UKOPA Meeting 13 October 2010
Implications of Pipeline Safety Regulations on Land Use Planning Zones for Gasoline Pipelines

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Introduction / Background

- Gasoline not included in PSR 96 due to low risks
  - mainly ignition probability, also low population at risk
- HSE generated risk assessment approach for LUP zones based on AD Little & WS Atkins
- Buncefield changed all that…..
- PSR amendments (2010) now include Gasoline as a dangerous substance
- Therefore PSR Part III - Regulations 18 to 27 will then apply to Gasoline pipelines
- *"gasoline" means a fluid which –*
  (a) is liquid at 15°C and 1013.25 millibars;
  (b) when tested in accordance with Part A9 of the Annex to the Directive has a flashpoint (as defined in that part) of less that 21°C; and
  (c) can be used or blended for use as a fuel for motor vehicles

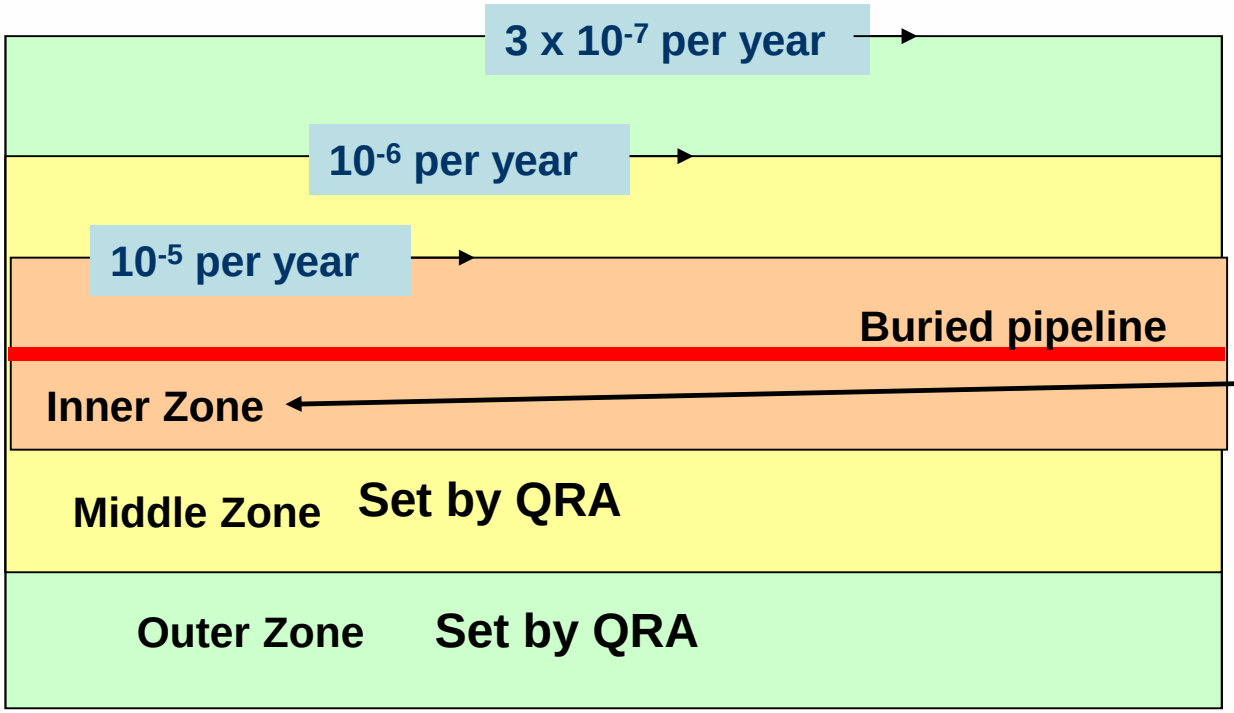
Main Changes to Gasoline Pipelines

- **Main changes:-**

1. **Need to produce a MAPD**
2. **HSE will impose Land Use Planning Zones – implications of new developments within ~ 80-100m from the pipeline**
3. **Need to have emergency procedures for dealing with consequences of a major accident**
4. **Local Authorities emergency plans must include gasoline pipeline emergencies**
5. **HSE will charge for time spent on visits and aspects of compliance with PSR.**

Land Use Planning Zones

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



Set by Fireball radius, or Building Proximity Distance (so far) – because pipelines do not have high enough risk level to reach 10^{-5} per year

- ❑ HSE's CI5 Section (currently Peter Harper) set these distances
- ❑ HSE's PADHI document describes permitted developments within these zones

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

The Sensitivity Levels are based on a clear rationale in order to allow progressively more severe restrictions to be imposed as the sensitivity of the proposed development increases. There are 4 sensitivity levels:

- Level 1 - Based on normal working population.
- Level 2 - Based on the general public - at home and involved in normal activities.
- Level 3 - Based on vulnerable members of the public (children, those with mobility difficulties or those unable to recognise physical danger).
- Level 4 - Large examples of Level 3 and large outdoor examples of Level 2.

Development Types are used as a direct indicator of the Sensitivity level of the population at the proposed development. Exceptions are made for some very large or very small developments by assigning them a higher or lower Sensitivity Level than normal for their Development Type.

The tables below expand on the four basic Development Types:

1- People at work, Parking
2 - Developments for use by the general public
3 - Developments for use by vulnerable people
4 - Very large and sensitive developments

PADHI

Guidance

DT2.1 - HOUSING	Houses, flats, retirement flats/ bungalows, residential caravans, mobile homes.	Developments up to and including 30 dwelling units **and** at a density of no more than 40 per hectare – **Level 2**	Development where people live or are temporarily resident. It may be difficult to organise people in the event of an emergency.
	EXCLUSIONS		
	Infill, backland development.	**DT2.1 x1** Developments of 1 or 2 dwelling units - **Level 1**	Minimal increase in numbers at risk.
	Larger housing developments.	**DT2.1 x2** Larger developments for more than 30 dwelling units – **Level 3**	Substantial increase in numbers at risk.
		DT2.1 x3 Any developments (for more than 2 dwelling units) at a density of more than 40 dwelling units per hectare - **Level 3**	High-density developments.

