

Appendix 9.11

Summary on Incidents Review

Appendix 9.11 - Summary on Incidents Review**Incidents Relevant to Transport of Explosives**

Incident Date	Explosive Type	Event	Activity	Location	Casualties	Summary	Source	Notes
1952	High explosives	Fire	Transport	Road (UK)	Fatalities: Unknown Injuries: Unknown	Fire broke out on non-regulation van carrying 6000lb of blasting explosives. A tarpaulin between the cab and van body was ignited by hot exhaust. There was no fire screen in front of the van body. Only two boxes of explosives were consumed in the fire.	EIDAS, UK	1.0
1953	Unspecified explosives	No ignition	Transport	Mine (UK)	Fatalities: 0 Injuries: 3	Local train hit lorry containing explosives, scattering a large quantity of the explosive along the line. There was no ignition. Three men were injured by the collision.	EIDAS, UK	1.0
1957	High explosives	No ignition	Transport	Road (UK)	Fatalities: 0 Injuries: 0	A road vehicle carrying a full load of blasting explosives was found to be on fire at the rear - presumably due to a puncture in one of the rear tyres.	EIDAS, UK	1.0
1958	High explosives	No ignition	Transport	Road (UK)	Fatalities: 0 Injuries: 0	Fire broke out in engine of truck carrying 7700 lb of blasting explosive. The fire was confined to the front of the fire screen but was not extinguished before severe damage had been caused to the engine and cab.	EIDAS, UK	1.0
1959	Safety fuse	Fire	Transport	Road (UK)	Fatalities: 0 Injuries: 0	A vehicle carrying 400 cases of safety fuse caught fire. The fire started in a rear twin tyred wheel. Possible cause was a deflated tyre or brake drum heat. Eighty two of the cases were salvaged.	EIDAS, UK	
19 Oct 1973	Unspecified	Fire/ Explosion	Transport	Demolition/ Construction site (UK)	Fatalities: 0 Injuries: 0	An unattended Landrover containing detonators and explosives caught fire on a construction site and exploded. It is thought that the fire was started by a discarded cigarette.	EIDAS, UK	1.0
16 Aug 1985	Slurry	No ignition	Transport	Manufactur-ing site (UK)	Fatalities: 0 Injuries: 0	Fork lift truck driven over case of slurry explosive. Case ruptured but there was no initiation.	EIDAS, UK	
23 May 1988	Unspecified	Explosion	Transport	Manufactur-ing site (Bishopton)	Fatalities: 0 Injuries: 0	A fork lift truck driver set down a stillage of explosives he had just delivered to the building. As he reversed to remove the forks from beneath the stillage, they grazed some dry explosive on the floor detonating it.	EIDAS, UK	
22 Mar 1989	Fuseheads, Slurry	Fire/ Explosion	Transport	Road (UK)	Fatalities: 1 Injuries: 107	Van carrying Powergel, Magna Primers, Ammon Gellit, detonators and fuseheads exploded in an industrial estate. Unsafely packaged fuseheads ignited by impact/friction when van went over ramp. Fire broke out and load exploded 10mins later killing fireman.	EIDAS, UK	
7 Jul 1989	Slurry	No ignition	Transport	Road (UK)	Fatalities: 0 Injuries: 0	SGV carrying 3000 detonators and 260 kg of Powergel E80 crashed head on with another HGV. Major incident procedure implemented - local residents evacuated and roads closed. However on examination, load was found to be intact.	EIDAS, UK	
25 Aug 1989	ANFO-P	No ignition	Transport	Road (Australia)	Fatalities: 0 Injuries: 2	Explosives vehicle ran off bitumen into culvert injuring driver and co-driver and causing major vehicle damage. Explosives unaffected.	DMP, Western Australia	
29 Aug 1989	Detonators	No ignition	Transport	Road (Australia)	Fatalities: 0 Injuries: Unknown	Explosives vehicle leaving reserve collided with passenger which had cut corner. Explosives unaffected.	DMP, Western Australia	

