

# **COMAH COMPETENT AUTHORITY POLICY ON CONTAINMENT OF BULK HAZARDOUS LIQUIDS AT COMAH ESTABLISHMENTS HANDLING PETROL (GASOLINE) AND SIMILAR PETROLEUM PRODUCTS OR OTHER FUELS**

## **REGULATORY IMPACT ASSESSMENT**

### **Introduction**

1. This regulatory impact assessment (RIA) accompanies the policy document 'Containment of bulk hazardous liquids at COMAH establishments: petrol (gasoline) and similar petroleum products or other fuels storage'. For brevity we will refer to this sector as 'fuel storage'.
2. The policy on fuel storage forms one part of the COMAH Competent Authority's documentation on containment at COMAH establishments handling bulk hazardous liquids. There will be a separate consultation and RIA on establishments storing flammable and toxic liquids in the chemical manufacturing, storage, and distribution industries.
3. The policy document proposes a set of technical measures that are required to achieve effective containment at fuel storage sites and to ensure that consistent standards of control are achieved in similar circumstances across the sector. This RIA attempts to inform policy decisions through quantification of the costs and benefits associated with such a containment policy.

### **Purpose and intended effect**

4. The purpose of the policy is to reduce the risks associated with loss of containment at fuel storage installations. These risks arise from failures in containment that lead to:
  - a) a leak or overflow that damages the environment but does not harm people or property
  - b) a leak or overflow that results in an explosion or fire damaging to the environment, property, and people.
5. The intended effect is to achieve consistency in standards across the sector and, on a site by site basis, an appropriate reduction in risk. Measures will be implemented according to a site-specific assessment of the hazard, risk and cost of control measures such that all reasonably practicable changes are implemented (i.e. those changes where costs do not grossly outweigh safety benefits).

## **Background**

6. The Buncefield incident in December 2005 challenged worldwide understanding about major accidents at fuel storage sites. In response to this, and other incidents, the COMAH Competent Authority (CA) has developed key principles relating to the bulk storage of hazardous liquids. In the case of fuel storage these principles have been translated into a new policy framework, as set out in the document 'Containment of Bulk Hazardous Liquids at COMAH Establishments: Expanded framework for handling petrol (gasoline) and similar petroleum products or other fuels'.
7. Containment at fuel storage sites may be in the form of primary, secondary or tertiary containment. Primary containment measures concern all equipment that comes into routine or intentional contact, including management and control systems, with fuel. Secondary containment involves containing spillages resulting from failures in primary containment, principally through the use of 'bunds' surrounding tanks. Tertiary containment prevents leakages and overfills from spreading uncontrollably beyond the confines of the site.
8. The policy will be applied to industry sectors and processes according to risk, and will be implemented on the basis of the hazards of the substances present, taking account of the situation, community and environment where the installations are located. The measures will be implemented according to the hazard and risk. The highest standards will be expected where the risks to people and environment are greatest.
9. The measures apply immediately to new establishments and any substantial changes in inventory or operation at existing establishments. The measures will be applied to upgrade existing establishments as far as it is reasonably practicable to do so, such that consistent standards apply across the sector.

## **Rationale for Government Intervention**

10. The rationale for government regulation of major hazards is that there may be negative offsite consequences (externalities) resulting from failure of containment measures. Such external effects may not be captured by the market interactions of firms and individuals, and through regulation government can effectively transfer some of external costs associated with risk to the industry. This should lead to a more socially optimal outcome, as transferring costs in such a way follows the 'polluter pays' principle. In other words, without regulation there is a danger that external effects will be ignored and the level of risk will be higher than the socially optimal level.

11. Buncefield demonstrated that a vapour cloud explosion at a site storing gasoline or substances with substantially similar characteristics is a credible event, whose extent and severity are greater than the previously assumed representative scenario of a large fire. This new information about the nature of the hazard posed by such substances, where the consequences of containment failure are now seen to be more severe than previously thought, means that external effects may be greater than previously thought and more stringent containment measures may be justified. The new guidance developed to support the policy will reflect this new information, in upgrading containment measures as far as it is reasonably practicable to do so.
12. Industry will also receive benefits from improved containment measures, in the form of a reduction in the frequency of costly incidents. Individuals may also benefit from the 'reassurance value' provided by government managing risks in this area.

