Title:	Impact Assessment (IA)
Amendments to the Pipeline safety Regulations 1996 and the Health and Safety (Fees) Regulations - classifying Gasoline as a dangerous fluid	**IA No:**
	Date: 2nd September
	Stage: Finall
Lead department or agency:	**Source of intervention:** Domestic
	Type of measure: Primary legislation
Other departments or agencies:	**Contact for enquiries:** Karen McDonough 0151 951 3308 karen.mcdonough:hse.gsi.gov.uk

Summary: Intervention and Options

What is the problem under consideration? Why is government intervention necessary?

Gasoline pipelines are not classified as major accident hazard pipelines and therefore do not fall within the scope of the additional duties as set out in Part III of the Pipeline Safety Regulations (PSR) 1996. Research has shown that gasoline pipelines have major accident hazard potential. Following the Buncefield incident the Major Incident Investigation Board expressed concern at the anomaly that gasoline pipelines are still not within the scope of the additional duties of PSR.

What are the policy objectives and the intended effects?

The policy objective is to reduce the risks of gasoline pipeline accidents, and to reduce the impact of accidents that may arise from gasoline pipelines. This will be achieved by the following:
1) Applying the more prescriptive, major accident hazard requirements of PSR to gasoline pipelines including emergency shut-down valves, notification, major accident prevention documents and local authority emergency plans;
2) Applying land use planning (LUP) controls around gasoline pipelines to manage the residual risks;
3) Updating the guidance "Guide to the Pipelines Safety Regulations 1996" L82, in line with the amendments to PSR, to ensure that both pipeline operators and others involved with pipeline activities or who may be affected by the Regulations understand what the regulations require and the new duties that are required of them.

What policy options have been considered? Please justify preferred option (further details in Evidence Base)

The following regulatory options are being considered:

i) no change;

ii) to classify gasoline as a dangerous fluid within the scope of PSR and therefore make it subject to both the general and additional duties of PSR, as pipelines conveying gasoline will then be come major accident hazard pipelines. This is the preferred option which is presented in this final stage IA.

When will the policy be reviewed to establish its impact and the extent to which the policy objectives have been achieved?	It will be reviewed 01/04/2013
Are there arrangements in place that will allow a systematic collection of monitoring information for future policy review?	Yes

SELECT SIGNATORY Sign-off For final proposal stage Impact Assessments:

I have read the Impact Assessment and I am satisfied that (a) it represents a fair and reasonable view of the expected costs, benefits and impact of the policy, and (b) the benefits justify the costs.

Signed by the responsible Minister: ..... Date: .....

Summary: Analysis and Evidence

Policy Option 1

Description: Do nothing, or the Baseline

Price Base Year 2009	PV Base Year 2009	Time Period Years 40	Net Benefit (Present Value (PV)) (£m)		
			Low: Nil	**High:** Nil	**Best Estimate: Nil**

COSTS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	Nil		Nil	**Nil**
High	Nil		Nil	**Nil**
Best Estimate	Nil			

Description and scale of key monetised costs by 'main affected groups'

Other key non-monetised costs by 'main affected groups'

BENEFITS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	N/a		N/a	**N/a**
High	N/a		N/a	**N/a**
Best Estimate	N/a		N/a	**N/a**

Description and scale of key monetised benefits by 'main affected groups'

Other key non-monetised benefits by 'main affected groups'

Key assumptions/sensitivities/risks **Discount rate (%)** 3.5/3

Key assumptions are documented in Annex 2

Impact on admin burden (AB) (£m):			Impact on policy cost savings (£m):	In scope
New AB: Nil	**AB savings:** Nil	**Net:** Nil	**Policy cost savings:**	Yes/No

Summary: Analysis and Evidence

Policy Option 2

Description: Amend PSR to include gasoline as a dangerous fluid and implement Land Use Planning restrictions

Price Base Year 2009	PV Base Year 2009	Time Period Years 40	Net Benefit (Present Value (PV)) (£m)		
			Low: Optional	**High:** Optional	**Best Estimate:**

COSTS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	0.5		0.13	**1.1**
High	0.76		0.30	**2.4**
Best Estimate	0.63		0.21	**1.7**

Description and scale of key monetised costs by 'main affected groups' : Cost to society include the cost to industry under PSR of between £1m and £1.5m and LUP costs to society of between £87,000 and £870,000,

The cost to industry is between £1.2m and £4.2 which also includes potential compensation to landowners of between £0.2m and £2.6m. Although a real cost to industry, society do not bear the full extent of this cost as much development is likely to be displaced and so benefit an alternative developer / society. The actual cost to society is the net loss of development value only due to HSE Land Use Planning advice.

Other key non-monetised costs by 'main affected groups'

There may be costs to industry if societal concern is raised on classification of the pipelines as dangerous under PSR. While nothing will change in practice for the public living in close proximity, this might require careful risk communication strategies to limit the number of queries to and adverse attention focussed on the industry.

BENEFITS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	Nil		0.09	**0.8**
High	Nil		0.19	**1.6**
Best Estimate	Nil		0.14	**1.2**

Description and scale of key monetised benefits by 'main affected groups' Benefits are calculated based on two scenarios, either that risk will be reduced by 10% or risk will be reduced by 20%. This is thought to be a likely range for the risk reduction that might be achieved, but is illustrative only, with other outcomes being possible. Health and safety benefits have therefore been estimated between £83,000 and £167,000. Cost savings benefits of between £700,000 and £1.4m over the 10 year period have been estimated based on the expected economic cost of an incident being around 10% of the total cost of the explosion at Buncefield fuel storage depot,(which reflects the lower expected consequences associated with gasoline pipelines than with a large scale fuel depot).

Other key non-monetised benefits by 'main affected groups' It is expected that the population around pipelines will increase over the 10 year appraisal period in the base line scenario. However, due to the lack of evidence available and a number of uncertainties, this effect has not been possible to quantify. This means that the health and safety benefits calculated under option 2 might in fact be greater than the estimates provided. The effect is not expected to be significant however, as many gasoline pipelines are already in populated areas so there is a limit to the amount by which the population can increase. There may also be benefits if the public take more care around gasoline pipelines, reducing the number of incidents involving third party damage each year.

Key assumptions/sensitivities/risks **Discount rate (%)** 3.5

The key assumptions are documented in annex 2.

Impact on admin burden (AB) (£m):			Impact on policy cost savings (£m):	In scope
New AB: 0.001	**AB savings: Nil**	**Net:** 0.001	**Policy cost savings:** Nil	No

Enforcement, Implementation and Wider Impacts

What is the geographic coverage of the policy/option?			Great Britain		
From what date will the policy be implemented?			06/04/2011		
Which organisation(s) will enforce the policy?			HSE		
What is the annual change in enforcement cost (£m)?			N/a – costs recovered.		
Does enforcement comply with Hampton principles?			Yes		
Does implementation go beyond minimum EU requirements?			N/a		
What is the CO_2 equivalent change in greenhouse gas emissions? (Million tonnes CO_2 equivalent)			**Traded:** Not quantified	**Non-traded:** Notuantified	
Does the proposal have an impact on competition?			No		
What proportion (%) of Total PV costs/benefits is directly attributable to primary legislation, if applicable?			**Costs:**	**Benefits:**	
Annual cost (£m) per organisation (excl. Transition) (Constant Price)	**Micro**	**< 20**	**Small** <0.03	**Medium <0.03**	**Large** <0.03
Are any of these organisations exempt?	No	No	No	No	No

Specific Impact Tests: Checklist

Set out in the table below where information on any SITs undertaken as part of the analysis of the policy options can be found in the evidence base. For guidance on how to complete each test, double-click on the link for the guidance provided by the relevant department.

Please note this checklist is not intended to list each and every statutory consideration that departments should take into account when deciding which policy option to follow. It is the responsibility of departments to make sure that their duties are complied with.