Incident Date	Explosive Type	Event	Activity	Location	Casualties	Summary	Source	Notes
20 Jan 1990	Ammonium nitrate and emulsion	No ignition	Transport	Mine (Australia)	Fatalities: 0 Injuries: 0	Blasting agent mixing vehicle self-propelled over bench face on mine site spilling ingredients.	DMP, Western Australia	
20 May 1990	Emulite 1210	No ignition	Transport	Road (Australia)	Fatalities: 0 Injuries: 0	15 tonnes of emulsion explosives conveyed on a dog trailer was spilt when the trailer overturned and the container ruptured.	DMP, Western Australia	
10 Aug 1990	Low sensitivity explosives	No ignition	Transport	Road (Australia)	Fatalities: 0 Injuries: 0	Bulk explosives vehicle collided with roadside tree - explosives not involved.	DMP, Western Australia	
18 Aug 1990	Detonators	No ignition	Transport	Road (Australia)	Fatalities: 0 Injuries: 1	A station wagon conveying detonators rolled over as the driver negotiated a compound curve. Detonators remained intact.	DMP, Western Australia	
7 Sep 1990	Powergel 2500 (emulsion)	Fire	Loading/ Unloading	Mine (Australia)	Fatalities: 0 Injuries: 0	A fire occurred on a mobile bulk explosives pumping unit due to an electrical short circuit. Examination of the unit revealed that the throttle cable had worn through the plastic battery cover and shorted out on the positive terminal causing overheating and resultant fire. The fire damage was limited to the battery, cables, alternator and isolation switch and fortunately did not spread to the load.	DMP, Western Australia	
7 Jan 1991	High explosives	No ignition	Transport	Road (UK)	Fatalities: 0 Injuries: 0	Lorry carrying one ton of explosives to an open cast coal site was involved in a collision with another lorry. Neither driver was injured. Accident occurred on the Guyzance bridge over the River Coquet, near Amble, which was blocked for almost an hour.	EIDAS, UK	
23 Sep 1991	Ammonium nitrate	Fire	Transport	Mine (Australia)	Fatalities: 0 Injuries: 0	Exhaust leakage caused fire to cladding in the engine compartment under the cabin of a blasting agent mixing vehicle. The fire was quickly extinguished by hose and caused no damage to the vehicle beyond the insulation.	DMP, Western Australia	
22 May 1992	Low sensitivity explosives	No ignition	Transport	Road (Australia)	Fatalities: 0 Injuries: 0	Tank seam failure due to poor road conditions resulted in spillage of bulk emulsion explosives.	DMP, Western Australia	
6 Jun 1992	Low sensitivity explosives	Fire	Loading/ Unloading	Mine (Australia)	Fatalities: 0 Injuries: 0	Smouldering and small flames were noticed from a mono pump on an explosives mixing vehicle while it was being use to load explosives. The vehicle was being used to self load product, with the mono pump in reverse mode as the static ground pump had broken down. Fire extinguishers were used to extinguish the flames prior to the vehicle being driven away from the loading area to an isolated location. The cause of this incident is believed to be a valve being left open, allowing the mono pump to draw air which resulted in it not being lubricated by the product and thereby overheating.	DMP, Western Australia	
21 Jan 1994	Bulk emulsion	No ignition	Transport	Mine (Australia)	Fatalities: 0 Injuries: 0	Brake failure on an explosives mixing vehicle allowed it to roll backwards and roll over when it rolled up a windrow. The impact caused a tear on emulsion tank which led to loss of some emulsion product.	DMP, Western Australia	
18 May 1994	Bulk emulsion	No ignition	Transport	Road (Australia)	Fatalities: 0 Injuries: 1	An explosives mixing vehicle rolled over when it failed to negotiate a bend on a gravel road. Approximately 4 tonnes of unsensitised emulsion was spilt due to damage to the top hatch.	DMP, Western Australia	2.0
4 May 1995	Non-sensitised emulsion product	No ignition	Transport	Road (Australia)	Fatalities: 0 Injuries: 0	The driver of an explosives mixing vehicles failed to negotiate a corner resulting in the vehicle rolling over and spilling bulk emulsion product.	DMP, Western Australia	2.0