## **Options**

This regulatory impact assessment considers two options:

### **Option 1 – no change to containment policy**

13. Option 1 is the 'do nothing' option, under which fuel storage site operators would continue to use existing containment measures without upgrading. No additional costs or benefits would be expected if this option were to be followed.

### **Option 2 – implement new policy for containment**

14. Option 2 implements the new policy, as set out by the CA in the document 'Containment of Bulk Hazardous Liquids at COMAH Establishments: Expanded framework for handling petrol (gasoline) and similar petroleum products or other fuels'. Implementation of this policy will substantially improve safety and environmental standards at sites. Fuel storage site operators will need to implement a system of upgrading existing facilities within a specified time frame, where the benefits of such changes are not grossly disproportionate to the costs.

## **Costs**

### **Costs of primary containment**

15. Assumptions

- There are 95 COMAH fuel storage sites (86 in England and Wales and 9 in Scotland) and around 2200 tanks are located at these installations.
- 690 of these tanks contain petrol or petrol related products that, because of the nature of the substance stored, are very likely to be affected by the new policy for primary containment (i.e. they will require upgrading to ensure that risks remain as low as reasonably practicable (ALARP)). Around 450 of these tanks contain finished petrol, the remaining 240 tanks contain petrol related products. Not all tanks will require all of the improvements costed owing to the level of their existing primary containment measures. Because of this we assume a 15% reduction in the total cost for these tanks.
- There are 1510 other fuel tanks where less volatile materials such as diesel, oil, aviation fuel and kerosene are stored and hence it is less clear as to how many of these will require upgrading to ensure that risks remain ALARP. Because of this uncertainty we assume that between 10% and 25% of such tanks may be affected by the proposal under option 2.
- Changes to primary containment will be implemented alongside routine maintenance or other activities where tanks are required to be shut down. Thus the additional costs presented in this RIA represent those costs associated with extra measures required to upgrade to the standards of the new policy and do not include shutdown or like-for-like replacement costs.
- The timescale for implementation is 20 years, thus costs are discounted over this period.
- 5% of sites will upgrade all of their tanks each year over the 20 year period.
- Each site has an average number of tanks.
- No new capacity will be required during this time because of upgrading.
- The cost of primary containment upgrade on a per tank basis is £500,000. This estimate is taken from the industry (Buncefield Standards Task Group), based on a cost for upgrading 500 tanks of approx. £250 million. Full details are in Annex 1. Please note, however, that this costing is a “best effort” based on the limited information that was available at the time. The subsequent recent release of further information is likely to have an impact, possibly substantial, on these costings, however, these costings are the best that we have available at this time.
- As noted above, some existing tanks already have elements of the controls costed for in place and to take account of this a 15% reduction has been made to the cost of the improvements necessary for tanks storing petrol due to the adequacy of existing standards on a proportion of tanks.
- The discount rate used is 3.5%. For further information please refer to the Treasury green book.<sup>1</sup>

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<sup>1</sup> Link to HMT green book

## Methodology

16. To calculate the national cost of upgrading fuel storage facilities in line with the new policy we must estimate the unit cost of upgrading a tank and the number of tanks likely to be affected. Industry data was used to arrive at a unit cost of £500,000 per tank (see Annex 1 and caveats above). This per-tank cost was then scaled up according to our estimate of the number of tanks likely to require upgrading to ensure that risks remain ALARP. These cost estimates are presented in the table below.

### Primary containment in fuel storage sector: undiscounted costs

	Number of tanks (UK total)	Cost per tank (£k)	Cost of upgrading (£m)
Finished petrol	450	500	225
Petrol related products	240	500	120
Total			345
15% reduction to total cost due to adequacy of existing standards			-50
Total			295
Other fuels	1510		
If 10% require upgrading	150	500	75
If 25% require upgrading	375	500	190
Total			<b>370 – 485<sup>2</sup></b>

17. The upgrading of affected tanks will be implemented over a period of 20 years. Expressed in net present value terms, with costs spread over 20 years and discounted at a rate of 3.5% pa, we estimate that the total cost of upgrading tanks to meet new primary containment policy will be £270-360 million.

