WGP Meeting with HSE
MSDU

21st April 2005

UKOPA/05/0067

ACDS-MHSC Working Group on Pipelines
(HSE/Industry Formal Consultation)

Origins : Formed in 2001 following industry lobbying (UKOPA) for a specific consultation forum with HSE

Objectives: Risk based assessment methodology and LUP advice; amendments to PSR, consideration of forthcoming policy

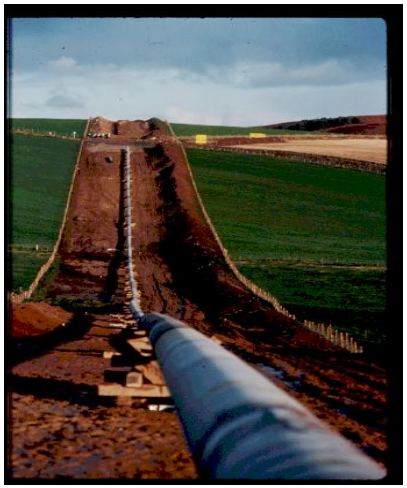
Constituency: Independent chairman, HSE policy, technical & operations, UKOPA, independent consultant

Involvement of HSE

- Original HSE involvement – Policy, MSDU, HID
- WP(RA) created to progress technical work programme
- MSDU withdrew – February 2002
- Interface with WGP then via the IFRLUP
- UKOPA priority is to deliver technical agenda (risk based LUP zones – all pipelines, risk assessment of gasoline pipelines, emergency planning)

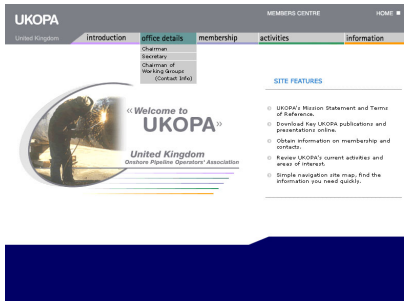
What is UKOPA?

- An independent, recognised forum representing the views and interests of UK pipeline operators.
- Non-profit making, funded by membership fees.



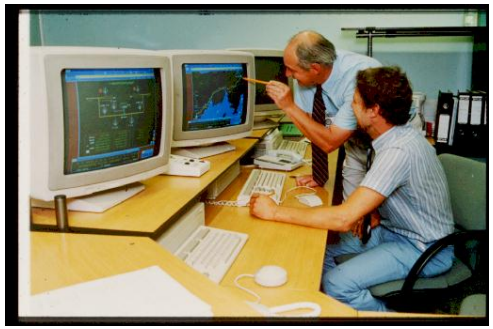
Background

- **Formed by Transco in 1996**
- Became a financially independent as a non-profit making organisation funded by membership fees in 1999.
- **Now comprises:**
  - ***Management Council***
  - ***Secretariat***
  - ***Membership – Full, Associate, Affiliate***
  - ***Working Groups***
- **Shares information through a website:**
  www.ukopa.co.uk



Benefits to Operators

- Share experience and lessons learned on incidents
- Share best practice
- Formulate and present common view
- Recognised Consultee
- Consistent and Focussed discussions with Regulator



Terms of Reference:

To provide the recognised and authoritative view of UK Pipeline Operators on strategic issues relating to safety management, operations and integrity of pipelines.

CURRENT MEMBERSHIP

Full Members:

BP, Huntsman, Shell, Transco

Associate Members:

Total, BG , Esso Petroleum,
Sembcorp, Unipen, BPA, OPA, Powergen

Invited Members:

HSE, PIG

AIMS:

Forum for discussion,knowledge sharing and promotion of best practice.