Incident Date	Explosive Type	Event	Activity	Location	Casualties	Summary	Source	Notes
16 Oct 1996	Ammonium nitrate	Fire	Loading/ Unloading	Mine (Australia)	Fatalities: 0 Injuries: 0	An ANFO mixing vehicle with a leaking fuel oil tank was used in charging operation at a surface mine. The vehicle caught fire halfway through loading a shot. The operators were not injured and mine personnel were evacuated to a distance of 1000 metres. The fire subsided to the area under the fuel oil tank, but continued to burn for 48 hrs, at which time the fire crew extinguished the fire.	DMP, Western Australia	2.0
6 Oct 1997	Unspecified explosives	Fire	Transport	Quarry (UK)	Fatalities: 0 Injuries: 0	A truck carrying 100kg of explosives caught fire in a quarry near Dunbar. A container packed with 1te of ammonium nitrate was located nearby. Firemen tackled the blaze and no explosion was reported.	EIDAS, UK	
8 Aug 1998	Unspecified explosives	Explosion	Transport	Road (Canada)	Fatalities: 0 Injuries: 0	A truck carrying 18,000 kg of blasting explosives caught fire. People were immediately evacuated from the site. The truck exploded about 32 to 37 minutes later, causing minor injuries and throwing debris 2.5km away.	NIOSH (2008 study)	
12 Aug 2002	Ammonium nitrate	No ignition	Transport	Road (Coleshill)	Fatalities: 0 Injuries: 0	125 kg ammonium nitrate were spilled in a lorry accident on the M42 during the rush hour.	EIDAS, UK	
13 May 2004	Ammonium nitrate-based liquid and detonators	No ignition	Transport	Road (US)	Fatalities: 0 Injuries: 0	A truck carrying 1,360 kg of ammonium nitrate based liquid and detonators overturned. Nearby homes and business evacuated.	NIOSH (2008 study)	
Sep 2004	Ammonium nitrate, detonators and boosters	No ignition	Transport	Road (US)	Fatalities: 0 Injuries: 0	A truck carrying ammonium nitrate and detonators overturned in I-85. Except for minor spill, the cargo was unaffected.	NIOSH (2008 study)	
12 Sep 2005	Ammonium nitrate	Explosion	Transport	Road (China)	Fatalities: 12 Injuries: 43	A large explosion occurred in the village of Shengangzhai, China. It is unclear what caused the truck carrying 18MT of ammonium nitrate to explode.	NIOSH (2008 study)	3.0
31 May 2006	Ammonium nitrate and other explosives	No ignition	Transport	Road (US)	Fatalities: 0 Injuries: 0	A truck carrying 18.2MT of ammonium nitrate, 10,000 blasting caps and several dynamites overturned in a highway traversing a sparsely populated area in Utah. Authorities evacuated homes within 3.3-km (2-mile) radius from the crash site.	NIOSH (2008 study)	
16 Jun 2006	Ammonium nitrate and other explosives	Fire	Transport	Road (US)	Fatalities: 0 Injuries: 0	Electric short-circuit caused fire on a truck carrying 10 MT of ammonium nitrate, 8 cases of dynamite and 1,466 blasting caps. The fire was extinguished and the cargo is unaffected. Authorities closed the interstate and evacuated a 1-mile radius area.	NIOSH (2008 study)	
1 Feb 2007	Ammonium nitrate	No ignition	Transport	Road (Australia)	Fatalities: 0 Injuries: 0	Truck carrying ammonium nitrate rolled over into creek.	NIOSH (2008 study)	3.0

Notes:

1. This involves nitroglycerin-based explosives.
2. This involves emulsion mixing vehicle, not an explosives vehicle.
3. This involves ammonium nitrate only, not explosives.