**Total cost of primary containment (NPV) = £270-360 million**

### Costs of secondary containment

18. The CA has carried out a review of secondary and tertiary containment upgrading required at fuel storage installations:

- Inadequate bund capacity was an issue at fewer than 10 sites. Operators are already carrying out the upgrading, so the costs have not been included in this RIA.
- Permeable bunding was found to be the most significant issue and many of the sites will need to carry out some upgrading. This will be

<sup>2</sup> Comprising an estimate for other fuels of £75 - £190 million and an estimate for petrol and petrol-related products of £295 million.

the predominant element of the cost for upgrading secondary containment.

- Penetrating pipework, bund drains, fire resistant joints, minimising the number of tanks in each bund and a number of other requirements were found to be an issue at the majority of sites. In some cases the costs of upgrading would be disproportionate to the benefits achieved so upgrading will not be required. In other cases the costs will be very small when compared to the costs of upgrading permeable bunding, so they have not been included in this RIA.

19. In the calculation of costs for secondary containment we assumed the following:

- There are 95 COMAH fuel storage sites (86 in England and Wales and 9 in Scotland) and around 2200 tanks are located at these installations.
- The cost of fully upgrading is estimated by the industry as £720,000<sup>3</sup> per tank.
- The CA review identified 19 installations in category 1, that are significantly below good practice. All tanks at these installations will require full upgrading.
- The CA review identified 57 installations in category 2, where there was some evidence that measures are below good practice.
- 7 of the 57 category 2 installations will require full upgrading.
- 41 of the 57 category 2 installations need to evaluate the permeability of their bunds at a cost of £15k per tank. Some tanks will not require any upgrading and some will need full upgrading so the costs have been given as a range from £15k to £735k per tank.
- 9 of the 57 category 2 installations are operated by the Oil and Pipelines Agency (OPA) and have below ground tanks. They were included in category 2 because some evaluation work is required but the CA does not anticipate that significant upgrading work will be needed.
- The CA review identified 10 installations in category 3 that demonstrate good practice and pose little risk to the environment, hence significant upgrading work will not be needed.
- The review only covered England and Wales. For the 9 installations in Scotland the same are proportions of tanks in categories 1,2, and 3 are used.
- Timescale for implementation is 20 years, thus costs are discounted over this period
- The discount rate used is 3.5%. For further information please refer to the Treasury green book<sup>4</sup>
- Life of a tank is taken as 30 years.

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<sup>3</sup> Source: BMIIB. Industry- Ken Rivers Buncefield Standards Task Group

<sup>4</sup> Link to HMT green book

20. Cost estimates are presented in the Table below for upgrading in order to meet new secondary containment requirements under option 2.

### Secondary containment in fuel sector: undiscounted costs

	Number of tanks	Cost per tank (£k)	Cost of upgrading (£m)
19 category 1 installations	220	720	160
7 category 2 installations needing full upgrading	380	720	270
41 category 2 installations needing evaluation and some upgrading	325	15 to 735	5 to 240
9 category 2 OPA installations and 10 category 3 installations	1075	0	0
Sub total England and Wales	2000	-	435 to 670
Sub total Scotland (pro rata)	200		45 to 70
<b>Total</b>	<b>2200</b>		<b>480 to 740</b>

21. The upgrading of affected tanks and bunds will be implemented over a period of 20 years. Expressed in net present value terms, with costs spread over 20 years and discounted at a rate of 3.5% pa, we estimate that the total cost of upgrading tanks to meet new secondary containment policy will be £360 to £550 million.

**Total cost of secondary containment (NPV) = £360 to £550 million**

### Costs of tertiary containment

22. Tertiary containment provides a third line of defence for the environment by enclosing the whole site. The costs will therefore be on a "per site" rather than a "per tank" basis. These costs are difficult to estimate because they will be site specific and highly dependent on the surrounding location. The policy does not specify any particular measures to be taken but does require operators to assess existing arrangements and options for improvement.