Influencing legislation development and modification

Co-ordinating consistent views on strategic issues

LUP
Risk Criteria
FFP/Revalidation
Safety

OBJECTIVES

External Communication

Liaison with HSE

Joint industry initiatives

Implementation of new technology

AIMS AND OBJECTIVES – HOW:

Formal Working Groups

Agreed ToR and organisation, work programmes and deliverables, appropriate funding

Informal Working Groups

Agreed remit, actions and reviews

Initial Studies

Limited scope, review and feedback

External Interfaces

Formal involvement and representation

FORMAL WORKING GROUPS

- Risk Assessment Working Group
- Fault Data Management Group
- Infringement Working Group
- Emergency Planning Working Group
- Competency and Training Working Group

WGP Technical Work

Working Party (Risk Assessment)

Driver: Re-evaluation of LUP zones using up-to-date methodologies

Objectives: Development of revised and agreed LUP zones for all MAHPs

Status: Established involvement to Fundamental Review of LUP (came later)

Actions Agreed by UKOPA on withdrawal of HSE from WP(RA)

- Establish a longer term process for future working to deliver the WGP technical agenda
- UKOPA to progress and resource work programme
- Deliver work programme through WGP-MHSC-ACDS
- WGP to confirm governance, approval and stakeholder consultation

WGP Technical Work Programme - ongoing

- Identifications of areas affected by land movement (Transco BGS) and incorporation into LUP advice.
- Improved Limit State Function – mechanical damage.
- Assessment of mitigation factors (slabbing & marker tapes)
- LUP zones for ethylene pipelines (using HSE methodology).
- LUP zones for Spiked Crude and NGL pipelines (using HSE methodology).
- Risk assessment methodology for gasoline pipelines.

Actions now being progressed by WGP:

- R McConnell represented WGP on HSE IFRLUP P5 (Review of assessment methodologies Part 1 (depth of analysis required and criteria)
- WGP input/joint working with HSE on P6 via R McConnell's involvement (Review of Assessment Methodologies – Part 2 (implementation)
- UKOPA is sponsoring full technical work programme
- Results of work programme to be published as supplements to BS PD 8010 and IGEM TD/1 to provide a codified approach for the application of pipeline risk assessment for LUP advice to Local Planning Authorities

Development of Supplements to BS PD 8010 and IGEM TD/1 to Provide a Codified Approach for the Application of Pipeline Risk Assessment for LUP Advice to Local Planning Authorities

Background

Land Use Planning:

- Controls the type, size and location of developments proposed in the vicinity of hazardous installations and pipelines
- Purpose is mitigation of consequences of hazardous accidents.

Responsibilities:

- Local Planning Authorities (LPAs) – approval of developments in the vicinity of notified hazardous installations and pipelines
- HSE – provide advice on tolerability of risk

Issues

- There is currently no formal, agreed methodology for the provision of advice by pipeline operators
- Potential exists for non-acceptance of operator advice by HSE
- A recognised, codified methodology which aligns with PADHI is required for use by pipeline operators

Role of the UK Pipeline Codes BS PD 8010 and IGEM TD/1

- Compliance with BS PD 8010 (all substances) and IGEM TD/1 (natural gas) demonstrates compliance with PSR 96.
- Compliance with the above pipeline codes demonstrates that the risk is **A**s **L**ow **A**s **R**easonably **P**racticable (ALARP).

Codified Approach – Application of Risk Assessment to for LUP Advise to

Requirements:-

- Definitions for :
  - Hazardous substances
  - Failure modes
- Recognised/accepted:
  - Operational data sources
  - Consequence models
- Defined failure scenarios and event trees
  - LUP risk criteria - individual
    - societal
  - Defined development categories and population types
  - Recognised mitigation methods and associated risk reduction factors