Incidents Relevant to Use of Explosives								
Incident Date	Explosive Type	Event	Activity	Location	Casualties	Summary	Source	Notes
1946	Detonators	Explosion	End use	Not specified (UK)	Fatalities: 0 Injuries: 1	Safety Fuse was being crimped onto a Detonator when the latter fired and communicated to other Detonators in a box, causing injuries to the operator.	EIDAS, UK	1.0
1948	Unspecified	Explosion	End use	Demolition/Construction Site	Fatalities: 3 Injuries: 2	A round of 27 holes had been charged and the charges were being connected for firing when one at a lower corner exploded. Witnesses said there was a flash of lightning at the moment of the explosion.	EIDAS, UK	
1953	Detonators	Explosion	Handling	Demolition/ Construction site (UK)	Fatalities: 0 Injuries: 1	While a workman was handling a detonator during an excavation for a water supply scheme, it exploded, injuring 2 of his fingers and one eye.	EIDAS, UK	1.0
1956	Electrical detonators	Explosion	Handling	Storage Area (Liskeard)	Fatalities: 0 Injuries: 1	An explosion occurred when a workman was taking electrical detonators from the detonator annex of a steel explosives store at a contractors' site. He received such severe injuries that he lost one hand and one eye.	EIDAS, UK	
1961	Capped fuses and detonators	Explosion	Handling	Demolition/ Construction site (UK)	Fatalities: 0 Injuries: 1	A land clearance contractor charged a bore hole with explosive under a tree stump and then lit a capped fuse which he dropped on to a plain detonator lying on the ground. The explosion of the detonator fired the main charge.	EIDAS, UK	1.0
1964	Detonators	Explosion	End use	Demolition/ Construction site (UK)	Fatalities: 0 Injuries: 1	A man was using a piece of safety fuse as a slow match unaware that the end he was holding had a detonator attached. As the fuse burned down the detonator exploded in his hand.	EIDAS, UK	1.0
1968	Unspecified	Explosion	Handling	Knox (Immel Mine)	Fatalities: 1 Injuries: 1	One man was fatally injured and another suffered serious injuries from a premature detonation of explosives.	US MSHA	
7 May 1973	Unspecified	Flyrock	End use	Wayne (Sibley Quarry)	Fatalities: 1 Injuries: 0	A blasting flyrock accident resulted in the death of a front end loader operator.	US MSHA	
6 Jul 1984	Not known	Flyrock	End use	Drainage trench (Australia)	Fatalities: 0 Injuries: 0	Flyrock damaged several vehicles in central Bunbury when blast mats moved during delayed firing in a drainage trench.	DMP, Western Australia	2.0
2 Sep 1984	Detonators	Explosion	End use	Not specified (Australia)	Fatalities: 0 Injuries: 1	A Quininup resident received a severe hand injury when he found a short length of fuse with a crimped detonator at the local tip. He decided to light the fuse and the detonator exploded in his hand.	DMP, Western Australia	1.0
13 Mar 1985	Not known	Flyrock	End use	Demolition/ Construction site (Australia)	Fatalities: 0 Injuries: 0	Overcharging with explosives whilst attempting to break up a concrete slab located within a prefabricated aluminum shed resulted in the destruction of the shed. The resultant flying debris subsequently damaged windows and asbestos panels on two adjoining holiday homes.	DMP, Western Australia	2.0
3 Dec 1985	Not known	Explosion	Drilling	Not specified (Australia)	Fatalities: 0 Injuries: 1	An Albany man sustained severe lacerations and shock when an unexploded portion of a charge exploded as he was drilling into an old drill hole.	DMP, Western Australia	
16 May 1989	ANFO	Flyrock	End use	Mine (Australia)	Fatalities: 0 Injuries: 1	Flyrock damage and injury resulted from overcharging of a blast pattern, believed to have been caused by a lack of supervision.	DMP, Western Australia	2.0
5 Jul 1990	Unspecified	Flyrock	End use	Mine (US)	Fatalities: 1 Injuries: 0	A blaster standing on the top of a 200-ft highwall about 505 ft from the blast site was fatally injured by flyrock. The highwall could not shield him from flyrock. The employee suffered a massive head injury. The flyrock originated from a toe blast. The toe round consisted of 23 holes ranging in depth from 3 to 5 ft. The holes were loaded with 2-1/2-in diameter packaged explosive product. The blaster failed to perceive that flyrock could strike him on the top of a highwall. This accident could have been prevented by using a proper blasting shelter or "matting" the holes.	US MSHA	2.0

