Multi-Product Pipeline Network
Quantified Risk Assessment

- Need for QRA to be applied to gasoline as MAHP for amendments to PSR 96 to include gasoline
- HSE approach – concerns with pinhole dominating risks and non-logical PIPIN failure rate data
- Methodology based on Atkins 1998 report and now applied to several UK pipelines

WGP Meeting at Lancaster University
17 October 2006

KEY PARAMETERS AFFECTING SAFETY RISK ASSESSMENT

- Pipeline failure mechanisms and size
- Release rate
- Product flowing at the time – gasoline or high flash (kero-type) product?
- Response time of operators shutting off flow
- Amount released during response time, depressurisation and drain down
- Hole size to cause spray
- Ignition probability – spray fire, immediate or delayed pool fire, no ignition
- Probability of escape
- Fire and thermal radiation effects

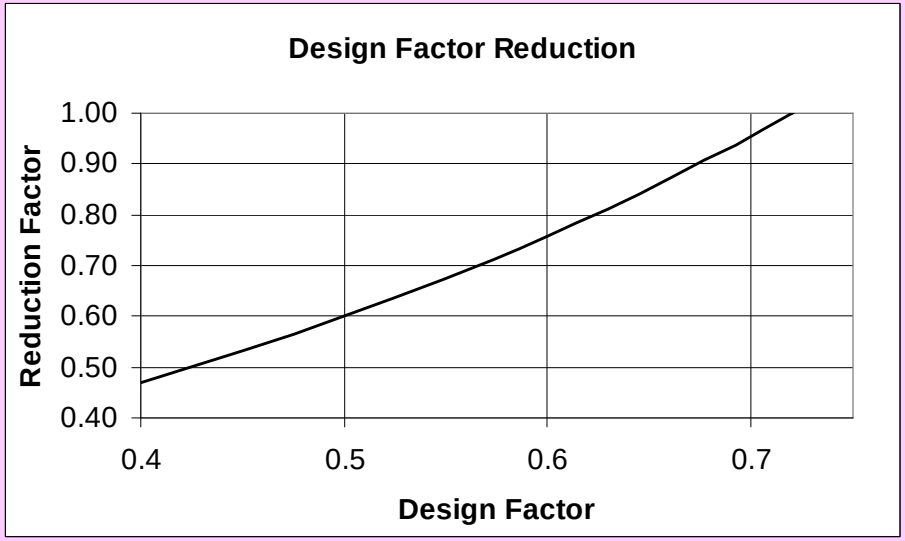
Table 2 - Failure Rates per 1000 kilometre-years – Product Oil Pipelines in the UK

Spillage Cause	Pinhole	Hole	Rupture	Total
Mechanical	0.025	0.022	0.012	0.059
Corrosion	0.012	0.049	0.002	0.063
Natural	0.002	0.008	0.004	0.014
Third Party	0.026	0.054	0.022	0.102
Total	0.065	0.133	0.040	0.238

Allow for:-

> Thicker wall
> Higher 3rd party
-At road crossings x 2
-Suburban areas x 3
(increased surveillance)

Figure 3 – Reduction in Failure Rate with Design factor



GENERIC FAILURE MECHANISMS

- 3rd Party interference / excavation
- Corrosion – internal and external
- Mechanical Defect – original or construction
- Natural Failure – earth movement / landslide etc.

OPERATIONAL FAILURE MECHANISMS

- Overpressure - e.g. due to multiple pump operation
- Thermal Expansion
- Overpressure due to surge
- Fatigue due to pressure cycling