Outline Work Programme

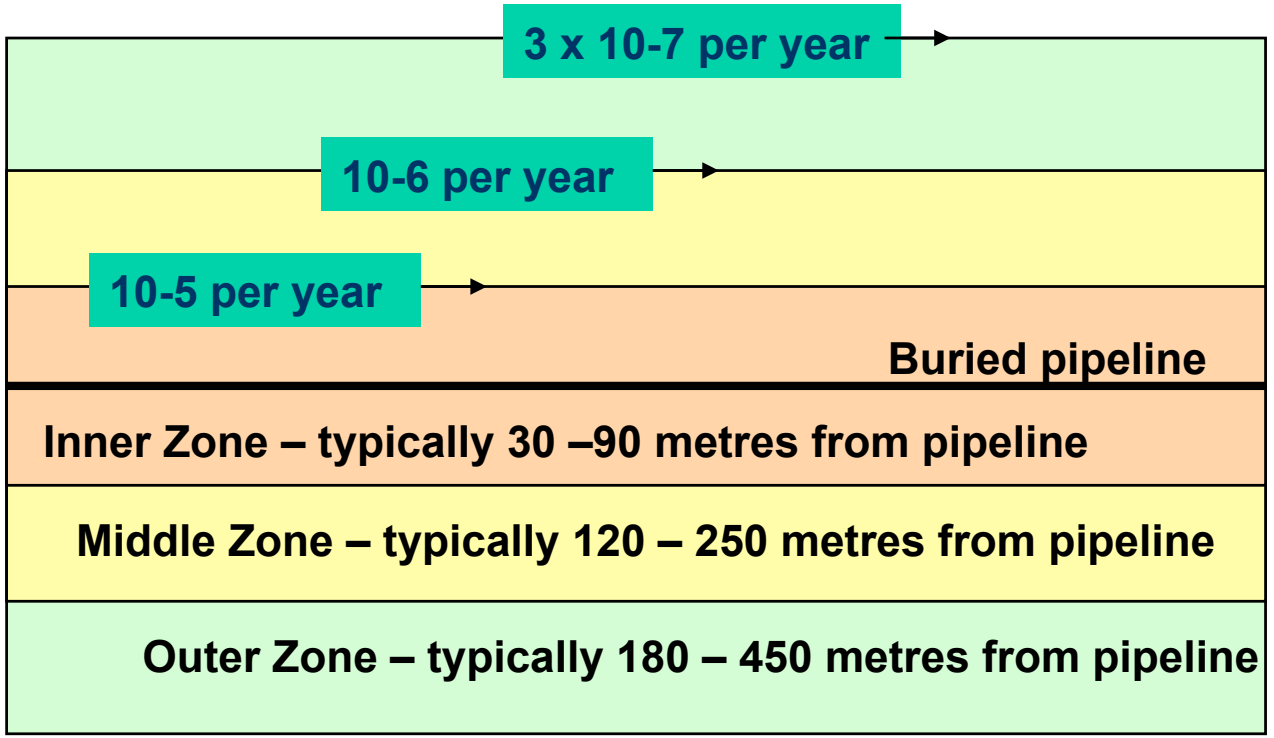
Requirement	Substance			
	Natural Gas	Ethylene	Spiked crude	Other
Failure Modes Failure Data Frequency prediction	√	√	April 05	June 05
UK risk of Ground Movement	June 05	Aug 05	Aug 05	Aug 05
Consequence Models	√	√	April 05	June 05
Accident scenarios and event trees	√	√	June 05	June 05
Generic LUP Zones	√ To be revised when 2 available	April 05, to be revised when 2 available	July 05	Aug 05
Mitigation Measures	√	April 05	April 05	April 05
Risk Reduction Factors	June 05	June 05	June 05	June 05

Outline Publication Programme

Outline draft (scope, format, available material)	30th April 05
Working draft (for technical comment)	30th June 05
Final draft (for public consultation/independent review)	31st Aug 05

Land Use Planning in Britain

- 3 zone Land Use Planning zones applied to Major Hazard Pipelines in late 1980s / early 1990s



- Permitted developments in each zone described in HSE document PADHI – Planning Advice for Developments near Hazardous Installations

Land Use Planning in other Countries

- **Europe - Article 14 of possible European Pipeline Directive**

Member States shall ensure that……there are controls on…...new developments such as transport links, locations frequented by the public, and residential areas in the vicinity of existing pipelines……to maintain appropriate distances between the pipelines and the developments….