Does your policy option/proposal have an impact on…?	**Impact**	**Page ref within IA**
Statutory equality duties[1] Statutory Equality Duties Impact Test guidance	Yes	
Economic impacts		
Competition Competition Assessment Impact Test guidance	No	21
Small firms Small Firms Impact Test guidance	No	21
Environmental impacts		
Greenhouse gas assessment Greenhouse Gas Assessment Impact Test guidance	No	21
Wider environmental issues Wider Environmental Issues Impact Test guidance	Yes	21
Social impacts		
Health and well-being Health and Well-being Impact Test guidance	Yes	22
Human rights Human Rights Impact Test guidance	No	22
Justice system Justice Impact Test guidance	No	22
Rural proofing Rural Proofing Impact Test guidance	No	22
Sustainable development Sustainable Development Impact Test guidance	yes	22

[1] Race, disability and gender Impact assessments are statutory requirements for relevant policies. Equality statutory requirements will be expanded 2011, once the Equality Bill comes into force. Statutory equality duties part of the Equality Bill apply to GB only. The Toolkit provides advice on statutory equality duties for public authorities with a remit in Northern Ireland.

Evidence Base (for summary sheets) – Notes

Use this space to set out the relevant references, evidence, analysis and detailed narrative from which you have generated your policy options or proposal. Please fill in **References** section.

References

Include the links to relevant legislation and publications, such as public impact assessment of earlier stages (e.g. Consultation, Final, Enactment).

No.	Legislation or publication
1	IA for Co2
2	Consultation document
3	
4	

+ Add another row

Evidence Base

Ensure that the information in this section provides clear evidence of the information provided in the summary pages of this form (recommended maximum of 30 pages). Complete the **Annual profile of monetised costs and benefits** (transition and recurring) below over the life of the preferred policy (use the spreadsheet attached if the period is longer than 10 years).

The spreadsheet also contains an emission changes table that you will need to fill in if your measure has an impact on greenhouse gas emissions.

Annual profile of monetised costs and benefits* - (£m) constant prices

	Y_0	Y_1	Y_2	Y_3	Y_4	Y_5	Y_6	Y_7	Y_8	Y_9
Transition costs	0.6									
Annual recurring cost	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13
Total annual costs	0.76	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13
Transition benefits	Nil									
Annual recurring benefits	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16
Total annual benefits	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16

* For non-monetised benefits please see summary pages and main evidence base section

Microsoft Office
Excel Worksheet

Evidence Base (for summary sheets)

Extension of pipeline safety regulations (1996) to include gasoline pipelines as a dangerous fluid

1. This Impact Assessment considers proposed changes to the regulations that apply to gasoline pipelines under the Pipeline Safety Regulations (PSR) 1996.

Purpose and intended effects

Issue

2. Gasoline is currently not a prescribed dangerous fluid for the purposes of the Pipeline Safety Regulations 1996 and therefore the additional duties of PSR for major accident hazard pipelines (those which carry prescribed dangerous fluids) do not currently apply to gasoline pipelines.

Objectives

3. The objective of this extension of the PSR regulations is to reduce the risks of gasoline pipeline accidents, and to reduce the impact of accidents that may arise from gasoline pipelines. The intended effect is to achieve the appropriate balance between limiting the risk of an accident affecting people in the vicinity of the gasoline pipeline, the benefits provided by gasoline pipelines, and the benefits of developing land around such sites.

Background

4. The Health and Safety Executive is considering taking forward amendments to the Pipeline Safety Regulations (PSR) 1996. The aim is that amended regulations can be ready for implementation in April 2011.

5. The Pipelines Safety Regulations 1996 (PSR), which came into force on 11 April 1996, impose 2 levels of duties;

    - The lower level (general duties) applies to all pipelines as defined in the regulations. These cover design, construction/installation, operation, maintenance and decommissioning of the pipeline.
    - The higher level (additional duties) imposes additional duties for notification, major accident prevention documents, emergency procedures and emergency planning – these apply to pipelines carrying prescribed dangerous fluids.

6. Gasoline pipelines currently only attract the general duties and are excluded from the additional duties for pipelines conveying fluids with a major accident hazard potential. Under general duties there are no requirements for the pipeline operator to notify HSE of its plans to construct a MAHP, produce an major accident prevention document and set in place emergency procedures, or for the local authority to prepare an emergency pipeline plan or for land use planning zones to be set around gasoline pipelines.

7. At the time of implementation of the Pipeline Safety Regulations, HSE initially proposed to including gasoline among the list of substances which would require notification under the new regulations, but decided that gasoline should be removed from this list until further research into the risks of gasoline pipelines had been conducted.

8. Two research projects[2] were carried out to assess the risks associated with different pipelines and have concluded that the risks associated with pipelines conveying gasoline justify the additional duties under PSR. The report into this work was accepted by the Advisory Committee on Dangerous Substances (ACDS) in February 2001, and a consensus was reached recommending the inclusion of gasoline as a dangerous fluid in PSR with the application of the land use planning provisions. It was concluded that non-topographical quantified risk assessment should be used to calculate consultation distances.

9. A number of options for amending PSR were considered including regulating gasoline pipelines without the application of land-use planning controls. The preferred option identified by ACDS was to include gasoline as a dangerous fluid in PSR with the application of the land use planning provisions, which is presented in this final stage Impact Assessment, compared with the baseline, or 'do-nothing' scenario.

10. By 2003 a draft consultation document, including a Regulatory Impact Assessment, had been prepared by HSE for the amendment of PSR, but the project was cancelled in July 2004 following the outcome of the 2002 spending review and HSE's subsequent sun setting project. At the time, the justification for this decision was that the PSR work should be suspended until the European Commission produced a pipeline directive.

11. Following the Buncefield Incident in December 2005 the regulation of gasoline pipelines again became a matter of debate. The Buncefield Major Incident Investigation Board indicated in its 'Recommendations on the design and operation of fuel storage sites' report that gasoline pipelines should be subject to the requirements of major hazard legislation. In their response to HSE consultation document 211 on land use planning, they noted the anomaly that major pipelines carrying gasoline are excluded from the additional duties of PSR. Therefore there are no requirements to for the local authority to produce a pipeline emergency plan or for land use planning zones to be set around gasoline pipelines.

Rationale for Government Intervention

12. The risk of a pipeline accident cannot be reduced to zero and so there is a residual risk to people who live in the vicinity of such pipelines. Information regarding pipelines and the level of risk associated with them is complex and difficult to understand and it is unlikely that individuals can fully access or interpret all relevant information and hence make informed decisions about such risks. Whilst risk may seem to be small, the consequences of a failure can be catastrophic and so reducing the risk of this failure to a tolerable level requires government intervention.

13. Additionally, pipeline operators might only consider the private costs and benefits relating to gasoline pipelines. External costs arising from the risk posed by the pipeline (to the public and environment) may not be fully captured in the operators' risk management decision making. These external costs are referred to as negative externalities and are a source of market failure. The maximising outcome for the firm is not that which maximises the welfare of society. Government intervention is therefore required to ensure that these negative externalities are appropriately controlled.

Options

[2] Arthur D Little "Risks from gasoline pipelines in the United Kingdom" report to the UK HSE, June 1996 and WS Atkins Safety and Reliability " Assessing the risk from gasoline pipelines in the UK based on a review of historical experience" HSE report 210/1999, HSE Books. A third paper was produced by HSE: 'Methodology for gasoline pipelines and reconsideration of appropriate land use planning distances.' MHAU/AS/347. March 1999. This corrected a number of apparent errors in the W.A Atkins report.

