

AVON AND SOMERSET LOCAL RESILIENCE FORUM INDIVIDUAL RISK ASSESSMENT (V2.0)

Avon and Somerset Local Resilience Forum Risk Assessment Working Group

Individual Risk Assessment Lead Agency:

Avon Fire & Rescue Service

Hazard / threat category:	Sub-category:
Industrial accidents and environmental pollution	Fire or explosion at a gas terminal or involving a gas pipeline
Hazard and threat description, including scale:	Risk reference no.:
Fire/explosion: a) HL1 – up to 3km around site causing up to 10 fatalities and up to 100 casualties; b) L5 – incident spread off-site with more than 5 fatalities and/or 20 hospitalisations, evacuation beyond the cordon and significant effects on gas distribution systems; or c) L6 – incident contained on-site, up to 5 fatalities and/or 20 hospitalisations, advice to shelter but no evacuation beyond the cordon and no significant effect on gas distribution systems.	IA/3
Date of revision:	Next review date:
January 2008	January 2009

1. Overview of hazard or threat

The Avon and Somerset area has some large-scale gas storage facilities which are subject to the Control of Major Accident Hazard (COMAH) Regulations 1999 (Schedule 1 defines the lower-tier threshold as 50 tonnes of “liquefied extremely flammable gases (including LPG) and natural gas (whether liquefied or not)” and the top-tier threshold as 200 tonnes).

The area also has pipelines designated under the Pipelines Safety Regulations 1996 which includes gas pipelines which form part of both the high pressure national transmission system (NTS, operated by National Grid Transco at approx. 70 bar g) and lower pressure local transmission system (LTS, operated by Wales and West Utilities Ltd. at between 14 and 40 bar g).

Hazards from such incidents include: (i) explosion; (ii) thermal radiation from fire; (iii) blast effects and projectiles; (iv) overpressure (caused by the decompression of the gas and also as a result of flame propagation if the gas cloud ignites); (v) toxic effects; (vi) environmental pollution; (vii) noise; and (viii) asphyxiation. Consequences may range from minor incidents dealt with in the routine activities of the emergency services and other supporting responding agencies to a large-scale incident requiring evacuation of large numbers of the general public and the combined resources of all responding agencies to deal with the incident and the threat of significant environmental damage.

2. Key historical evidence

Esso Gas Plant, Longford, Victoria, Australia, September/October 1998

The fracture of a vessel in a gas plant caused several massive explosions and triggered fires at the State's main gas plant. The explosion killed two people, injured eight more, caused the evacuation of hundreds of local residents and closed roads within a 5km radius of the plant. Fires continued to burn for two days. The incident cost Au\$150 million and severely affected Victoria's domestic, commercial and industrial use of gas. About 1.3 million households and 89,000 businesses were affected and export earnings were cut by over Au\$200 million.

Reference: Emergency Management Australia (<http://www.ema.gov.au/ema/emadisasters.nsf>)

Fracture of Gas Main, Bristol, 27 April 2005

Development work on Anchor Road in Bristol led to the accidental fracture of a 180mm polyethylene gas main operating at 2 bar g pressure by an excavating digger. As well as serving domestic premises, the gas main fed the Bristol Royal Infirmary and many university buildings and the hospital had to switch to contingency oil supplies for fuel. The incident required the evacuation of a cordon of 500m radius, the closure of a main arterial route through a core city for over five hours and the protracted stand-by of the emergency services during the capping of the gas leak. There were no fatalities or injuries.

3. Likelihood

Hazard	Outcome description	Likelihood
Fire/explosion	Up to 3km around site causing up to 10 fatalities and up to 100 casualties.	Negligible (1) (National assessment – Health and Safety Executive)
Fire/explosion	Incident spread off-site with more than 5 fatalities and/or 20 hospitalisations, evacuation beyond the cordon and significant effects on gas distribution systems.	Unlikely (3)
Fire/explosion	Incident contained on-site, up to 5 fatalities and/or 20 hospitalisations, advice to shelter but no evacuation beyond the cordon and no significant effect on gas distribution systems.	Possible (4)

4. Impact

Summary

Hazard	Outcome description	Impact	
Fire/explosion	Up to 3km around site causing up to 10 fatalities and up to 100 casualties.	Health:	Moderate (3)
		Social:	Significant (4)
		Economic:	Significant (4)