- **USA - "Transmission Pipelines and Land Use – A Risk-informed approach" Special report 281 Transportation Research Report**

<u>Recommendation 1:</u> Office of Pipeline Safety should develop risk-informed land use guidance for application by stakeholders

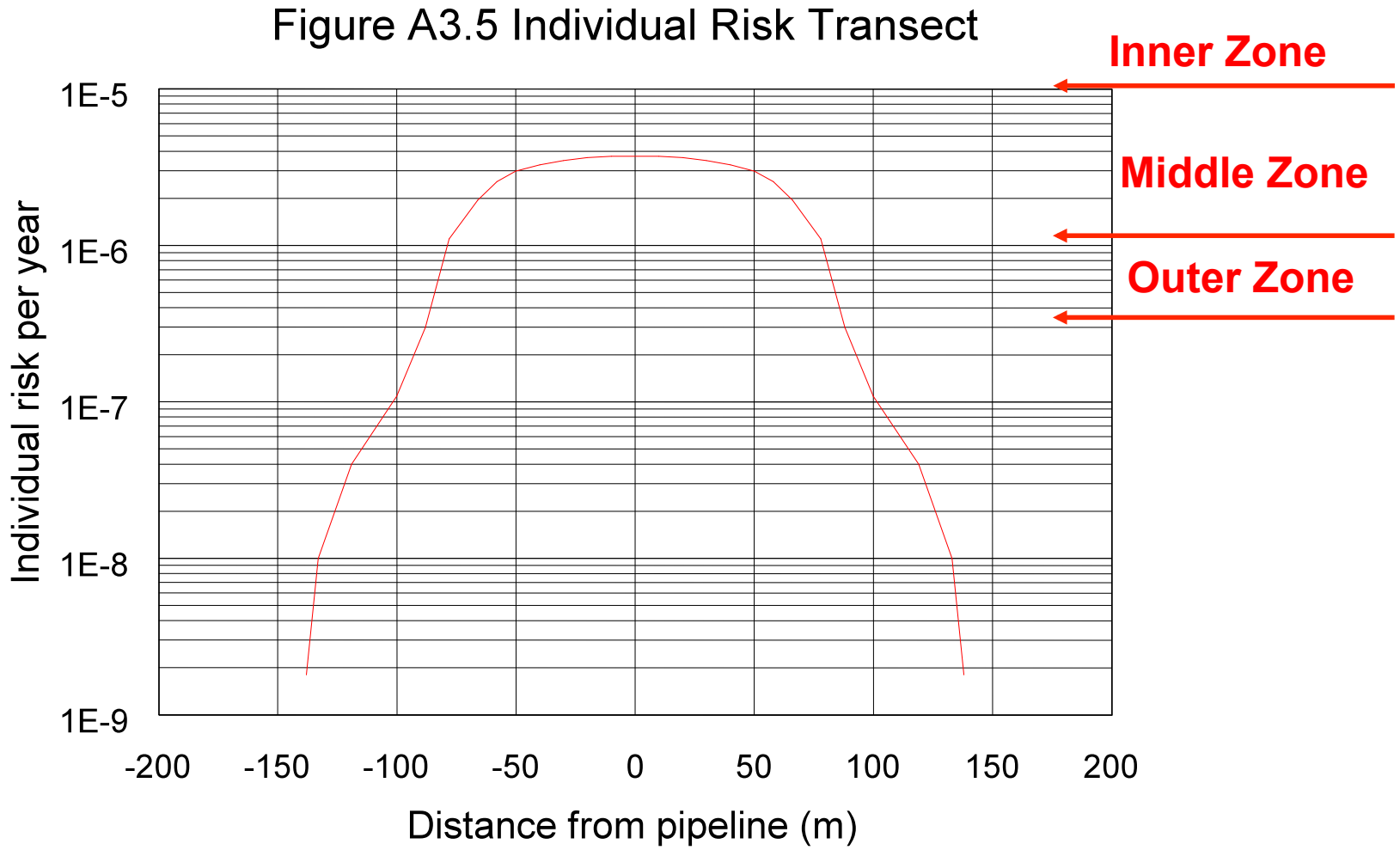
<u>Recommendation 2:</u> The process for developing risk-informed land use guidance should
(*a*) involve the collaboration of a full range of public and private stakeholders (e.g., industry and federal, state, and local governments)
(*b*) be conducted by persons with expertise in risk analysis, risk communication, land use management, and development regulation
(*c*) be transparent, independent, and peer reviewed