23. For the purposes of this RIA some costs for upgrading tertiary containment equipment have been estimated by the CA based on the following assumptions:

- The costs will be larger on the top tier sites compared to lower tier because top tier sites are physically larger.
- The very biggest top tier sites are the 9 oil refineries but these will not incur greater costs than other top tier sites because the refineries already have some tertiary containment.
- Top tier costs will be £0.2m to £2m per site (average £1m) and lower tier costs will be £0.1m to £1m per site (average £0.5m).
- There are 32 top tier sites and 63 lower tier sites.
- Improvements will be implemented over 20 years at 5% of total a year.
- No new capacity is required to maintain supply during the improvement programme.

24. If all 32 top tier and 63 lower tier sites had to be upgraded in order to meet new tertiary containment requirements under option 2, then there would be a total cost of £64 million. Since all these sites are in scope this estimate for costs has been used.

25. The upgrading of sites will be implemented over a period of 20 years. Expressed in net present value terms, with costs spread over 20 years and discounted at a rate of 3.5% pa, we estimate that the total cost of meeting new tertiary containment policy will be £46 million.

**Total cost of tertiary containment (NPV) = £46 million**

## **Benefits**

26. The benefits of new containment measures take the form of averting future costs - the proposed changes will reduce the risk (i.e. the frequency) of incidents occurring that cause harm to people, property or the environment. To the extent that the measures reduce the probability of incidents occurring they reduce the expected cost (based on a frequency estimate) of such incidents.

27. It is helpful to distinguish between the safety benefits of new containment measures and their environmental benefits. For the purposes of this analysis we will associate primary containment measures with safety benefits (reduced likelihood of harm to people and property) and secondary and tertiary containment measures with environmental benefits (reduced likelihood of harm to the environment). In reality there is some overlap between the two: improved primary containment can reduce the frequency of overfilling and other spills that could cause environmental damage; secondary containment can limit the spread of fuel when primary containment fails and hence avoid fire

spreading between tanks. However, for simplicity only one objective is assigned to each kind of containment.

28. The policy on containment will be implemented on a site by site basis according to the hazard and risk posed and the cost of control measures, such that all reasonably practicable measures are put in place. Ideally, therefore, we would look at costs and benefits as they apply to each site. However, given time and resource constraints we have not been able to conduct such a detailed analysis.
29. Instead of a site-by-site analysis we have relied on averages which are then scaled-up to provide a national picture. While we may estimate costs with some degree of accuracy using this method, in relation to estimating benefits this method is far more problematic. Essentially this is because the notion of there being an 'average' or 'typical' incident is a simplification: in reality any incident is practically unique. Similarly, the risk posed by each site varies, and no site will be truly 'typical' or 'average'.
30. Nevertheless, in the absence of alternatives we have carried out an analysis of benefits based on just such an imaginary 'typical' incident and event frequency. The methodology used below therefore provides only a hypothetical measurement of benefits and should not be applied on a site by site basis. In reality an assessment of costs and benefits should be carried out more fully on a site by site, and in practice this is how the policy will be implemented.

### **Primary containment benefits**

31. Due to the infrequency of major accidents it is difficult to quantify the actual risk posed by large fuel storage sites. In the post-war period, since large-scale fuel storage and chemical industries have been in existence, there has only been one major onshore incident, in this industry sector in the UK causing loss of life on the scale assumed below – the explosion at Flixborough in 1974. Hence the levels of risk used in this RIA provide an illustrative example of how the benefits of improving primary containment relate to risk, and should be treated with extreme caution. They do not reflect the actual level of risk posed by any particular site.
32. It is important that the risks posed by major hazards are seen in context. To this end Annex 2 provides a table of comparative risks from 'normal life'.
33. Due to the many uncertainties associated with calculating the benefits of primary containment measures, we illustrate below the potential benefits for a hypothetical site. In order to carry out this exercise we have made the following assumptions:

- Benefits will span the life of a tank, assumed to be 30 years
- Improvements in primary containment are brought in over a period of 20 years
- The discount rate for economic (i.e. environmental) benefits is 3.5%
- The discount rate for health (i.e. safety) benefits is 1.5%
- An incident would lead to an economic cost of £1 billion and a human cost of £40 million
- Safety improvements resulting from primary containment improvements will reduce the likelihood of an incident by an order of magnitude
- The current risk of an incident per site is 1 in 10,000 years, though alternative scenarios are also provided through a sensitivity analysis

34. For the purposes of analysis we adopt a hypothetical event frequency per site of 1 in 10,000 years. This assumed level of risk is particularly uncertain and does not reflect actual levels of risk at any particular site, which could fall either side of this assumption. To illustrate this we also provide estimates based on a frequency per site of 1 in 1,000 years and 1 in 100,000 years.

