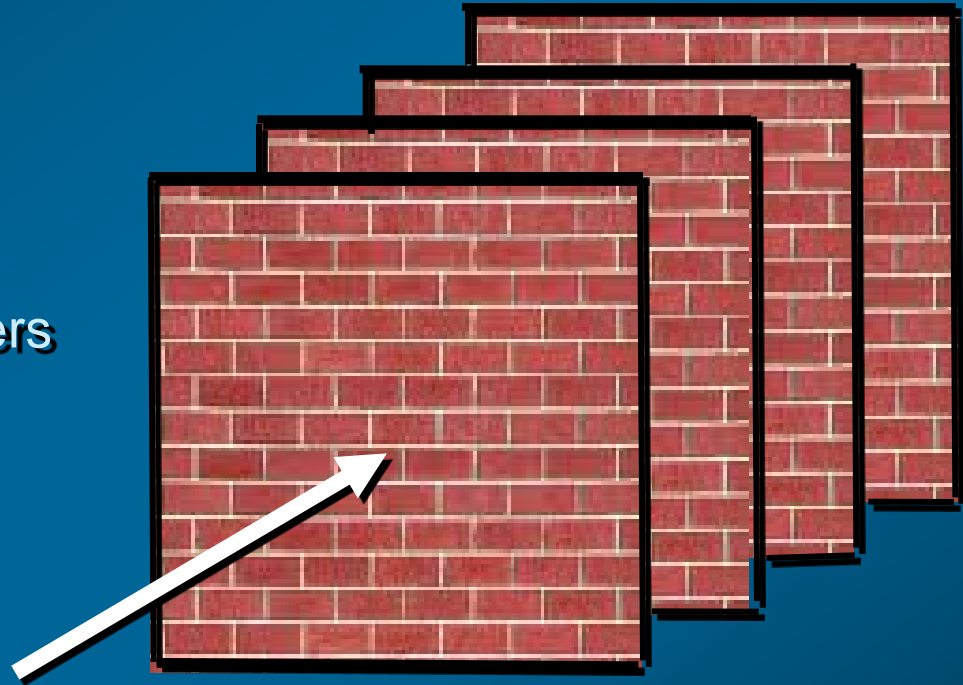
Independent Layer of Protection

Threat



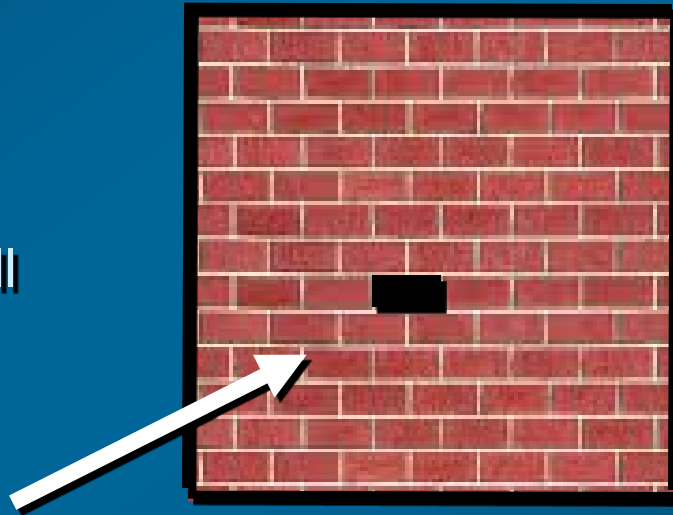
Independent Layers of Protection

Often there are several layers



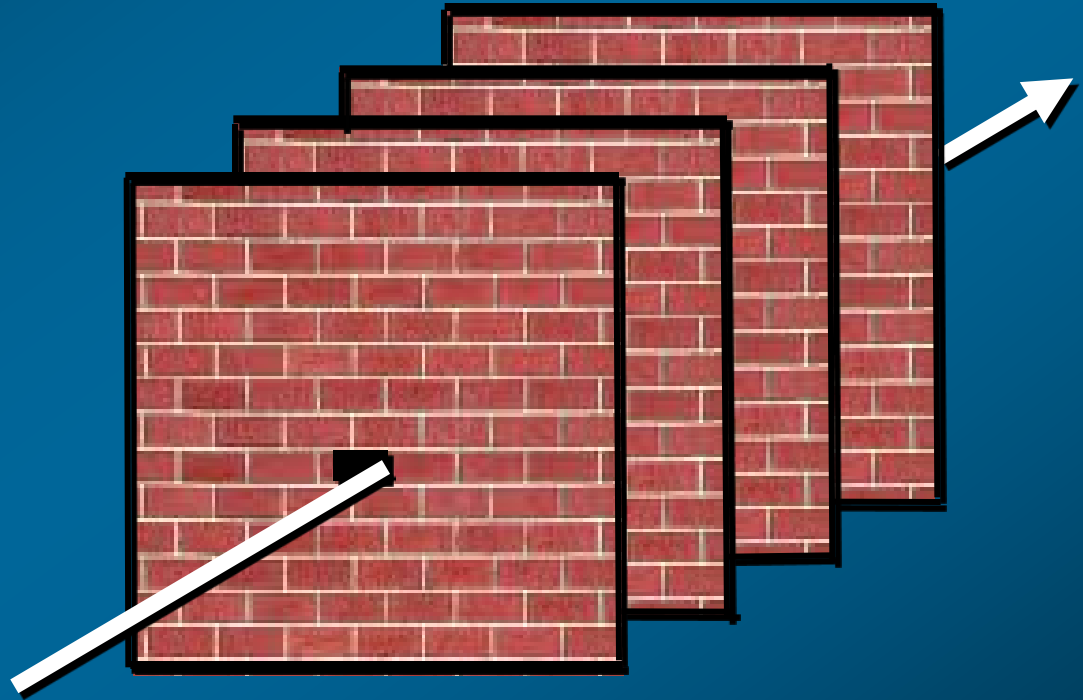
Independent Layer of Protection

A holes in the wall



Independent Layers of Protection

When the holes align ...
An accident can happen





We have more work to do ...



We have more work to do ...

- Be more diligent in the identification of High Risks



We have more work to do ...

- Be more diligent in the identification of High Risks
- **Minimize their likelihood of occurring**



We have more work to do ...

- Be more diligent in the identification of High Risks
- Minimize their likelihood of occurring
- **Reduce the significance of the impact**

Benefits are many ...



Other benefits ...



In closing ...



- ◆ Put disasters into perspective

In closing ...

- ◆ Put disasters into perspective
- ◆ **Learn from the past**



In closing ...

- ◆ Put disasters into perspective
- ◆ Learn from the past

◆ **Proactively mitigate risk**



In closing ...

- ◆ Put disasters into perspective
- ◆ Learn from the past
- ◆ Proactively mitigate risks

◆ **Let's move forward responsibly**



Thank you

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Any Questions?