14. The initial approach when considering the amendments to PSR was to address gaps in legislation and clarify existing arrangements for duty holders. In light of the Coalition Government's new approach to regulation, HSE have rigorously reviewed the proposed amendments to identify what is regarded as still requiring regulatory change and what can be handled through an alternate approach to regulation. However, non-legislative approaches have been discounted for the following reasons:
    a. Gasoline pipelines create major hazard risks that could have a direct impact on communities in the vicinity of a pipeline. In these circumstances regulatory options provide certainty in the system that non-regulatory options can not. With many Government interventions, if some amount less than 100% of the target population follow the guidance or push from the government, an improvement in outcomes will still be achieved. However, due to the catastrophic potential associated with major hazards, discretion on implementation of safety practices can not be tolerated. For example if just 1% of duty holders did not follow the behavioural push from government which resulted in one accident, this could have catastrophic consequences for society, including very significant economic costs to Government, the hazard operators, to individuals and the environment. Therefore when there is a real risk of catastrophe that needs addressing, methods which can not be enforced by the regulator will not adequately protect against this risk.
    b. The uncertainty that is associated with non-regulatory options would also increase societal concern. There are costs to society associated with societal concern, which include; time spent by the regulator and duty holders communicating risk management; time spent directly addressing public concerns; and the possibility of land values in close proximity to the hazard sites being blighted. Regulatory options which guarantee the regulator can ensure safety is ALARP will quite rightly increase public assurance and so avoid these sort of costs.
    c. Notifications required under the additional duties of PSR provide the sole measure which enable HSE to intervene at a point when the safe design of the pipeline can be influenced. Building safety into design is usually the most cost effective means of reducing risks. Early intervention also enables enforcement action to be taken where standards fall short of the law. Defects caused by poor design can lie dormant for a long time and only become known once a serious event occurs. Non-regulatory options would not deliver the benefits of early regulatory intervention.

15. Two realistic options have therefore been considered:

Option one – Do nothing

16. No change to PSR so that gasoline would continue to not be classified as a dangerous fluid under PSR. Gasoline pipelines remain under general duties where there are no requirements to produce an emergency plan and there are no requirements for land use planning zones (consultation distances) around gasoline pipelines.

Option two - Amend PSR to include gasoline as a dangerous fluid and implement Land Use planning restrictions

17. Option two is the preferred option and would consist of the following:

- Arrangements for notifications for new major hazard pipelines;

- Emergency shut down valves to be fitted to all risers of MAHP of 40mm or more in diameter at offshore installations;
- Pipeline operators to prepare a major accident prevention document and emergency procedures put in place;
- Local Authority to prepare a pipeline emergency plan
- Land use planning controls (consultation distances) around gasoline pipelines to manage residual risks from gasoline pipelines.
- A requirement to ensure that information provided is sufficient to set consultation zones and maintain an adequate data base for land use planning purposes

COSTS and BENEFITS

Data sources and assumptions

Technical assumptions

18. This section presents an assessment of the costs and benefits of the options that are outlined above. A full list of detailed assumptions is provided in Annex 2.

19. Costs have been discounted over a period of ten years and expressed in present value terms[3]. Beyond a period of ten years there is too much uncertainty to be able to represent the costs of this intervention in a reasonable and fair manner.

20. A discount rate of 3.5% is applied to costs and non-health and safety benefits in line with HM Treasury guidelines. A 1.5% discount rate is applied to health and safety benefits.

21. Based on current plans, it is assumed there will not be any further pipelines constructed during the appraisal period.

22. It is assumed that operators keep their pipelines in good repair and will upgrade them regularly to compensate for any deterioration and decline in capacity that would otherwise occur.

23. It has been estimated that there are between 30 and 40 operators of gasoline pipelines, 6 being the main operators with the rest being smaller operators.

24. Consultation distances (CDs) have been estimated by HSE for a variety of pipeline diameters in urban and rural areas, see Annex 3. A weighted average CD for urban and rural areas has been estimated as 80m and 60m respectively, based on length of pipeline for each diameter out of the total length of gasoline pipeline, see Annex 3.

25. It is assumed that classifying gasoline as dangerous under PSR and implementing Land Use Planning advice will reduce individual risk by between 10 and 20%. This estimated range of the risk reduction is for illustrative purposes only; the actual risk reduction and so cost savings / benefits achieved could vary from the figures presented here.

Methods of calculating risk

Individual risk

26. Evidence is not yet available to HSE on the average individual risk around pipelines over a consultation distance (CD) of 80m for urban pipelines and 60m for rural gasoline pipelines. .

[3] The present value is the future value of a cost / benefit expressed in present terms by a process called discounting. The discount rate includes the social time preference rate, being the value that society attaches to present rather than future consumption. See Treasury guidance in the Greenbook available at: http://www.hm-treasury.gov.uk/d/Green_Book2_03.pdf

For prudence the average individual risk for both urban and rural areas has been estimated as 1 x 10^{-6} based on HSE best estimates.

27. Multiplying the calculated individual risk by the population within proximity of gasoline pipelines for both urban and rural areas (being 45,913 and 8,506 respectively) gives an estimation of the expected number of fatalities per year. These are night-time residential populations, reflecting the maximum number of persons that would be present in the CD at the time of an incident. The actual population could be less than this if the incident occurred during the daytime.

28. Additionally, due to land use planning advice, it would be expected that the population around gasoline pipelines will be prevented from increasing into the future and by applying LUP there will be an additional benefit from avoiding this population being exposed to risk. Due to the lack of available evidence and the level of assumptions that would be necessary in order to quantify this effect, no attempt to quantify the growth in population has been made. In the analysis, the expected risk reduction of 10% to 20% is assumed to include the risk reduction from implementing the additional duties under PSR as well as the reduced risk from avoiding exposure of populations due to land use planning.

29. Analysis of past accident reports also indicates that each fatality from a gasoline pipeline leak ignition might be associated with four significant injuries. Thus, the expected number of injuries is obtained by multiplying the expected number of fatalities by 4.

30. The calculated fatality / injury estimates of an average incident are given in the table below.

	Total Population in zone	**Expected No. of fatalities per year**	**Expected No. of injuries per year**	**Expected fatalities over 10 yr period**	**Expected injuries over 40 yr period**
Urban	**45,913**	**0.046**	**0.184**	**0.459**	**1.837**
Rural	**8,506**	**0.009**	**0.034**	**0.085**	**0.340**

Pipeline Failure

31. Estimates of the risk of pipeline failure have been provided by the Health and Safety Laboratory[4]. These estimates are based on historical failure data collected by CONCAWE (Conservation of Clean Air and Water in Europe)[5], using over 35 years of performance data for Western European cross country oil pipelines. Failure rates provided are based on the ratio of the number of observed failures to the overall population of pipelines, see Annex 2. These updated estimates recommend that a failure rate of 0.263 events per 1000 km years is used (0.207 rural and 0.767 suburban).

32. The expected number of incidents in urban areas can be calculated using the formula: percentage of pipelines in urban areas * total length of pipeline/1000km * risk of incident / 1000km yrs * probability of incident being an ignition event = 0.1*2.15*0.767*0.05 = 0.008 (see annex 2 for assumptions).

Benefits

Option one – No change to PSR

[4] Advice provided by Higher Scientist , Health and Safety Laboratory to the Health and Safety Executive in July 2008.
[5] Concawe report number 7/08. Performance of European cross – country pipelines. Available at: http://www.concawe.be/DocShareNoFrame/docs/2/MFAMCPDCHLDPELAMHMLNJKIIVEVCBW939YBDC3B6ENE3/CEnet/docs/DLS/Rpt_08-7-2008-03666-01-E.pdf

33. This option provides the baseline for analysis of costs and benefits in this impact assessment, and so by definition there are no benefits associated with this option.

Option two – Amend PSR to include gasoline as a dangerous fluid

34. By classifying gasoline as a dangerous fluid the additional duties under part 3 of PSR for Major Accident Pipelines will apply to gasoline. These additional duties include provisions regarding emergency shut down valves, notification before construction and use of pipelines, production of a Major Accident Prevention Document and emergency procedures and emergency plans. Such duties are designed to reduce the risk of a catastrophic event and reduce the associated costs of loss of fatalities and injuries, i.e. deliver health and safety benefits. The costs of damage to property and infrastructure, disruption to economic activity and potentially injuries / fatalities will also be reduced by HSE LUP advice around these pipelines.

i) Health and safety benefits

35. The expected cost of fatal and major injuries associated with a gasoline pipeline incident has been calculated. This is based on the expected number of fatalities / injuries per year (see paragraph 26) and the HSE estimated cost of a fatality / injury of £1.5m and £40,500 respectively.[6] Benefits of intervention are estimated by comparing what the health and safety costs of an incident are with no intervention, compared to the expected health and safety costs if risk is reduced by classifying gasoline as dangerous under PSR. Two alternative assumptions have been made, which show how outcomes might change if risk is reduced by either 10% or 20%. It should be emphasised that these are just illustrative options which are thought to be likely, but different outcomes could be achieved.