35. We assume that the economic cost (i.e. damage to property and infrastructure) of an incident is £1 billion. This assumption suggests a large incident, though it may be comparable to the costs of the accident at Buncefield. We further assume that the number of people killed by a 'typical' incident will be 15 (this is the number of people killed by the incident at BP's refinery in Texas in 2005). We also assume that for each fatality there will be 7 major injuries (roughly equivalent to an additional 15 fatalities). We then multiply this by HSE's appraisal value of £1.4 million per fatality to provide an estimate of human costs of £40 million approximately (1.4 x 30).

36. To calculate the current annual expected economic cost of the risk posed by the hypothetical site we divide the assumed cost of an incident by the associated level of risk (if the level of risk is 1 in 10,000 years then the annual expected economic cost is £100,000 (1 billion/10,000)). To calculate the annual expected economic cost at the future level of risk we do the same but multiply by the estimated future level of risk (if 1 in 100,000 years after safety improvements then annual cost falls to £10,000 (1 billion/100,000)).

37. The difference between current and future economic costs is then calculated to provide the value of economic costs averted:

$$[(£1b / 10,000 = 100,000) - (£1b / 100,000 = 10,000)] = £90,000 \text{ per year.}$$

This cost is spread over 30 years (the assumed life of a tank) and discounted at a rate of 3.5%, resulting in a net present value of £1.7m.

38. The difference between current and future human costs is calculated along similar lines to provide the value of human costs averted:

$$[(40\text{m} / 10,000 = 4000) - (40\text{m} / 100,000 = 400)] = \text{£}3,600 \text{ per year.}$$

This cost is spread over 30 years (the assumed life of a tank) and discounted at a rate of 1.5%, resulting in a net present value of £88,000.

39. Adding economic and human benefits together we estimate a total benefit from safety improvements on a net present value basis of £1.8m for the hypothetical site.

40. If we assume that all sites are identical to the hypothetical site, posing similar levels of risk and being located in similar geographical positions, then we may scale up by the number of sites where changes will be required. Taking 95 sites as our assumption of the number of sites affected, and allowing for a 20 year phasing in period, then the total benefit from primary containment measures would be in the region of £130m on a NPV basis. However, as this analysis is based on a hypothetical site, and assumes that all sites are identical to the hypothetical site, this is an approximation of the likely benefits of the containment measures set out in the policy document.

41. The table below helps to demonstrate the sensitivity of the hypothetical example to the assumed level of risk. It compares estimated benefits under alternative assumptions about the level of risk posed by the example site. As above, we assume all sites are identical to the hypothetical example, so that estimated benefits are scaled-up to a national figure, and estimates are presented on a NPV basis. In reality the level of risk posed by each site will be assessed individually when considering which control measures are reasonably practicable, and we do not have sufficient information to know the average level of risk currently posed by fuel storage sites.

**Primary containment measures: sensitivity of benefits to risk assumptions**

<b>Change in the level of risk posed</b>	<b>NPV of benefits</b>
From 1 in 100,000 to 1 in 1,000,000	£13m
From 1 in 10,000 to 1 in 100,000	£130m
From 1 in 1,000 to 1 in 10,000	£1.3 billion

