

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 LPG or LNG terminal (or associated onshore feedstock pipeline) or flammable gas storage sites.
Hazard and threat description, including scale:	Risk reference no.:
<p>Fire/explosion:</p> <p>a) H1 – up to 3km around site causing up to 500 fatalities and 1,500 casualties. Gas terminal event likely to be of short duration once feed lines are isolated; event at a storage site could last for days if the explosion damaged control equipment;</p> <p>b) HL25 – up to 1km around site, causing up to 50 fatalities and 150 casualties;</p> <p>c) L1 / L2 – 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</p> <p>d) L3 / L4 – 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.</p>	IA/1
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). There are also smaller-scale storage sites such as petrol filling stations which also sell LPG, retail outlets for propane and butane, etc.

Hazards from such sites include fire/explosion and environmental pollution. 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>)

3. Likelihood

Hazard	Outcome description	Likelihood
Fire/explosion	Up to 3km around site causing up to 500 fatalities and 1,500 casualties. Gas terminal event likely to be of short duration once feed lines are isolated; event at a storage site could last for days if the explosion damaged control equipment.	Rare (2) (National assessment – Health and Safety Executive)
Fire/explosion	Up to 1km around site, causing up to 50 fatalities and 150 casualties.	Negligible (1) (National assessment – Health and Safety Executive)
Fire/explosion Top-tier sites	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 Lower-tier sites	Incident spread off-site with more than 5 fatalities and/or 20 hospitalisations, evacuation beyond the cordon and significant effects on transportation infrastructure and emergency accommodation.	Possible (4)
Fire/explosion Top-tier sites	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)
Fire/explosion Lower-tier sites	Incident contained on-site, up to 5 fatalities and/or 20 hospitalisations, advice to shelter but no evacuation beyond the cordon.	Unlikely (3)

4. Impact

Summary

NOT PROTECTIVELY MARKED

Hazard	Outcome description	Impact	
Fire/explosion	Up to 3km around site causing up to 500 fatalities and 1,500 casualties. Gas terminal event likely to be of short duration once feed lines are isolated; event at a storage site could last for days if the explosion damaged control equipment.	Health:	Catastrophic (5)
		Social:	Significant (4)
		Economic:	Significant (4)
		Environment:	Significant (4)
		Overall:	Significant (4)
Fire/explosion	Up to 1km around site, causing up to 50 fatalities and 150 casualties.	Health:	Significant (4)
		Social:	Significant (4)
		Economic:	Significant (4)
		Environment:	Moderate (3)
		Overall:	Significant (4)
Fire/explosion Top-tier sites	Incident spread off-site with more than 5 fatalities and/or 20 hospitalisations, evacuation beyond the cordon and significant effects on transportation infrastructure and emergency accommodation.	Health:	Moderate (3)
		Social:	Moderate (3)
		Economic:	Moderate (3)
		Environment:	Moderate (3)
		Overall:	Moderate (3)
Fire/explosion Lower-tier sites	Incident spread off-site with more than 5 fatalities and/or 20 hospitalisations, evacuation beyond the cordon and significant effects on transportation infrastructure and emergency accommodation.	Health:	Moderate (3)
		Social:	Moderate (3)
		Economic:	Moderate (3)
		Environment:	Moderate (3)
		Overall:	Moderate (3)
Fire/explosion Top-tier sites	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)
Fire/explosion Lower-tier sites	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 fuel 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.
Secondary impacts from loss of routine fuel supplies (eg hypothermia in vulnerable people during cold weather)
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

Sevenside area in Avon has a high density of top-tier COMAH sites and is consistently ranked in the top five areas of COMAH risk areas in the UK. Preparedness is co-ordinated through the Sevenside Emergency Planning Forum, which has been identified by the HSE as a model of best practice.

Lower-tier sites are more venerable and less resilient to such an event due to the limited security of sites and the locations (often in built up residential areas); some less secure sites are known to have bulk storage facilities of up to 170 tonnes. An event at such a site will place a high impact on emergency services and other responding agencies and is unlikely to be contained within the site.

Historical evidence of incidents at petrol filling stations suggests that they are dealt with without requiring any mutual aid resources and, with one or two exceptions, the effects are generally limited to on-site implications.

Small-scale domestic and larger-scale clandestine storage of flammable / toxic liquids is usually on a scale such that the effects of an incident may be dealt with as part of the routine operations of the emergency services and other supporting responding agencies.

Some pipelines have above ground installations (AGIs) but these are usually subject to additional security measures.

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 LPG or LNG terminal (or associated onshore feedstock pipeline) or flammable gas storage sites

NOT PROTECTIVELY MARKED

Outcome description	Impact	Likelihood	Risk
Up to 3km around site causing up to 500 fatalities and 1,500 casualties. Gas terminal event likely to be of short duration once feed lines are isolated; event at a storage site could last for days if the explosion damaged control equipment.	Significant (4)	Rare (2)	HIGH
Up to 1km around site, causing up to 50 fatalities and 150 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 of gas distribution systems (top-tier sites)	Moderate (3)	Unlikely (3)	HIGH
Incident spread off-site with more than 5 fatalities and/or more than 20 hospitalisations, evacuation beyond the cordon and significant effects on transportation infrastructure and emergency accommodation (lower-tier sites)	Moderate (3)	Possible (4)	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 (top-tier sites)	Minor (2)	Possible (4)	MEDIUM
Incident contained on-site, up to 5 fatalities and/or 20 hospitalisations, advice to shelter but no evacuation beyond the cordon (lower-tier sites)	Minor (2)	Unlikely (3)	MEDIUM

Controls in place:

- 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).

NOT PROTECTIVELY MARKED

- 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.
- Severnside Sirens, Bristol Alert scheme and B&NES emergency radio broadcast scheme for warning and informing the public.

Additional risk treatment required:

- None identified.

Intentional blank page