Urban areas

36. The total expected cost of injuries and deaths in urban areas due to gasoline incidents has been estimated as £703,000 over a 10 year appraisal period.

37. If the individual risk due to gasoline pipelines is reduced by 10% as a result of the intervention, then the total expected costs of fatalities and major injuries over the period is estimated to be £633,000. The difference between the current expected costs and those expected if risk is reduced by 10% is a saving of £70,000.

38. If classifying gasoline as dangerous under PSR reduces risk by 20% then the total expected cost of fatal and major injuries over the 10 year period is £563,000. The difference between the current expected costs and those expected if risk is reduced by 20% is a saving of £141,000.

Rural areas

39. The same methodology has been applied for rural areas. The total expected cost of fatalities and major injuries in rural areas is calculated as £130,000 over the 10 year appraisal period.

40. If the individual risk due to gasoline pipelines was reduced by 10% then the total cost would be £117,000 over the appraisal period. The difference between the current expected costs and those expected if risk is reduced by 10% is a saving of £13,000.

[6] See the HSE Economic Analysis Unit Appraisal Values, available at: http://www.hse.gov.uk/economics/eauappraisal.htm

41. If the individual risk due to gasoline pipelines was reduced by 20% then the total present value of the costs over a 10 year appraisal period would be £104,000. Compared to the current expected costs, this would be a saving of £26,00 over the appraisal period.

42. As noted, the benefit of land use planning advice is to reduce the population around the pipelines. Thus, in the baseline scenario and against which the benefits of the intervention should be measured, the population would increase in the absence of land use planning advice.

43. A quick analysis of the possible benefits of excluding populations from around major hazards has been performed. Paragraph 77 onwards describes the costs of Land use planning advice and assumes that between 1 and 2 developments are advised against per annum. If it is assumed that these developments are all housing, and that average housing density is 43 dwellings per hectare[7], then the average number of dwellings advised against per application is between 3 and 17. At an average population density of 2.32, this equates to between 10 and 50 extra people per development advised against. Given that individual risk is estimates to be $1x10^{-6}$ and the total population around gasoline pipelines is already estimated to be over 50,000, the extra health and safety benefit from preventing these 10 – 50 people being in the vicinity for 1 or 2 developments is small.

44. The following table summarises these potential health and safety benefits.

Total Health and Safety Benefits

	Costs Avoided	Benefits of 10% reduction in risk £m	Benefits of 20% reduction in risk £m
Option 1		Nil	Nil
Option 2	Death and injury	0.08	0.17
Total		**0.08**	**0.17**

ii) Other benefits

Business Interruption and clean up costs

45. Following an ignition incident there will be business interruption costs and clean up costs. HSE is looking into the feasibility of modelling such costs, but currently there is no readily available information at this time. Thus, in the absence of alternative information, the Buncefield Incident of 11th December 2005 has been used to illustrate the potential costs of such a large scale incident.[8] This was a major incident and the total estimated costs of £894m include the site operators' compensation claims, aviation costs, Competent Authority and Government response, emergency response and environmental impact.

46. The Buncefield incident occurred in an urban area and so is only representative of the costs of incidents in urban areas and due to its size, is not representative of the average incident that would be expected to occur. It is assumed that the average total cost of cleaning up,

[7] Average number of dwellings per hectare and average household size taken from the Housing and Planning Key Fact report August 2010: available at: www.communities .gov.uk/documents/statistics/xls/1693158.xls

[8] See chapter 3 of the Buncefield Incident 11 December 2005: The final report of the Major Incident Investigation Board. Available at: http://www.buncefieldinvestigation.gov.uk/reports/volume1.pdf

damage and business interruption due to the average incident might be 10% of the costs associated with Buncefield (i.e. £89m) for incidents occurring in urban areas, and 1% (i.e. £8.9m) for those occurring in rural areas.

Urban areas

47. The expected number of incidents in urban areas is 0.008 (see risk section above and annex 2 for assumptions). Applying this expected frequency to the estimated costs per average incident, the total expected clean up costs associated with ignition incidents is £740,000 per annum with a present value of £6.1m over the 10 year appraisal period.

48. As noted above, two scenarios have been modelled, assuming that classifying gasoline as dangerous under PSR 1996 might reduce risk by between 10 and 20%. Thus, if risk is reduced by 10%, the expected number of ignition events in urban areas will decrease to 0.0074 per annum. This will equate to a present value of the cost of an incident of £5.5m over the 10 year appraisal period and so a cost saving of £612,000 over the appraisal period compared to the current expected costs.

49. If instead the risk is reduced by 20% the expected number of ignition events per annum in urban areas will be 0.0066 and the total present value of the cost of incidents over the 10 year period will be £4.9m, with a cost saving of £1.2 m compared to the current expected costs.

50. In summary, in urban areas over the 10 year appraisal period, the present value of the total costs that could be saved in relation to clean up costs / business disruption in urban areas could range between £612,000 and £1.2m.

Rural areas

51. The same methodology can be applied to rural areas, but the expected cost of an incident is assumed to be much lower. In a rural area it is fair to assume that property damage will be small but environmental costs on the other hand might be much larger. As described above, instead of 10% of the costs of Buncefield it is assumed that costs may be an order of magnitude less, in other words 1%, or £8.9m.

52. The expected number of ignition events in a rural area is calculated using the methodology explained above, adjusting the risk of an incident per 1000 km years to 0.207 for rural areas. The expected number of ignition events per year is therefore 0.012 (which is greater than in urban areas due to the assumption that there is 9 times more pipeline in rural areas). The expected cost of an ignition event is calculated as £107,000 per annum with a present value of £890,000 over the 10 year appraisal period.

53. Again, if the classification of gasoline as a dangerous fluid under PSR 1996 should reduce the risk of an incident by 10% then the expected costs of an incident in rural areas would be £803,000 over the appraisal period, being a cost saving of £89,000.

54. If the risk is reduced by 20% then the costs will be £714,000 over the appraisal being a cost saving of £178,000.

55. The total cost savings of clean up, property and business interruption costs in rural areas are therefore estimated to be somewhere in the region of £89,000,to £178,000 over the 10 year appraisal period.

56. The total cost savings in urban and rural areas associated with clean up, property and business interruption costs are estimated to be between £701,000 and £1.4m

Improved awareness of gasoline pipelines

57. It is possible that by classifying gasoline as dangerous under PSR, that the general public will have an increased awareness of the risks associated with such pipelines and take more care when performing digging and other such works around these pipelines. This might in turn reduce the amount of third party damage to pipelines, saving costs to operators and reducing the risk of large scale incidents. It is not possible to quantify such an effect however.

Total Cost savings – rural and urban areas

	Costs avoided	Benefits of 10% reduction in risk (£m)	Benefits of 20% reduction in risk (£m)
OPTION 1		Nil	**Nil**
OPTION 2	Clean up costs	0.7	**1.4**

Cost to Industry

Option 1 – do nothing

58. Option 1 is the baseline for the analysis presented in this Impact Assessment, and there are no additional cost implications associated with this option

Option 2 - Amend PSR to include gasoline as a dangerous fluid

59. There would be no cost implications from general regulations (5 – 18) as these already apply to gasoline pipelines.

60. The additional costs of this option apply under additional duties in Regulations 21- 28. These are considered below:

Regulation 21 – Notification before construction

61. This applies to new pipelines only. It is considered to be unlikely that any new gasoline pipelines will be constructed over the next 10 years so no additional costs should be incurred.

Regulation 22 – Notification before use

62. HSE must be notified and have 14 days to act before fluids can be conveyed in pipelines that have not been in regular use. It is assumed that when the amended Regulations come into being, all gasoline pipeline operators will have to notify the Regulator that they have a Major Accident Hazard Pipeline conveying a dangerous fluid. It is estimated that there are between around 30 – 40 operators, 6 main operators with the remainder being smaller operators. The notification process will require 2 days of time of a technical expert at the larger operators, and around 0.5 days worth of time of a technical expert at the smaller operators.