**Secondary and tertiary containment benefits**

42. Secondary and tertiary containment are complementary, providing the second and third lines of defence to prevent liquid dangerous substances escaping into the environment following the loss of primary containment. The benefits of upgrading are therefore the same irrespective of whether the secondary or tertiary system is utilised, so the benefits should be considered together. These are independent of primary containment benefits, which relate to reducing the risk of a vapour cloud explosion resulting from overfilling a petrol storage tank.
43. Secondary containment does have safety benefits, in the event of a fire, by keeping the fire within the bund. The existing permeable bunds were designed to achieve this and the upgrading will not result in a significant improvement in safety performance.
44. The benefit of making the proposed changes is that future costs of environmental clean up will be avoided following the loss of primary containment. Data collected by the Competent Authority indicates that the major containment accident frequency rate for the 2200 fuel tanks in the UK is approximately 1 per year for the period 2000-06 and 75% of these resulted in the spillage getting off site. This is from all scenarios e.g. corrosion, and not just overfilling. The clean up costs for spillages that get off site is £0.2 million to £20 million, whereas the clean up costs for spillages retained by the secondary or tertiary containment systems is less than £100,000.

We have assumed in the calculation of benefits:

- Benefits will span the life of a tank and containment system, assumed to be 30 years
  - Improvements in secondary and tertiary containment are brought in over a period of 20 years
  - The discount rate for environmental benefits is 3.5%
  - That the average clean up cost for a spillage that gets off site is £10 million
  - That the average cost of a spillage retained by the secondary or tertiary containment systems is £0.1 million.
  - There are no safety benefits because the existing permeable bunds are sufficient to prevent the spread a fire spreading.
  - The frequency of primary containment failure is unchanged at 1 per year.
45. The current clean up costs associated with secondary and tertiary containment are 1 accident per year costing  $(0.75 \times £10m) + (0.25 \times £0.1m) = £7.525$  million. In future the clean up costs for 1 accident a year will be  $(0.01 \times £10m) + (0.99 \times £0.1m) = £0.199$  million. The annual avoided costs because of secondary and tertiary containment upgrading is therefore  $£7.525m - £0.199m = £7.326$  million i.e. approximately £7.3 million per year.

46. This benefit is spread over 30 years (the assumed life of a tank and containment system) and discounted at a rate of 3.5%, resulting in a net present value of £138million.

**Total Benefit from secondary and tertiary containment measures (NPV) = £138 million**

### **Costs to the CA**

47. With option 2 there may be some costs borne by the CA in the form of administration, communication and implementation of new policy. These additional costs currently remain unquantified.

### **Sectors and groups affected**

48. The proposed reforms have very well defined sectoral effects, as it will only be those firms operating fuel storage sites that will be affected.

### **Costs to business**

49. Costs will be placed upon fuel storage site operators as set out above.

### **Small Firms Impact Test**

50. Information was sought through the consultation exercise that would assist in the assessment of any disproportionate effects that the policy may have on small firms in the sector (as defined by OECD - having fewer than 50 employees).

### **Competition Assessment**

51. The policy seeks to maintain a level playing field across the sector in the UK in terms of standards of containment, so that one firm may not undercut another through adopting lower standards. However, the policy may discourage new firms from entering the market, as all new sites would be required to meet the new standards. This said, since this is a mature sector we expect that there will be very few new tanks built each year and that any competition effects will be limited.

### **Enforcement, Sanctions and Monitoring**

52. The proposed options will be enforceable in practice through on-site inspections by the CA. No additional cost should be faced beyond that which is currently incurred by the CA.

### **Implementation and Delivery Plan**

53. The reform will be implemented via changes in practice in line with the new policy.

### **Post-implementation Review and Evaluation**

54. It is normal to review policy changes 3-5 years after implementation, and it would be sensible to review 3 years after implementation, i.e. during 2011.

### **Administration burden**

55. There may be some additional administrative (as opposed to operational or investment) burdens external to the CA associated with implementing the containment policy. These burdens currently remain unquantified.