- **Responsible International pipeline operators in countries worldwide trying to apply development restrictions**

Application of QRA to obtain Land Use Planning Zones

- HSE committed to setting LUP zones using risk-based approach
- Most pipelines do not have peak risks levels at or above 10-5 per year, so NO INNER ZONE !!
- However, inner zone set by 1 BPD as defined in IGE/TD/1 and PD 8010
- Middle and Outer zones set by cautious application of risk analysis
- Failure rate data used from UKOPA Fault Database
- Most Consequence models published by HSE staff in late 1990s
- Middle and Outer zone distances dominated by risks from Fireball

Typical Individual Risk Transect from TD/1



Mitigation methods for risk reduction

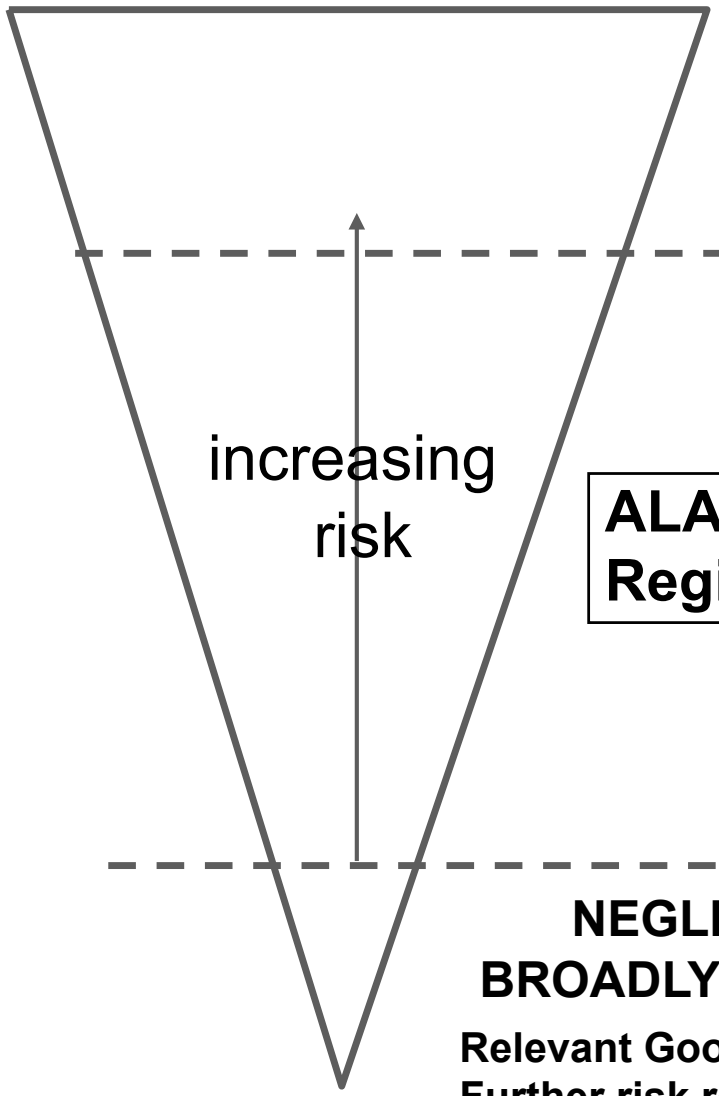
Mitigation methods:-

- essential part of risk management
- risk reduction over and above code requirements
- target cost effective expenditure on reducing risks
- categorised as “hard” (engineering) and “soft” (systems) measures

Engineering - slabbing / barriers over pipeline, deeper burial, more marker posts, thicker pipe …..
Systems - increased route surveillance, one-call systems…..

