Summary: Intervention & Options

Department /Agency: HSE	Title: Impact Assessment of a new duty for Local Authorities to test the emergency plans currently required under PSR

Stage: Provisional	Version: Draft V3	Date: 7 August 2008

Related Publications:

Available to view or download at:

http://www.

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

Pipelines Safety Regulations 1996 (PSR) require Local Authorities to produce emergency for major hazard pipelines and review them on a three yearly basis. There is no requirement to periodically test these plans, as a result their adequacy cannot be demonstrated.

As the duty holders do not bear the cost it imposes on the wider community, the market cannot itself be expected to deliver any further risk reduction.

What are the policy objectives and the intended effects?

The policy objectives are:

1. To ensure that emergency plans, which mitigate the consequences of major accidents to memebers of the public, are fit for purpose.

2. To bring the requirements of PSR in line with those for COMAH whilst reflecting the differences between fixed installations and linear structures

3. To bring the requirements of PSR in line with UNECE's 'Safety Guidelines and Good Practices for Pipelines' published in 2006.

What policy options have been considered? Please justify any preferred option.

The following regulatory options are being considered

i) no change

ii) testing every three years

iii) testing every three years alternative between live tests and control post exercises

iv) testing if and when changes are made to the plans

Non regulatory options have been discounted as they allow discretion on implementation.

When will the policy be reviewed to establish the actual costs and benefits and the achievement of the desired effects?

The policy will be reviewed within five years of implementation.

Ministerial Sign-off For consultation stage Impact Assessments:

I have read the Impact Assessment and I am satisfied that, given the available evidence, it represents a reasonable view of the likely costs, benefits and impact of the leading options.

Signed by the responsible Minister:

.... Date:

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Summary: Analysis & Evidence

Policy Option: **Description:**

COSTS

ANNUAL COSTS	Description and scale of **key monetised costs** by 'main affected groups'	
One-off (Transition) **Yrs**		
£		
Average Annual Cost (excluding one-off)		
£	**Total Cost** (PV)	£

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

BENEFITS

ANNUAL BENEFITS	Description and scale of **key monetised benefits** by 'main affected groups'	
One-off **Yrs**		
£		
Average Annual Benefit (excluding one-off)		
£	**Total Benefit** (PV)	£

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

Key Assumptions/Sensitivities/Risks

Price Base Year	Time Period Years	**Net Benefit Range** (NPV) £	**NET BENEFIT** (NPV Best estimate) £

What is the geographic coverage of the policy/option?	GB
On what date will the policy be implemented?	
Which organisation(s) will enforce the policy?	
What is the total annual cost of enforcement for these organisations?	£
Does enforcement comply with Hampton principles?	Yes/No
Will implementation go beyond minimum EU requirements?	Yes/No
What is the value of the proposed offsetting measure per year?	£
What is the value of changes in greenhouse gas emissions?	£
Will the proposal have a significant impact on competition?	Yes/No

	Micro	Small	Medium	Large
Annual cost (£-£) per organisation (excluding one-off)				
Are any of these organisations exempt?	Yes/No	Yes/No	N/A	N/A

Impact on Admin Burdens Baseline (2005 Prices)   (Increase - Decrease)

Increase of   £   Decrease of   £   **Net Impact**   £

Key: **Annual costs and benefits: Constant Prices**   **(Net) Present Value**

[Use this space (with a recommended maximum of 30 pages) to set out the evidence, analysis and detailed narrative from which you have generated your policy options or proposal. Ensure that the information is organised in such a way as to explain clearly the summary information on the preceding pages of this form.]

Duty for Local Authorities to test the emergency plans currently required under PSR

1. This paper sets out an initial assessment of the impacts of the proposed changes to duties for Local Authorities to test emergancy plans currently required under PSR

Purpose and intended effects
Issue

2. Pipelines Safety Regulations 1996 (PSR) require Local Authoriities to produce emergency plans for major hazard pipelines and review them on a three yearly basis. Under the current regulations there is no requirement to periodically test these plans, as a result their adequacy can not be demonstrated.