63. The total one off cost to industry is calculated to be between £4,600 and £6,000, which is not significant.

Regulation 23 – Notification in other cases

64. HSE must be notified about any changes in the operator within fourteen days. In such circumstances, the operator will also have to notify customers and others of this change and so the act of notifying HSE is a small marginal cost and not expected to be significant.

65. Notification is also required when there are major modifications or changes in the operating limits or fluid being transported in the pipeline (all gasoline pipelines in the country are operated as multi-product pipelines conveying gasoline approximately 40% of the time). It has been assumed that such a change in operating limits / fluid will occur about twice a year. The notification of such changes is not anticipated to take much longer than between 1 and 2 hours of time of a science and technology professional. The total cost is not therefore expected to be greater than £500 over the 10 year appraisal period.

Regulation 25 – Major Accident Prevention Document (MAPD)

66. The operator will have to prepare, and thereafter revise or replace as often as necessary, a document relating to the pipeline, to demonstrate that all hazards relating to the pipeline are identified; the risks evaluated; the safety management system is adequate and that adequate arrangements are in place for the audit of such.

67. The MAPD is not dissimilar to documents required under other regulations and so it is anticipated that much of the preparatory work for these documents will have already been done. The major task will be assembling the information together. Experience with MAPD documents already prepared under the regulation suggests a typical cost of preparation in the order of £6,000 per MAPD document.

68. The total one off cost of preparing MAPD's will be between £180,000 and £240,000 for the 30 – 40 gasoline pipeline operators. It is assumed there will be no net addition to the number of operators and that, if there are any changes in ownership, it is possible to transfer the MAPD at minimal cost.

69. MAPDs will need to be periodically reviewed; it is assumed they will be reviewed every five years at a cost of one fifth of the initial cost. This amounts to £1,200 each time the MAPD'S are reviewed. Over a period of 10 years, the present value of the costs of reviewing the MAPDs will be between £29,000 and £39,000.

70. Over a period of 10 years, the total cost of initial preparation and five yearly reviews is estimated to be between £210,000 and £280,000.

71. Regulation 23 also requires adequate arrangements for audit and for making reports on the audit, which can be performed in-house provided the person doing so is sufficiently independent of the system. Thus, the costs to industry are in terms of the time it takes to complete these audits. It is assumed an audit is undertaken each year and that it takes one person one week for the six major gasoline pipeline companies. The opportunity cost of this time is estimated to be £960 per audit[9]. The remaining smaller operators are assumed to have costs a quarter of the cost for the main operators. The total cost to industry per annum of the audits is between £12,000 and £14,000. The total present value of the costs over the 10 year appraisal period is estimated to be between £96,000 and £116,000.

[9] Based on the Annual Survey of Hours and Earnings 2009, and the gross hourly wage rate for a science and technology professional of £19.70, see : http://www.statistics.gov.uk/downloads/theme_labour/ASHE-2009/tab14_5a.xls The true economic cost of the employment is calculated by grossing up the hourly rate by 30% to reflect the other costs associated with employment such as employer NICS / Income tax and pension contributions.

Regulation 27 – Preparation for Emergency Plans in case of major accidents

72. Every local authority (LA) which has a pipeline passing through it, must prepare an adequate plan detailing how an emergency relating to a possible major accident in its area will be dealt with before the pipeline is used or within 9 months of notification that there will be a major accident hazard pipeline in the area. Thus, on classification of gasoline as a dangerous fluid under PSR, the LAs will have a duty to prepare an emergency plan for that pipeline.

73. The Emergency Plan has to set out how it proposes to deal with the possibility of major accidents. This must be revised at least once every three years. It is expected that every LA will build upon plans it (or other LA's) already has in place. It is not expected that this cost will be as great as the costs of drawing up the MAPD. It has been assumed that the plan will take between 15 and 25 days of work by a Business and Public Service Professional[10] and so the cost per LA is calculated as between £3,000 and £5,000 one off cost. Assuming the total number of LAS with a major accident hazard pipeline running through it is 103[11] and that all these LAs are required to produce such a plan, the total one off cost in year 1 is between £318,000 and £530,000.

74. Under regulation 25 plans must also be reviewed and revised every 3 years. The cost of this is assumed to be approximately half of the initial preparation costs, i.e. between £1,500 and £2,600 per LA. Over a 10 year appraisal period, the present value of reviewing / revising the plans for 103 LAs is expected to be between £376,000 and £626,000

75. In total, therefore, the cost of regulation 25 to the local authorities will be between £683,000 and £1.1m. According to Regulation 26, the LA can charge a fee to the operator of the pipeline to which the plan relates. The fee must not exceed the costs reasonably incurred by the LA. Thus, in practice, the industry will incur costs of up to £1.1m over the 10 year appraisal period.

76. Total costs to industry of complying with the regulations are as follows:

	Min (£'000)	**Max (£'000)**
Notifications	5	6
MAPD Initial preparation	180	240
MAPDs 5 yearly reviews	29	39
MAPD audit	96	116
Emergency plans	683	1,138
Total	**996**	**1,500**

Of this total, the cost of notifications is classed as administrative burdens as notifications relate to requirements on the duty holder to provide information.

Cost of Land Use Planning (LUP) around Gasoline pipelines.

77. If gasoline pipelines are notifiable to HSE as major accident hazard pipelines under PSR (1996) then they will become subject to HSE land use planning advice. HSE is a statutory consultee on the route of major accident hazard pipelines and thus will provide advice on the routing of any new gasoline pipeline. HSE will also be required to set LUP consultation distances (CDs) around gasoline pipelines and will in future advise local planning authorities on developments in the vicinity of gasoline pipelines. The duty on HSE to act as consultee

[10] Using the ASHE 2008 gross hourly wage rate for Business and Public Service Professionals of £20.39 and grossed up to reflect the true economic cost of employment to £26.51.
[11] Source: Health and Safety Laboratory, GIS team: Local Authorities intersected by gasoline pipelines as of 16/04/2010.

arises out of the Town and Country Planning (General Development Procedure) Order 1995, and so although the costs of LUP calculated below are a real cost to both society and industry, they are not a direct consequence of HSE amending the Pipeline Safety Regulations 1996.

78. The land use planning restrictions will only impose additional costs for *future* development proposals near existing pipelines. HSE will not apply advice retrospectively, so there will be no alterations made to developments which have been previously allowed but which would now be considered inappropriate.

79. The value of land affected depends on the uses to which it has or can be put – it depends on buildings already on the land and what buildings would otherwise be permitted. Land for residential or industrial development typically has a value several times greater than agricultural land. The difference between its value with permission for a specified use of development and its value without that permission is its development value.

80. If a proposal is rejected, other less sensitive schemes may be planned instead and the actual loss in development potential will be the difference between the value of the development if it had been allowed to proceed and the next best use to which the land could be put. The overall net loss in development value is the value of development that would have taken place with the gasoline pipeline remaining in operation but without HSE's advice, less the value of development that actually occurred in the CD in the specified period, less the value of development that was displaced elsewhere. If development is displaced elsewhere, the loss to the original land owner is equal to the development value of the land in the absence of HSE's advice on LUP. However, the loss to society is just the difference between the original development value and the value of the alternative development (which will also include any loss in efficiency due to the second best option being selected).

81. HSE is currently undertaking a study into the economic cost of Land Use Planning advice around major hazard sites, which will also cover pipelines. While this study is not complete at the time this Impact Assessment is being prepared, initial results indicate that development loss is greatest in highly populated urban areas where space is at a premium, while development loss is much lower in rural areas where there are likely to be other planning restrictions on the land anyway. Whilst a robust estimate of the average development loss due to HSE planning advice around pipelines is not available at this stage, indications are that the development value lost around Control of Major Accident Hazards (COMAH) sites can be upwards of 50% in urban areas but almost zero in rural areas.