Need to be able to account for risk reduction factors in risk analyses to be able to assess ALARP measures

HSE Framework for Risk Tolerability



Must reduce the risk or
stop operating

UNACCEPTABLE

Individual risk
10-3 (worker)
10-4 (public)

Risk reduction
must be considered -

ALARP
Region

Risks to be reduced to
"As Low As Reasonably Practicable"

Use Cost-benefit analysis to assess
Risk Reduction Measures
"Gross Dis-proportionation" can justify not
spending more money

10-6 per year
Individual Risk

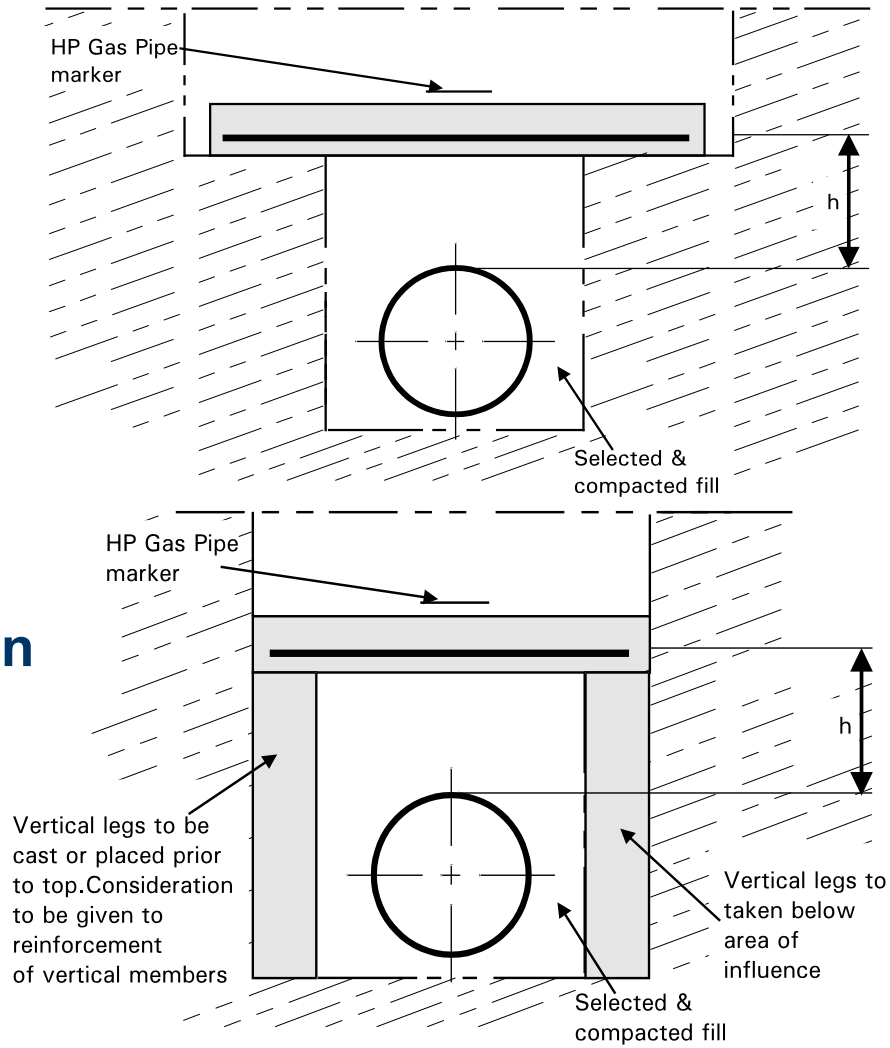
NEGLIGIBLE OR
BROADLY ACCEPTABLE

Relevant Good Practice must be applied
Further risk reduction need not be considered

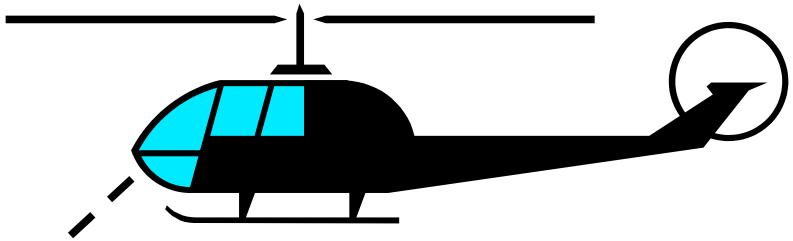
Mitigation methods – slabbing and marker tape – IGE/TD/1