Objectives

3. To ensure that emergency plans, which mitigate the consequences of major accidents to members of the public, are fit for purpose.
4. To bring the requirements of PSR in line with those for COMAH whilst reflecting the differences between fixed installations and linear structures
5. To bring the requirements of PSR in line with UNECE's 'Safety Guidelines and Good Practices for Pipelines' published in 2006.

Background

6. Current testing practice for pipelines in general has been examined by the Health and Safety Laboratory[1]. The pipeline operators contacted during the study felt that emergency planning for pipelines was an integral part of emergency planning as a whole. Any site which included a pipeline would include pipeline scenarios as part of the total list of scenarios to be tested over time. Another operator had recently completed a table-top seminar exercise which included the operator, the fire brigade, the Environment Agency, and the Local Authority. A further operator made the point that the pipeline operators input to the pipeline emergency plan can be relatively small compared with on-site (i.e. at the plant itself) events.
7. A working group of the United Kingdom Operators of Pipelines Association (UKOPA) produced the following recommendations for the testing of emergency plans for pipelines under PSR:
   - ➤ Site visits and 'control post' exercises be carried out annually by each pipeline operator;
   - ➤ A table-top exercise is carried out every two years by each operator;
   - ➤ A live exercise is carried out for each predefined UK zone (of five zones).
8. PSR requires "a reasonable level of testing [by the local authority] to enable it to offer a demonstration of confidence in the plan".
9. The operating company that had carried out the live exercise used site visits to familiarise 'front line' workers with the pipeline and control room. Control post exercises, which involve key personnel being at pre-arranged sites and ensuring constant all-way communication, were also routinely used. It should be noted that these test the pipeline operator's emergency plan rather than the LA emergency plan.
10. A plan may cover a number of pipelines and may, in future, include gasoline pipelines if they are present in the area. The local authority may elect to test its plan on any one of a

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[1]"Current Practice in the Testing of Emergency Plans", A J Widley et al, report prepared by the Human Factors Group on behalf of the Health and Safety Laboratory, RAS/98/7 (1998).

number of different pipelines in its area - natural gas during one three-year cycle, gasoline during the next cycle, and so on.

Rationale for Government Intevention

11. The rational for government intervention to extend local Authorities duties to include the testing of emergency plans is based on the fact that the risk posed from an accident cannot be reduced to zero. Therefore there is residual risk to people in the vicinity of pipelines which carry hazardous substances.
12. Because information regarding pipelines and the level of risk associated with them is complex and difficult to understand, it is unlikely that individuals can fully compute all the information and hence make appropriate decisions about such risks. In the event of an accident at a pipeline it is important that emergency plans are in place to mitigate the extent of damage that can amount.
13. Such emergency plans already exist however; the adequacy of these is unknown as they currently do not need to be tested.
14. Generally, people will benefit form the "reassurance value" provided by testing the plans and ensuring they are "fit for purpose".

Options
Option 1: No change

15. Under option 1 there is no change to current duties on Local Authorities. The duty remains under Pipelines Safety Regulations 1996 (PSR) that Local Authoriities are required to produce emergency plans for major hazard pipelines and review them on a three yearly basis. There is no requirement to periodically test these plans.

Option 2: Extend duties to test emergency plans on a three yearly basis

16. Under option 2 local authorities will be required to have an initial emergency plan test and then test emergency plans on a three yearly basis. This is in addition to reviewing emergency plans on a three yearly basis.

Option 3: Extend duties to test emergency plans every three years, alternating between live tests and control post exercise.

17. Under option 3 local authorities will be required have an initial emergency plan test and then to test emergency plans on a three yearly basis, alternating between a full live test and a control post exercise. This is in addition to reviewing emergency plans on a three yearly basis.