82. Given that there are a number of ways that a development could be altered so as to keep the most sensitive parts away from the inner zone of the CD around a pipeline, and by moving the development a matter of meters it might go ahead, it is assumed that there won't be much efficiency loss in total, estimated to be around perhaps 5% of the original value of the land.
83. It has been assumed that the value of housing development land for small sites is £2.1m per hectare[12], or £210per m^2. Thus, if development is advised against, it is assumed that the possible loss in development value of the land would be 5% of this, or £10.48 per m^2.

84. With no past history of planning applications around gasoline pipelines, a best estimate of the number advised against by HSE has been required. Using details from PADHI+ database, the number of planning applications advised against around major hazard

[12]Average per hectare land value for residential development as at January 2010, averaged across all regions. Data taken from the Valuation Office Agency, Property Market Report 2010, available at: http://www.voa.gov.uk/publications/property_market_report/pmr-jan-2010/jan-2010-pmr-sections/jan-2010-pmr-sct-2.pdf

pipelines in 2008 and 2009 was 50 and 44 respectively. It has been estimated that there is approximately 25,000km of natural pipeline in the UK, and so on a simplified basis, the number of advised against cases was 2 per 1,000km for an average CD of 100m. Based on the estimated length of gasoline pipeline (being 215km in urban areas and 1,932km in rural areas), this would equate to around half an advised against applications (AA) per annum in urban areas and 4AA applications per annum in rural areas. Most development that would be advised against only on health and safety grounds would be in urban areas, but there is no analysis available of how the AA applications in 2008/09 were split between rural and urban areas for pipelines in general. It is not anticipated that there will be as many planning applications made in rural areas as urban areas, due to other restrictions on the land apart from health and safety concerns. Thus, the estimate in rural areas is reduced by 50% to reflect this. The estimate of 2 applications per 1,000km also applies to a CD of 100m. However, for gasoline pipelines, the average CD in urban areas will be 80m (or 80% of 100m) and the average CD in rural areas will be 60m (or 60% of 100m). If the AA cases are adjusted to reflect this weighting of the CDs compared to that of natural gas pipelines, then the total number of AA cases per annum is expected to be between 1 and 2 along the length of gasoline pipeline.

85. It is possible that this might be reduced further given the knowledge that the majority of gasoline pipelines run through urban areas which are already fully developed, and so there is limited opportunity to propose alternative developments. However, no further adjustment is made to reflect this due to lack of available evidence and the fact LUP would apply to any new and alternative developments proposed on sites already developed.

86. The land area that might be affected by each development advised against has been estimated using data from the Valuation Office Agency (VOA). The Property Market report (see footnote 12) estimates that the average suburban development will be 5,000m^2 . To account for the fact that some development applications may be smaller retail sites or development for vulnerable populations, a range of development size has been used, between 1,000m^2 and 5,000m^2. The inner zone CD is estimated to be about 40m on average, (see Annex 2) applying this to the size of development used would give a range of development length of between 25m and 125m which seems reasonable for a range of development types.

87. So, based on the assumption that between 1 and 2 applications will be advised against each year, the total cost of the land use planning restrictions around gasoline pipelines are estimated to be between £10,500 and £105,000 per annum. Over the 10 year appraisal period, the present value of the cost of the land use planning restrictions to society is estimated to be between £87,000 and £870,000.

88. As noted, this is the cost to society from development being lost to the area and is a cost directly associated with the Town and Country Planning (General Development Procedure) Order 1995, which places a duty on HSE to act as statutory consultee. The costs calculated are not a direct consequence of HSE amending the Pipeline Safety Regulations 1996.

Cost of compensation to industry

89. As noted, the total loss to society is the difference between the development that would have occurred if the pipeline was not hazardous, the development that did take place, and the development that was displaced.

90. However, the loss to the landowner above that which is the loss to society is equal to the development that was displaced from their land

91. From the initial research undertaken for HSE, indications are that the value of development that is displaced is a much smaller proportion of the original development value than the development that actually occurred anyway. Around pipelines, displaced development is likely to be even less, given that there are ways in which developments can be altered along the length of the pipeline to fit in with HSE advice without having to pick an alternative location altogether.

92. Consequently, it has been assumed that the development that might be displaced due to the LUP advice might be between another 5 – 10% of the total development that would have occurred without the hazardous pipeline. So, with a total loss to society of 5% of the original value, this then means we are assuming that the development that does in fact occur around the site is between 85% and 90% of the development that would have occurred without HSE advice.

93. Using the above assumptions, for the 1 to 2 developments advised against per annum, the total cost to landowners over the 10 year appraisal period would be between £0.17m and £2.6m.

94. Under the General Deed of Grant (Easement), if the only reason for planning permission not being granted is the presence of the pipeline, the landowner (developer) can request the pipeline to be moved or that the pipeline owner pays compensation for the loss of development value. Compensation clauses covering restrictions in land development that are normally incorporated in contracts drawn up between pipeline operators and land owners would affect both applications for development where there are existing buildings and where there are no existing buildings. Thus, the maximum cost to the pipeline operators to compensate for this loss is between £0.17m and £2.6m over the 10 year appraisal period.

95. However, the pipeline operator may look for alternatives to paying compensation, for instance installing additional safety measures subject to HSE approval or diverting the pipeline. In both cases, it is assumed that the costs of doing so must be less than the compensation payments. It would also mean that the original development would go ahead and so the only cost to society of this approach would be the costs to the pipeline operators.

96. However, in the absence of information about these alternative costs, it has been assumed that if there is a loss to landowners then this will be compensated by industry and so the cost to industry is estimated to be between £174,000 and £2.6m over the 10 year appraisal period.

97. As noted, this cost to industry is a transfer payment to the landowners for any development that is displaced, and so the overall cost to society is just the 5% of the development value that is actually lost for each consultation, estimated to be between £87,000 and £871,000 over the appraisal period. As noted, the costs are directly associated with the Town and Country Planning (General Development Procedure)Order 1995, which places a duty on HSE to act as statutory consultee. The costs calculated are not a direct consequence of HSE amending the Pipeline Safety Regulations 1996.

98. The costs of compensation have been included to reflect the maximum costs to the industry that could in theory arise as a result of LUP. In practice, the scale of compensation that will actually be required is uncertain as there is no evidence of payments having been made in the past.

99. It is also possible that by classifying gasoline as dangerous, some members of the public may become more concerned than they have been previously about pipelines on their land, simply due to how the pipeline is classified under PSR and not due to an increase in risk associated with the pipeline. In fact, the risk from the pipeline should decrease due to the

additional duties that will be employed under PSR. It is possible though that if this is not communicated to the public as effectively as possible, the industry will experience an increased number of questions from the public, combined with possible reputation concerns. This is offset against the chance that an increase in public awareness, which might reduce third party damage, which is discussed in paragraph 57 above.

100. HSE will commit to undertake a post implementation review 2 years after the implementation date, in order to try to find out what was the direct impact on industry as a result of these amendments.

Consultation and familiarisation

101. There will be a need for managers in industry to familiarise themselves with the proposed regulations once they are introduced. It is assumed that there will be 3 science and technology professionals from the main pipeline operator who are required to familiarise themselves with the changes to the regulations, and 1 each from the smaller pipeline operators. Assuming this familiarisation process takes 2 hours per person, the total cost to industry of familiarisation will be around £2,000 in total which is insignificant.

102. Similarly, local authorities will have to familiarise themselves with their requirements to produce Emergency Plans. Given that the relevant staff will have the background knowledge from plans produced for other regulations, the familiarisation process may not take that long. Thus, it is anticipated that it will take one Business and Public Professional per LA half an hour to read up on their requirements. The total familiarisation costs for all LAs involved is therefore calculated as £1,400, again being insignificant.

103. Total costs to society of familiarisation are between £3,000 and £4,000.

Costs to HSE

104. When notifications are received, HSE (HID Gas & Pipelines Team) will be required to check that all information received is correct and complete, this is usually carried out by a HSE Band 3 Inspector and is estimated to take half a day. This information is then referred to another part of HSE (HID Risk Assessment Team) for setting the land use planning zones.