Having determined which zone the development falls into and also the Sensitivity Level of the development, the following matrix is used to decide the type of advice.

Level of Sensitivity	Development in Inner Zone	Development in Middle Zone	Development in Outer Zone
1	DAA	DAA	DAA
2	AA	DAA	DAA
3	AA	AA	DAA
4	AA	AA	AA

DAA = **D**on't **A**dvise **A**gainst development.
AA = **A**dvise **A**gainst development.

Land Use Planning Zones – How Large?

- How are LUP Zones set?
- Original HSE suggestion was:-
  - 50 metres Inner Zone
  - 80 metres Outer Zone
- Based on “notional” bund size for gasoline spillage

- UKOPA reviewed this and suggested alternative approach based on previous work (Atkins) and realistic parameters
  - Pool fire radius for inner zone based on max. flowrate
  - QRA based on spray fire + delayed pool fire for middle and outer zones

Land Use Planning Zones

- HSE (Peter Harper) responded at Nov 2008 meeting with proposal based on evaporation and QRA:-

	Inner Zone m	Middle Zone m	Outer Zone m
16” pipe diameter	44	39	62
14” pipe diameter	35	17	44
12” pipe diameter	32	36	50
8” pipe diameter	19	41	43

- However at Nov 2009 meeting Peter Harper described work by HSL looking at blast effects from semi-confined cloud of gasoline vapour with 200m + effect distances

HSE have now proposed LUP zones in their recent document

cd 228 “Analysis of responses to the consultation on proposed amendments to PSR”

Annex 3 - LUP Zones for Representative Gasoline Pipelines

Pipeline	Inner Zone	Middle Zone	Outer Zone/CD
16” Urban	44	75	80
12” Urban	40	75	80
8” Urban	32	55	70
6” Urban	19	45	60
16” Rural	44	44	55
12” Rural	40	40	60
8” Rural	32	32	32
6” Rural	19	19	35

Land Use Planning Zones - Implications

- Existing situation remains – "Grandfather rights" – what's there is there, however close to the pipeline
- Local Planning Authorities will be informed of Consultation Distance (Outer Zone Distance) by HSE
  ……however it may be worth being pro-active?
- New developments within zones which do not meet PADHI – HSE will advise against … can cause difficulties with expansion to existing non-compliant buildings – e.g. schools and hospitals
- Interim situation can cause difficulties – outline planning permission granted now – detailed planning permission advised against after PSR amendments come into force
  ……. Compensation for any pre-work carried out?
- Possible future development pressures in populated areas?

Land Use Planning Zones – Possible Further Actions

Possible further actions:-

- **Review pipeline routes to assess where populated areas are present within proposed new LUP zones**
- **Ensure procedures for surveillance are in place to minimise risks of 3rd party interference in these areas.**
- **Mark up suitable route maps with population types, densities and special risk factors (hospitals, schools, care homes etc.)**
- **Review planning applications/ construction activities currently in place within LUP zones along route of pipelines**
- **Consider initiating discussions with local planning authorities where outline planning permission granted now could cause problems in 6-12 months time..**

Land Use Planning Zones – PD 8010 (2004)

Table 1 — Categorization of fluids according to hazard potential

Category	Description	Typical examples
A	Typically non-flammable water-based fluids.	Water, brine, dilute effluents.
B	Flammable and/or toxic fluids that are liquids at ambient temperature and at atmospheric pressure conditions.	Oil and petroleum products. Methanol is an example of a flammable and toxic fluid.
C	Non-flammable fluids that are non-toxic gases at ambient temperature and atmospheric pressure conditions.	Nitrogen, oxygen, carbon dioxide, argon and air.
D	Non-toxic, single-phase natural gas.	Non-toxic, single-phase natural gas.
E	Flammable and/or toxic fluids that are gases at ambient temperature and atmospheric pressure conditions and are conveyed as gases and/or liquids.	Hydrogen, natural gas (not otherwise covered in category D), ethane, ethylene, liquefied petroleum gas (e.g. propane and butane), natural gas liquids, ammonia and chlorine.
	Mixtures of petroleum or chemical substances, having a Reid vapour pressure greater than 31 kPa absolute.	Spiked or live crude oil.

Land Use Planning Zones – PD 8010 (2004)

5.5.3.1 *Pipelines conveying category A or category B substances*

The minimum distance between a pipeline conveying category A or category B substances and occupied buildings should be determined by the designer, who should take into account both access requirements during construction, and access requirements for maintenance and emergency services during operation.

Is a new Category required for gasoline?
Should a Substance Factor Q be set for gasoline?

UKOPA Note – Written then Withdrawn in May 2007

5 Proposed Minimum Distance to Occupied Buildings for Gasoline

The results for gasoline are as follows:-

Pipeline Diameter		Pressure - Barg					
inches	mm	15	30	40	60	80	100
		Minimum Distance to Occupied Buildings - MDOB metres					
18	457	15	19	22	27	32	37
16	406	14	17	20	24	29	34
14	355	13	16	18	22	27	31
12	323	12	15	17	21	25	30
10	273	11	14	16	20	23	27
8	219	10	13	15	18	22	25
6	168	10	12	14	17	20	23

These are based on Substance Factor Q = 0.4 for gasoline.