Option 4: Extend duties to test emergency plans if and when any changes are made.

18. Under option 4 local authorities will be required have an initial emergency plan test and then to test emergency plans again if and when any changes are made to plans or in the light of notification of any major changes by pipeline operators. This is in addition to reviewing emergency plans on a three yearly basis. It is assumed that plans will be tested in 3 to 6 year intervals.

Costs and Benefits
Data sources and assumptions
Technical assumptions

19. The extension to duties will affect 366 local authorities, and for the purpose of cost benefit analysis it is assumed to effect 366 emergency plans. It is assumed that there will be a homogeneous emergency plan test taken by all local authorities.
20. Costs have been discounted over a period of 30 years in present value terms.
21. Costs and benefits are discounted at a rate of 3.5% and 1.5% (for health benefits) in accordance with HM Treasury's green book.
22. It is assumed that owners keep their pipelines in good repair and that no new pipelines will be constructed in this period. Therefore compensating for any depreciation that would

otherwise occur. The stock of pipelines is thus considered constant over the time period in analysis.

23. Owners of pipelines will notify local authorities[2] with any changes to pipelines which will affect the effectiveness of emergency plans.

Risk of pipeline failure

24. Emergency plans are called into action at an event of pipeline failure, this happens with an approximate probability of 0.1[3] per year.

25. Under current duties the effective "fit for purpose" level of emergency plans is assumed to have an efficiency level of 0.4 (40%) Cost savings. Total potential cost savings are estimated in **Annex 1.**

26. The proposed changes will not affect the probability of pipeline failure, but will affect the effective "fit for purpose" level of the emergency plans. Its effects are two fold, firstly to ensure the plan does not fail out right and secondly it affects the overall efficiency of the plan.

Modeled "fit for purpose" levels of emergency plans

It is assumed that under current arrangements the probability of emergency plan completely failing is 0.5 (50%). If an emergency plan fails, the cost of an accident is approximately £13 million.

27. If an emergency plan does not fail, it has an efficiency ("fit for purpose") level of how effective the plan is in the event of an accident. This average level is currently assumed to be 0.4.

28. The expected cost savings under the current emergency plan system is approximately £1 million:

Expected current cost saved =
(% chance of an accident) x (probability that emergency plan fails) x (cost of an accident) +
(% chance of an accident) x (probability that emergency plan does not fail) x (reduced costs from an accident)

E(current cost saved) = (0.1)(0.5)(13m) + (0.1)(1-0.5)(1-0.4)(13m) = £1m
(per year)

29. It is assumed that the probability of complete failure of emergency plans drops to zero after the first test is carried out.

30. After the first test of an emergency plan it assumed the efficiency level increases to 0.85 (85% of total cost saving potential). By carrying out a control post exercise, the efficiency level is assumed to be 0.7.

31. The effective level of an emergency plan is assumed to depreciate by 10% each year due to changes in infrastructure, people etc in the vicinity of the pipeline. This is based on the average depreciation of intangible local authority stock[4].

Benefits (costs avoided)

32. Benefits from an emergency plan are the costs saved through mitigating the results from an accident.

33. Options 2, 3 and 4 require at least a first Emergency plan test. The initial test (and subsequent corrections if needed) reduce the probability of complete emergency plan failure to zero.

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[2] As required by Pipeline Safety Regulations 1996 (PSR)
[3] Failure frequency taken from UKOPA fault database, Pipeline product loss Incidents (1962 – 2006) 5th Report of the UKOPA fault database management group Report # 6957 Issue 1.0 August 2007. Available at: http://www.ukopa.co.uk/publications/pdf/UKOPA-07-0050.pdf
[4] Average of period 1995 – 2006, from national office of statistics http://www.statistics.gov.uk/statbase/TSDdownload1.asp

34. If the probability of pipeline failure is 0.1, the current failure of emergency plans has a probability of 50% and the cost of an accident are £13 million. The expected costs of failure given a pipeline failure are:

P(EP Failure | Pipeline failure) = (0.1)(0.5 x13million)   =   £650,000

35. Furthermore, the first emergency test increases the efficiency of the test plan from 40% to 85% such that:

E(cost 40% efficiency) = (0.1)(1-0.5)(1-0.4)(13m)   =   £390,000
E(cost 85% efficiency) = (0.1)(1-0.85)(13m)   =   £195,000

36. Such that total cost saving form an initial test is:

650,000 + 390,000 - 195,000 (approx)   =   £800,000

37. Benefits incurred after the initial emergency plan test are through increased effectiveness of the emergency plan being implemented from further tests. Each test returns the effective level of the emergency plan to 85% and each control test returns the efficiency level to 70%. The benefit varies between options.
38. **Option 2:** under option 2 the effective level of the emergency plan returns to 70% every six years and 85% every three years between. This amounts to a present value benefit of £ 55 million
39. **Option 3:** under option 3 the effective level of the emergency plan returns to 85% every three years. This amounts to a present value benefit of £ 59 million
40. **Option 4:** Under option 4 the effective level of the emergency plan depends on actions taken after either the three yearly reviews or after notification of changes to pipelines etc. Testing of the emergency plan is on a risk based approach. Assuming tests are run between every 1 to 6 years, present value benefits are in the range £ 57 million to £ 60 million.
41. **Total benefits under each option:**

Option	Benefits
Option 2	£ 55 million
Option 3	£ 59 million
Option 4	£ 57 million to £ 60 million

Costs
42. The HSL report[5] looked at the resource cost for all participants in testing emergency plans drawn up under COMAH:
  - ➢ Table top exercise   =   £!0,000
  - ➢ Live exercise   =   £140,000
43. The live exercise may have overestimated the costs of having the fire brigade present).
44. The nuclear industry also made cost estimations:
  - ➢ Table top exercise   =   £25,000
  - ➢ Live exercise (level 2)   =   £50,000
  - ➢ Live exercise (level 3)   =   £500,00
45. A full scale level 3 live exercises typically lasts 36 hours.
46. We make the following time assumptions for visits and control post exercises per annum:
  - ➢ 1 man day for 10 middle managers
  - ➢ 1 man day for 10 site / control engineers
  - ➢ 1 man day for 20 "front line" personnel

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[5] Current Practice in the Testing of Emergency Plans", A J Widley et al, report prepared by the Human Factors Group on behalf of the Health and Safety Laboratory, RAS/98/7 (1998).

47. The above man days are calculated at a full economic cost of:
   - £200 a day for middle managers / site engineers
   - £150 a day front line operators
48. Where full economic cost includes an additional 30% of wage to account for costs including superannuation, employers' national income contributions and capital costs. It does not include accommodation costs.
49. This suggests an annual cost per operator for a site visit and control post exercise of:

$$10(200) + 10(200) + 20(150) \qquad = \qquad £7000$$

50. Pipeline operators are reported by HSL as stating that the type of scenario that needs to be tested is simpler than a full scale test of an on-site emergency at a major site. We therefore estimate the total cost of a "live" pipeline test by a local authority to be £25,000. This is half the cost of a level 2 test carried out by the nuclear industry, which would tend to be more complex.
51. Costs are estimated to comprise:
   - Emergency services = £6,000
   - Operators personnel = £5,000
   - Local authorities (and other authorities) staff on day = £5,000
   - Preparation and test analysis = £9,000 (36 days of middle managers time)
52. **Total costs under each option:**

Option	Costs (year per plan)	Total Costs
Option 2	£6,300	£70 million
Option 3	£4,300	£46 million
Option 4	£3,500 – £17,000	£38 – 185 million

Competition assessment
53. No significant economic impact on competition

Small firms Impact test
54. No significant economic impact on SMEs.