105. The HID Risk Assessment Team will spend between 3 and 5 days assessing the information and compiling a paper for submission at a 'Panel'. Panel is a forum for HSE internal technical review and will confirm the appropriateness of the assessment and land use planning distances calculated. HSE estimates that approximately 90% of notifications may be presented to the Panel. There will be around half a day's time required to advise local authorities and local HSE offices of the LUP zones.

106. In total, based on HSE Ready Reckoner employment costs which reflect all overheads associated with employment of HSE staff, the total cost to HSE of processing notifications is expected to be between £54,000 and £110,000.

107. There will be a small amount of local authority time required when HSE informs them about the land use planning zone, but this is not expected to be significantly more than they are currently incurring.

108. Following notification of a gasoline pipeline, the HSE inspector will prepare an inspection programme covering a 5 year period for the operator which, on average, comprises 3-4 inspector days in the first year, 1-2 days in the second; and as necessary (decided between inspector and operator) in subsequent years.

109. As HSE will not require additional inspectors to meet this requirement, there will be no additional cost overall. However, if it is assumed that inspectors are currently fully utilised then this means that to include gasoline pipelines in the inspection programme there will be some diversion of resource from other inspection activities. It is not possible to quantify the impact that this might have. It should also be noted that inspection activity under PSR 1996 will be subject to cost recovery in the future and the impact of this on the industry in total has already been estimated as being between £1.1m and £2.3m over the 10 year appraisal period,

110. Total cost of Option 2

Cost to society	**Total present value £'000 (Min)**	**Total present value £'000 (Max)**
Familiarisation	3	**4**
Notification	5	**6**
MAPD – Initial preparation	180	**240**
MAPD – 5 yearly reviews	30	**40**
MAPD – yearly audit	96	**116**
Emergency plans – reviewing and revising	683	**1,100**
Land use Planning	87	**871**
HSE	54	**109**
TOTAL	1,100	2,400

111. The total cost to industry is between £1.2m and £4.2m, including the costs under PSR of between £996,000 and £1,500 and the potential compensation payments to landowners of between £174,000 and £2.6m. The costs to HSE for processing notifications and inspections will also be recovered from industry, however, this is expected to fall within current inspection effort and the cost of PSR cost recovery has already been estimated, in total being between £1.1m and £2.3m.

Risks and Assumptions

112. There are uncertainties with regard to cost and risk in the analysis. These are detailed through the text. There has been discussion with industry representatives and HSE specialists on the assumptions underlying these calculations.

113. HSE will be monitoring the number and type of land-use planning cases received, which involve gasoline pipelines and this will be recorded in the database. Then this can be reviewed after a sufficient number have been received, to ensure the system is working correctly.

114. This Impact Assessment is carried out on an individual risk based approach. It is noted however that a societal risk based approach may be more appropriate. This would require further research to identify how societal risk should be applied to this analysis.

115. Thus, the costs and benefits here present just one scenario out of many possible alternative scenarios. However, the scenario selected is thought to represent the most reasonable approximation of reality based on the evidence available at this time.

116. Assumptions are detailed in Annex 2.

117. The health and safety benefits of this intervention have been assessed by estimating the reduction in individual risk that might be achieved by the intervention, and valuing this using HSE's 'value of preventing a fatality' which is currently £1,500,000[13].

118. The actual calculated value of the benefits of these amendments is subject to significant uncertainty. A review of the historical evidence suggests that preventing all fatality risk is unfeasible. For example, there are examples of gas and gasoline pipeline ruptures from ground disturbance during isolated construction work that have resulted in immediate ignition and death to the worker concerned. On the other hand, there are many multiple fatality events which could have been almost entirely mitigated by adequate emergency response. Preventing ignition or mitigating a spreading fire early could also realise significant loss prevention. We would also expect the frequency of unignited releases to fall. So, although an attempt has been made to calculate the monetary value that would result for two estimated levels of risk reduction, this is just an illustration of what could be achieved. There are a number of alternative assumptions that could have been made about risk, but in the absence of alternative evidence the 10% - 20% assumption has been used here.

119. The actual costs of land use planning restrictions will depend on the specific development proposals that become subject to Land Use Planning. Again, in the absence of evidence it has been necessary to make assumptions about the number of applications that will be advised against. The cost of LUP restrictions is the largest driver of the cost estimate. HSE has commissioned research to find a weighted average estimate of the cost of LUP restrictions in specific relation to Pipelines. As this project is not complete, assumptions have been made based on the preliminary findings of the research and HSE opinion.

Balance of resource costs and benefits

120. Total costs to society are estimated to be between £1.1m and £2.4m over the 10 year appraisal period. Total benefits are estimated to be between £0.8m and £1.6m over the 10 year period, or costs being 1.5 times the benefits. Costs to society include the costs of LUP advice of between £0.09m and £0.9m around the gasoline pipelines, and although this advice is provided by HSE, the legal duty for HSE to provide this advice comes out of the Town and Country Planning (General Development Procedure) Order 1995 under section 10 and so is not a direct consequence of PSR.

Wider Impacts

Wider impacts per the specific impacts checklist on page 3 have been considered further below.

Statutory Equality Duties

A statutory equality assessment has been performed in accordance with the equality legislation.

Economic Impacts

Impact on Competition

The Office for Fair Trading's advice on competition provides four filter questions:

Does the policy:

- Directly limit the number or range of suppliers – No. it is not expected that the review of the Regulations proposed will limit the number of operators of gasoline pipelines, for

[13] http://www.hse.gov.uk/economics/eauappraisal.htm

instance it will not award exclusive rights to a supplier or create closed procurement or licensing programmes.

- Indirectly limit the number of range of suppliers – No, it is not expected that the review of the proposed Regulations will limit the range of operators of gasoline pipelines. Although costs of complying with the additional duties of PSR would have a greater impact on smaller operators, the sort of industries involved with the transport of gasoline in pipelines at the pressures specified, will require large start up costs and so there will be significant barriers to entry. Thus, it is likely that the operators of such gasoline pipelines will be larger organisations. The nature of the industry will already limit competition and so it is not expected that PSR regulations will have a significant additional impact on competition.
- Limit the ability of suppliers to compete –No, it is not expected that the channels available to suppliers will be reduced or reduce the geographic area in which they can operate.
- Reduce supplier's incentives to compete rigorously – No, it is not expected that it will encourage or enable the exchange of information on prices, costs, sales, or outputs between suppliers.

Impact on Small Businesses, Charities and Voluntary Organisations

As noted above, the sort of industries which will transport gasoline will be large by nature of the significant start up costs associated with such industries. Thus, although the costs of complying with PSR additional duties would have a larger impact, proportionally, on smaller companies, it is unlikely that such smaller companies will be operating at such pressures. Thus, it is not expected that there will be an impact on small businesses, charities or the voluntary sector.

Environmental impacts

Greenhouse gas assessment – the burning of gasoline contributes to CO_2 emissions. The amendments to PSR will only serve to make the transportation of gasoline safer, and will not have an impact on the ultimate end use of gasoline by users, and so will not have an impact on CO_2 emissions.

Wider environmental issues

Updating the Regulations to ensure that the transportation of gasoline in pipelines is appropriately controlled will help to reduce the risk of a catastrophic incident which might adversely affect the environment. Estimates of the reduction in risk that might arise as a result of classifying gasoline as dangerous have been attempted, but are for illustrative purposes only. If an explosive gasoline incident occurred it would cause infrastructure and environmental damage, as well as harm to individuals. By increasing the controls required for the transportation of gasoline the risk of such an explosion is reduced and so there is likely to be less environmental damage over time. Overall cost savings associated with gasoline incidents has been calculated and this includes an element of environmental damage.

Social impacts

Health and wellbeing

It is expected that the amendments proposed will ensure the health and safety of those people working on and in the vicinity of gasoline pipelines. It has been estimated that the amendments might save injuries and lives over the 10 year appraisal period, see paragraph 29 – 43.