Incident Date	Explosive Type	Event	Activity	Location	Casualties	Summary	Source	Notes
11 Jul 1990	Unspecified	Flyrock	End use	Mine (Livingston)	Fatalities: 1 Injuries: 1	Victim was seriously injured on July 11, when a piece of flyrock which was thrown approximately 930 feet from the blast site struck him while he was mowing his grass. He died from head injuries on July 17, 1990.	US MSHA	
12 Oct 1990	Unspecified	Flyrock	End use	Mine (US)	Fatalities: 1 Injuries: 1	A visitor sustained severe injuries and a miner was fatally injured by flyrock in a surface silica flux mine. The mining company used a blasting contractor for loading and firing the shots. The visitor and the miner were about 150 ft from the edge of the blast. Upon firing the shot, the miner was fatally struck on the back of his head.	US MSHA	2.0
15 May 1991	Explosives	Explosion	End use	Mine (Buchanan)	Fatalities: 1 Injuries: 2	A mechanic was killed and another mechanic injured when they were destroying deteriorated explosives.	US MSHA	
1 Feb 1992	Unspecified	Flyrock	End use	Mine (US)	Fatalities: 1 Injuries: 0	A blaster was fatally injured in a surface coal mine. The blaster positioned himself under a Ford 9000, 2-1/2-ton truck while firing the shot. Flyrock travelled 750 ft and fatally injured the blaster.	US MSHA	2.0
24 Mar 1992	Unspecified	Flyrock	End use	Construction site (US)	Fatalities: 1 Injuries: 0	An employee was standing next to a front-end loader when a blast was detonated. The blast consisted of 68 holes loaded with 2-in diameter by 16-in long cartridges of explosives. A dirt cover of 4 to 5 ft was used to confine the blast. The employee suffered trauma to his neck and lacerations to his face.	US OSHA	2.0
25 Apr 1994	Unspecified	Flyrock	End use	Mine (US)	Fatalities: 1 Injuries: 0	A driller/loader was fatally injured by flyrock in a surface coal mine. The blaster notified the superintendent of an impending blast and cleared other employees from the pit area. The victim and another employee working under the direction of the blaster were about 236 ft from the nearest blasthole. Upon firing the blast, the driller/loader was fatally injured by flyrock.	US MSHA	2.0
13 Apr 1995	Unspecified	Flyrock	End use	Construction site (US)	Fatalities: 1 Injuries: 0	A blaster having 16 years experience was fatally injured by flyrock. He loaded the blastholes and took shelter behind a magazine of approximate size 4-ft high by 4-ft wide by 6-ft depth. Upon firing the shot, a single piece of rock struck the blaster on the head. He was about 150 ft from the blast site.	US OSHA	2.0
29 Jun 1995	Unspecified	Flyrock	End use	Mine (Australia)	Fatalities: 0 Injuries: 2	A receptionist received a scalp laceration and a supervisor bruised ribs when flyrock from a blast struck them. The rock passed through a window, across an empty room then through a closed door before striking the occupants of the office.	DMP, Western Australia	2.0
16 Jul 1998	Unspecified	Detonation	Explosion and breaking agents	Mine (Schuylkill)	Fatalities: 1 Injuries: 1	An unplanned detonation of explosives caused fatal injuries to one miner, and seriously injured one other miner.	US MSHA	
31 Jan 1998	Unspecified	Explosion	End use	Mine (Australia)	Fatalities: 0 Injuries: 1	A two metre length of safety fuse burnt in less than five seconds resulting in a premature blast.	DMP, Western Australia	1.0
19 Mar 1998	Unspecified	Air blast	End use	Mine (Australia)	Fatalities: 1 Injuries: 0	A leading hand of the scaling crew was fatally injured when he was struck on the head by either the ventilation doors or a ventilation regulator. The deceased had been assisting in charging a long hole raise and had retired behind the ventilation doors in the decline prior to firing. It is believed the air blast associated with the detonation caused the doors to swing and strike him.	DMP, Western Australia	
28 Mar 1998	Detonators	Explosion	End use	Unspecified (Australia)	Fatalities: 0 Injuries: 1	A teenage boy sustained superficial injuries to his hand and face when he accidentally initiated a detonator.	DMP, Western Australia	
12 Aug 1999	Unspecified	Explosion	End use	Mine (Moffat)	Fatalities: 1 Injuries: 0	A blast helper was fatally injured when an unintentional detonation of explosives occurred.	US MSHA	