**Annex 1: - Industry breakdown of upgrade costs: estimate based on 500 tanks**

	Breakdown	Total for 500 tanks
<b>Cost per tank</b>	£334,000	<b>£167,000,000</b>
of which:		
Instrument	£234,000	
Mechanical	£25,000	
Electrical	£6,000	
Civil	£13,000	
Contingency	£56,000	
<b>Cost per site instrument air</b>	£700,000	<b>£35,000,000</b>
Percentage of Tanks taken out of service in short term	30%	
Number of Tanks taken out of service in short term	150	
<b>Cost per tank taken out of service</b>	£65,000	<b>£9,750,000</b>
Per tank cost tanks at refineries not in single location	£60,000	
Ave number of tanks at refineries	15	
<b>Number of refineries</b>	9	<b>£8,100,000</b>
Number of tanks requiring longer pipe runs	365	
<b>Cost of longer pipe run per tank</b>	£20,000	<b>£7,300,000</b>
<b>Cost of additional cabling per site</b>	£200,000	<b>£10,000,000</b>
<b>Contingency for new items</b>	£8,000,000	<b>£8,000,000</b>
		<b>£245,150,000</b>

## Annex 2: Risks from ‘Normal Life’

Risks in ‘normal life’		
<i>Annual risk of death</i>	<i>Annual risk</i>	<i>Annual risk per million</i>
All causes, aged 45-64 (England and Wales, 2003) (1)	1 in 190	5230
All causes, aged 30-44 (England and Wales, 2003) (1)	1 in 940	1060
Accidents in the home, all ages (England and Wales, 2004) (3)	1 in 17,000	60
Road accidents (Great Britain, 2005) (2)	1 in 18,000	55
Accidents in the home, aged 15-64 (England and Wales, 2004) (3)	1 in 25,000	40
Injuries to all employees in different industries (Great Britain, average 2001/02-2005/06) (4)	1 in 140,000	7

### Sources:

(1) Office for National Statistics *Focus on Health*:

<http://www.statistics.gov.uk/CCI/nugget.asp?ID=1337&Pos=1&ColRank=1&Rank=278>

(2) Department for Transport *Road Casualties Great Britain: 2005 (Table 31)*:

[http://www.dft.gov.uk/pgr/statistics/datatablespublications/accidents/casualtiesgbar/coll\\_roadcasualtiesgreatbritain2/roadcasualtiesgreatbritain2005a](http://www.dft.gov.uk/pgr/statistics/datatablespublications/accidents/casualtiesgbar/coll_roadcasualtiesgreatbritain2/roadcasualtiesgreatbritain2005a)

(3) Office for National Statistics *Mortality Statistics – Injury and poisoning*:

[http://www.statistics.gov.uk/downloads/theme\\_health/DH4\\_29/DH4\\_29\\_2004.pdf](http://www.statistics.gov.uk/downloads/theme_health/DH4_29/DH4_29_2004.pdf)

(4) Health and Safety Commission *Statistics of Fatal Injuries 2005/06*:

<http://www.hse.gov.uk/statistics/overall/fatI0506.pdf>

### Annex 3: Recent COMAH Incidents involving liquid loss of primary containment

Operator Date of incident	Location	Material Loss	Cleanup costs	Total costs
Esso Petroleum July 1999	Fawley Refinery	400 te of crude oil	£7,500 No loss of secondary containment	Not available
Vopak July 1999	Seal Sands, Middlesbrough	16 te of sodium cyanide	Not available Loss of secondary containment	£300,000 est.
Uniqema October 2000	Wilton, Middlesbrough	4 te of ethylene oxide	Not available No loss of secondary containment	£25,000
Nipa Laboratories January 2001	Ruabon Works, Wrexham	14 te of phenol	Not available No loss of secondary containment	£40,000
Hickson and Welch Ltd, July 2002	Castleford, West Yorks.	30 te of para- toluidine	Not available Loss of secondary containment	Not available
Petroplus August 2005	Milford Haven	653 te of kerosene	Not available Loss of secondary containment	£4.5 million
Total October 2005	Antwerp Belgium,	37,000 m3 of crude oil	Not available Slight loss of secondary containment	Not available
Conoco, December 2005	Plymouth Harbour,	30 te of Kerosene	Not available Loss of secondary containment	Not available
HOSL December 2005	Buncefield Fuel Depot,	Initially 340 te of petrol. Final inventory loss	Not available Loss of secondary containment	Not available
BP UK April 2006	Coryton Refinery	121 te of gas oil	£25k. Contained in tertiary containment	Not available
Chevron UK October 2006	Poole Harbour	30 te of diesel oil	Not available Loss of secondary containment	Not available