Human Rights
Everyone's life must be protected by law. Thus, the proposal to amend these regulations will assist duty holders in protecting the lives of their workers and the public around gasoline pipelines.

Justice
It is not expected that the proposal will have any impact on justice.

Rural Proofing
It is not expected that the proposal will have any impact on the quality of rural lives.

Sustainability
The sustainability principle is that the current generation satisfies its basic need and enjoys an improving quality of life without compromising the position of future generations. It is expected that the regulations will reduce the number of adverse incidents associated with the transportation of gasoline, and so reduce possible environmental damage, helping to preserve the quality of the environment for future generations.

Summary and preferred option

The preferred option is to amend the Pipeline Safety Regulations 1996 and the Health and Safety (Fees) Regulations to include gasoline as a dangerous fluid, and implement land use planning.

It is estimated that the net cost to society will be between £1.1m and £2.4m over 10 years with an estimated equivalent annual cost of about £135,000. Industry costs are estimated to be between £1.2m and £4.2m over the 10 year appraisal period, with an equivalent annual cost of around £245,000.

Benefits are estimated as between £785,000 and £1.6m over 10 years, with an equivalent annual benefit estimated of around £140,000.

The other options previously outlined were not considered as they would allow discretion on implementation.

Annexes

Annex 1 should be used to set out the Post Implementation Review Plan as detailed below. Further annexes may be added to provide further information about non-monetary costs and benefits from Specific Impact Tests, if relevant to an overall understanding of policy options.

Annex 1: Post Implementation Review (PIR) Plan

A PIR should be undertaken, usually three to five years after implementation of the policy, but exceptionally a longer period may be more appropriate. A PIR should examine the extent to which the implemented regulations have achieved their objectives, assess their costs and benefits and identify whether they are having any unintended consequences. Please set out the PIR Plan as detailed below. If there is no plan to do a PIR please provide reasons below.

Basis of the review: [The basis of the review could be statutory (forming part of the legislation), it could be to review existing policy or there could be a political commitment to review];
Review objective: [Is it intended as a proportionate check that regulation is operating as expected to tackle the problem of concern?; or as a wider exploration of the policy approach taken?; or as a link from policy objective to outcome?]
Review approach and rationale: [e.g. describe here the review approach (in-depth evaluation, scope review of monitoring data, scan of stakeholder views, etc.) and the rationale that made choosing such an approach]
Baseline: [The current (baseline) position against which the change introduced by the legislation can be measured]
Success criteria: [Criteria showing achievement of the policy objectives as set out in the final impact assessment; criteria for modifying or replacing the policy if it does not achieve its objectives]
Monitoring information arrangements: [Provide further details of the planned/existing arrangements in place that will allow a systematic collection systematic collection of monitoring information for future policy review]
Reasons for not planning a PIR: [If there is no plan to do a PIR please provide reasons here]

Annex 2 - List of assumptions used in the model.

- Failure rate = 0.263 events per 1000 km yrs (being 0.207 events per 1000km yrs for rural and 0.767 events per 1000 km yrs for urban). (Higher Scientist, Health and Safety Laboratory dated 23rd July 2008).

- Total length of pipeline in UK = 2,147 km (per Health and Safety Laboratory, GIS team calculations, 2010)

- Expected number of ignition events: rural areas = 3%; urban = 5% (Based on original estimates per WSA Report, page 12, which estimated 2.5% of incidents were ignition events in rural areas and 4.3% in urban areas, and adjusted by HSE for wider experience to 3% and 5% respectively).

- Location of pipelines = 10% urban and 90% rural. Advice provided by Higher Scientist, Health and Safety Laboratory (2008): total length of underground pipeline between 1988 and 2005 = 391,000 km yrs. Suburban length = 39100 km yrs (10%); rural length = 351,900 km yrs (90%).

- Consultation distance = on average 80m in urban areas and on average 60m in rural areas (Assessed by HSE, see Annex 3 for detailed analysis by width of pipeline.

- Individual risk: $1x10^{-6}$ for urban and rural areas, on average over the whole consultation distance. (HSE best estimate given the extended consultation distance from previous estimates and evidence available at the time of publishing).

- Total night time residential population in zone = 50,593 (urban) and 9,206 (rural). (GIS team at Health and Safety Laboratory 2010, based on 80m buffer zone)

- Expected reduction in the risk of an incident due to classifying gasoline as a dangerous fluid = between 10 and 20% (best estimate by Economics Analysis Unit for benefit calculations)

- Average cost of clean up in rural areas for the average incident (including business interruption costs) = 1% of the Buncefield economic cost = 1% x £894m (Chapter 3 of the Final Report of the MIIB).

- Based on data from HSE PADHI system, analysis of the average number of planning applications advised against around all major accident hazard pipelines over the last two years (50 per annum) and the estimated length of all pipelines of 25,000km, it has been estimated there are approximately 2 advised against cases per 1,000km of pipeline for an average CD of 100m. When this assumption is applied to the length of gasoline pipeline in urban areas, it is estimated that 0.43 applications are advised against per annum. In rural areas there is a much lower development pressure on land and other planning constraints which reduce the impact of HSE planning advice. Therefore it has been assumed that 2 advised against cases per 1,000km of pipeline is an over estimate in rural areas, and it may be more like one advised against case per 1,000km. The number of applications advised against in urban areas is therefore assumed to be around 2. Both the rural and urban estimates are based on the average number of AA cases for all major hazard pipelines, which cover 100m CD on average. It would be expected that the number of cases would reduce in proportion to the size of the CD for gasoline in these areas to reflect the smaller CD in which AA cases might occur. Thus, the total number of AA cases for 2,147km of pipeline is estimated to be between 1 and 2 per annum.

- Whether or not development is advised against depends on the type of development and the zone is it proposed for. According to PADHI, development is advised against if it is classed as a very large and sensitive development in any zone; development for vulnerable people would be advised against if in the middle zone and inner zones; development would be advised against in the inner zone if used by the general public, and finally no developments are advised against if they are used by working populations.

- The Valuation Office Agency (VOA) Property Market Report 2010 was used to estimate the size of the average developments that might be advised against. According to the VOA, the average

suburban residential site might be half a hectare in size, or 5,000m^2. Alternative developments that may be advised against include retail developments and sensitive developments. These are not expected to be a frequently applied for as housing, and the area of 5,000m^2 is assumed to cover such developments also. To account for smaller retails / sensitive type developments a range in development size has been provided from 1,000m^2 to 5,000m^2

- The value of development that is lost to society for each advised against case is assumed to be 5% of the total land value for residential development (5% lost value for each application reflects the fact that the majority of developments will proceed on alternative sites, or be slightly modified and so proceed on the same land, and so there will just be some efficiency loss to society, Results from an on-going research project indicates that this loss is up to 50% in urban areas, but almost zero in rural area for major hazard sites. Due to the nature of a pipeline and that developments do not have to be moved very far to be outside of the CD, the efficiency loss is expected to be quite small at around 5%).

- The value of land for a residential site has been used to value all the development assumed to be lost. This is the most expensive use of land, so enables the maximum value of the land to be estimated.

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

The weighted average consultation distance is estimated as follows, weighted using the percentage of total gasoline pipeline accounted for by each diameter.

Pipeline	Inner Zone	Middle Zone	Outer Zone / CD
Weighted av Urban	38	71	78
Rounded	40	70	80
Weighted av Rural	39	39	57
Rounded	40	40	60

Annex 4 - References

- WSA Report: Assessing the risk from gasoline pipelines in the UK based on a review of historical experience. Prepared by W.S Atkins Safety and Reliability for the Health and Safety Executive. Contract Research Report 210/1999. Available at: http://www.hse.gov.uk/research/crr_pdf/1999/crr99210.pdf
- A.D. Little 'Risks from gasoline pipelines in the UK' report to HSE in June 1996. Contract Research Report 206/1999. Available at: http://www.hse.gov.uk/research/crr_pdf/1999/crr99206.pdf
- The Buncefield Incident 11December 2005. The final report of the Major Incident Investigation Board. Volume 1. Available at: http://www.buncefieldinvestigation.gov.uk/reports/volume1.pdf