Extensive trials by British Gas in early 1990s showed :-

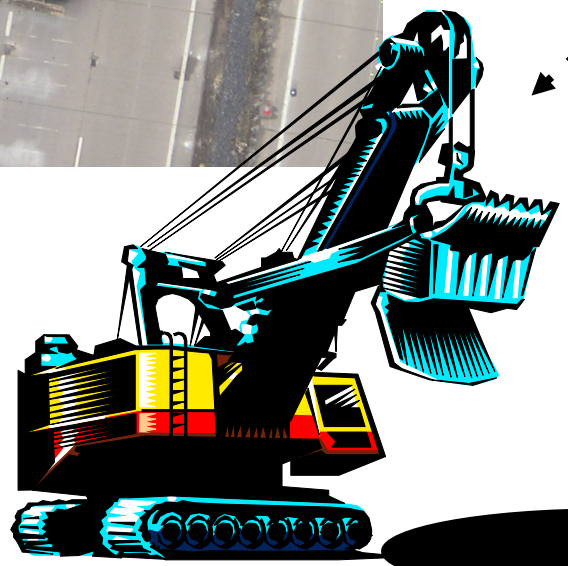
- **substantial reduction in risk by protecting pipeline with slabbing and marker tape (no damage in 30 trials)**
- **combination of mechanical protection (slabbing) and human factors (tape)**
- **risk reduction factor developed by Fault Tree analysis**



Mitigation methods – increased surveillance

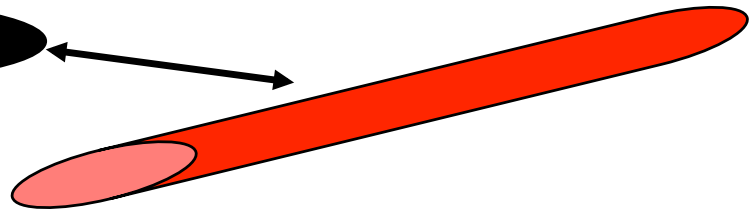


Frequency of Surveillance ?



How long to reach pipeline?

When does excavation start?



Proposed new supplement for PD 8010

- Land use planning zones now becoming an accepted requirement for high hazard pipelines - by pipeline operators
- Separation from population is already included in Codes as part of initial design and routing
- Need to incorporate ongoing requirement for maintaining limits on population growth during lifetime of pipeline as part of responsible operation - Land Use Planning zones
- Setting LUP zones should be a transparent process with understanding and participation of all stakeholders
- PD 8010 (Annex E) and IGE/TD/1 (Appendix X) already have protocol for Safety Evaluation and Risk Assessment procedures

Proposed new supplement for PD 8010

- Proposed new supplement to PD 8010 (and TD/1 for gas) to be a sub-set of existing risk assessment processes to enable Land Use Planning zones to be calculated

- Methodology will use established and published data for
  - Failure Rate data
  - Release rates
  - Ignition probabilities
  - Consequence models
  - Impact models for exposed population

- Objective is to use methods parallel to HSE's published models to obtain similar results for Land Use Planning zone distances

- Inner zone based on Building Proximity Distance, so Middle and Outer zones largely defined by Fireball radius and Impact models

Benefits of Proposed new supplement for PD 8010 & IGE/TD/1

- Maintaining ongoing separation distances from high hazard pipelines becomes part of Codal requirements
- Takes pressure off HSE to develop LUP zones in isolation – becomes transparent process supported by key stakeholders
- Reduces pressures on limited HSE resources for detailed assessments of pipeline systems to specify LUP zones (and special cases)
- Establishes standards for mitigation methods and associated risk reduction factors which can be used in risk assessments
- Allows developments and improvements in knowledge base to be incorporated into risk assessment models – e.g. better failure data predictive modelling, jet fire modelling, specific products such as ethylene and spiked crude