Incident Date	Explosive Type	Event	Activity	Location	Casualties	Summary	Source	Notes
11 Dec 1998	Unspecified	Flyrock	End use	Unspecified (Australia)	Fatalities: 0 Injuries: 0	Flyrock from a blast landed on occupied residential properties however there were no injuries.	DMP, Western Australia	2.0
7 Dec 1999	Detonators	Explosion	End use	Unspecified	Fatalities: 0 Injuries: 1	An underground loader operator damaged his right eardrum when the bucket of the loader squashed a detonator against the wall, causing it to explode.	DMP, Western Australia	
21 Dec 1999	Unspecified	Flyrock	End use	Unspecified (US)	Fatalities: 1 Injuries: 0	An equipment operator in a pickup truck was guarding an access road to the blast site. The pickup truck was about 800 ft from the blast site. Flyrock entered the cab through the windshield and fatally struck the employee. The highwall face was about 50 ft high and the depth of holes ranged between 49 and 54 ft. The blast round consisted of 22 holes drilled on a 16- by 16-ft pattern. Some of the holes were angled up to 25 deg toward the highwall to compensate for irregularities in the highwall face. At least one of the holes blew out causing flyrock.	US MSHA	2.0
22 Feb 2000	Explosive detonation	Explosion and flyrock	End use	Unspecified	Fatalities: 0 Injuries: 0	An excavator's bucket caused a small explosion and flyrock when working at the face. A loaded hole had not been tied in to the previous blast and the action of the excavator had initiated part of the explosive.	DMP, Western Australia	
14 May 2001	Unspecified	Flyrock	End use	Unspecified	Fatalities: 0 Injuries: 1	A shotfirer was struck by a piece of flyrock from a blast while standing on a bench away from the blast site.	DMP, Western Australia	
2 Nov 2001	Detonators	Explosion	End use	Unspecified	Fatalities: 0 Injuries: 0	While an excavator was operating on a bench a loud explosion and flash occurred. It is believed that the bucket of the excavator had initiated a detonator and booster which had not fired during the previous production blast.	DMP, Western Australia	
26 Jan 2002	Unspecified	Flyrock	End use	Unspecified	Fatalities: 0 Injuries: 1	A shotfirer's assistant received a laceration when he was struck above the eye by a piece of flyrock from a blast. The shotfirer's vehicle was also struck by flyrock from the blast, which was initiated from a point only 46 metres from the nearest hole. The approved procedure for blasting requires that the initiation point be at least 300 metres from the nearest hole.	DMP, Western Australia	
15 Aug 2003	Unspecified	Explosion	End use	Unspecified (Australia)	Fatalities: 0 Injuries: 1	A shot-firer received a flash burn to his hand when he initiated a blast using a Cobra non-electric initiator. It is believed that the shot-firer had failed to ensure that the signal tube was fully engaged on the initiator before firing the shot. The unit was tested and returned to service.	DMP, Western Australia	
10 Jan 2005	Explosives detonation	No ignition	End use	Unspecified	Fatalities: 0 Injuries: 0	A delayed detonation of explosives (approximately 20 seconds) occurred in a pit blast after the shotfirer assumed the detonation had failed. The short firer had attempted to initiate the blast using the Rothenbuhler remote firing device and after the shot failed to initiate had started to pack up the Rothenbuhler device to move it in order to establish a better communication link when the shot initiated. Firing with the device has been suspended and an ICAM investigation is underway.	DMP, Western Australia	
16 Jul 2007	Unspecified	Flyrock	End use	Mine (Pike)	Fatalities: 1 Injuries: 1	A mechanic was fatally injured when he was struck by fly rock from blasting operations.	US MSHA	

Notes:

1. This involves plain detonators and safety fuse or crimping, which are not relevant to this operation.
2. This involves surface blasting and flyrock, which are not relevant to this operation.