NOT PROTECTIVELY MARKED

		Environment:	Moderate (3)
		Overall:	Significant (4)
Fire/explosion	Incident spread off-site with more than 5 fatalities and/or 20 hospitalisations, evacuation beyond the cordon and significant effects on gas distribution systems.	Health:	Moderate (3)
		Social:	Moderate (3)
		Economic:	Moderate (3)
		Environment:	Moderate (3)
		Overall:	Moderate (3)
Fire/explosion	Incident contained on-site, up to 5 fatalities and/or 20 hospitalisations, advice to shelter but no evacuation beyond the cordon and no significant effect on gas distribution systems.	Health:	Moderate (3)
		Social:	Minor (2)
		Economic:	Minor (2)
		Environment:	Minor (2)
		Overall:	Minor (2)

Details

Impacts associated with fire/explosion:

Primary:

Physical harm and injury: burns, smoke inhalation, hearing damage (varying degrees of severity, including death).
 Damage to property.
 Disruption to routine gas supplies.
 Evacuation and temporary accommodation needs.
 Environmental pollution from products of combustion or escaping unburned product (eg airborne, aquatic, ground water).
 Environmental pollution from firefighting operations (eg foam, firefighting water run-off).

Secondary:

Loss of economic income.
 Safety assessments, possible demolition of damaged buildings and structures.
 Environmental remediation and clean-up.
 Temporary impact on transport infrastructure (eg road closures or restrictions on use of railways as safety precautions).
 Need for public information.
 Reduced availability of fire and rescue resources for routine emergency cover.

5. Vulnerability and resilience

Large-scale gas terminals are subject to the Control of Major Accident Hazards (COMAH) Regulations 1999.

Underground gas mains are marked on maps available to contractors to avoid accidental fractures during development or excavation works but are not always consulted. Some pipelines have above ground installations (AGIs) but these are usually subject to additional security measures. Gas companies maintain specialists on-call 24/7 to deal with significant incidents involving the gas distribution infrastructure and the Fire and Rescue Service has standard operating procedures to deal with such events. Local Authorities produce and maintain Major Accident Hazard Pipeline (MAHP) plans in accordance with the Pipelines Safety Regulations 1996.

NOT PROTECTIVELY MARKED

Experience from significant pipeline incidents overseas (particularly on the African continent) indicates that the unlawful drainage of product from pipelines is a particular problem. However, in accordance with para. 4.37 of *Emergency Preparedness* this assessment only takes into account non-malicious hazards.

6. Overall assessment

Category:		Sub-category:		
Industrial accidents and environmental pollution		Fire or explosion at a gas terminal or involving a gas pipeline		
Outcome description	Impact	Likelihood	Risk	
Up to 3km around site causing up to 10 fatalities and up to 100 casualties.	Significant (4)	Negligible (1)	MEDIUM	
Incident spread off-site with more than 5 fatalities and/or 20 hospitalisations, evacuation beyond the cordon and significant effects on gas distribution systems.	Moderate (3)	Unlikely (3)	HIGH	
Incident contained on-site, up to 5 fatalities and/or 20 hospitalisations, advice to shelter but no evacuation beyond the cordon and no significant effect on gas distribution systems.	Minor (2)	Possible (4)	MEDIUM	
Controls in place:				
<ul style="list-style-type: none"> Compliance with: (a) Control of Major Accident Hazards (COMAH) Regulations 1999; (b) Pipeline Safety Regulations 1996. Local Authorities: PSR96 Major Accident Hazard Pipeline (MAHP) plans; off-site COMAH plan; other generic emergency plans (eg evacuation and rest centre plans). Fire and Rescue Service: fire wallet scheme, bulk foam plans, Environment Agency 'grab-packs' and Environmental Protection Unit for pollution control, Environment Agency-Fire and Rescue Service Memoranda of Understanding on environmental protection, mutual aid reinforcement schemes. Sevenside Sirens, Bristol Alert scheme and B&NES emergency radio broadcast scheme for warning and informing the public. 				
Additional risk treatment required:				
<ul style="list-style-type: none"> None identified. 				