Environment
55. PSR does not cover the environment – however there is potential for significant environmental benefits in the form of costs avoided through limiting the damage of an accident.

Other tests
56. No Significant or economic impact on legal aid, sustainable development, carbon assessment, Health impact assessment, race equality, disability equality, gender equality, , Human rights or rural proofing.

Uncertainties
57. There are uncertainties with regard to both costs and benefits in this analysis and further research is needed to produce adequate estimations.
58. There is no data available on current failure rate or effective levels of emergency plans. Therefore also it is difficult to estimate the precise change in the effective levels that emergency plan testing will result in. there has been discussion with industry representatives on the assumptions underlying these calculations.
59. Costs are taken form a HSL report that is ten years old. For accurate costing this will need to be updated.

Specific Impact Tests: Checklist

Use the table below to demonstrate how broadly you have considered the potential impacts of your policy options.

Ensure that the results of any tests that impact on the cost-benefit analysis are contained within the main evidence base; other results may be annexed.

Type of testing undertaken	Results in Evidence Base?	Results annexed?
Competition Assessment	Yes	Yes/No
Small Firms Impact Test	Yes	Yes/No
Legal Aid	Yes	Yes/No
Sustainable Development	Yes	Yes/No
Carbon Assessment	Yes	Yes/No
Other Environment	Yes	Yes/No.
Health Impact Assessment	Yes	Yes/No
Race Equality	Yes	Yes/No
Disability Equality	Yes	Yes/No
Gender Equality	Yes	Yes/No
Human Rights	Yes	Yes/No
Rural Proofing	Yes	Yes/No

Annex 1

1. Benefits from an emergency plan are the costs saved through mitigating the results from an accident.

2. As there is little evidence on the actual costs saved from emergency plans, an example scenario is used to estimate these costs. The example is taken from the Extension of pipeline safety regulations (1996) to include gasoline as a dangerous fluid impact assessment.

3. Research on previous evidence on the scale of loss incurred following high cost chemical/petrochemical accidents finds a lack of reliable data in the public domain. Published costs tend not to include unobserved cost. An analysis of 119 events at petrochemical, chemical and refinery sites were on average 2.7 times the commercial property damages.

4. If between 10-20 residential properties were destroyed in an urban area, the property damage can be valued at around 10-20 x £150,000 = up to £3 million. Business interruption, clean-up and other infrastructure damage could increase this figure to £4 million. As WS Atkins[6] note, there is insufficient data from the research to build up a consequence model for ignition events from the historical data. From the data, losses of **£4 million** would not be a worse case scenario.

5. Using (limited) data on gasoline pipeline failure Non-catastrophic risks can be considered. These are the costs of losses from an event which does not result in an ignition. These will result in environmental damage, business loss etc.

6. There is little information from the historical record about the costs of damage and mitigation of gasoline pipeline releases, since these tend to focus on technical descriptions of the incidents. However, 'clean-up' operations in rural areas are typically stated to take between one and two weeks and involve many personnel. A cost of $25,000 was reported by one US operator.

7. Adopting a worse case scenario for this event, the paper suggests a cost of around £130,000 for a non-catastrophic event. In present value terms over the period this is approximately **£2 million.**

8. There is a further benefit in terms of "value of preventing a fatality" (VPF) of £1,435,000 [7] from the economic analysis unit (EAU) appraisal values.

9. The EAU appraisal values can be used to estimate the benefits of proposed measures which aim to improve safety, and to compare such benefits with the cost of government intervention. The prevention and mitigation of an accident leads to a reduction in costs to society, the EAU appraisal values are used to inform estimates of the size of such reduction in cost.

10. The Extension of pipeline safety regulations (1996) to include gasoline as a dangerous fluid impact assessment estimates an average equivalent fatality preventable risk per year of 1×10^{-7}.

11. Making the assumption that this can be generalised to all pipelines, the present value over the time period considered is approximately **£7.2 million.**

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[6] 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.

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