



Government of **Western Australia**
Department of **Mines and Petroleum**
Resources Safety

Overview of dangerous goods incident reports 2010

April 2011

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Contents

Overview of 2010 incident reports 3

Number of dangerous goods incidents for 1991–2010 4

Explosives incidents in 2010 5

Dangerous goods storage and handling incidents in 2010 8

Dangerous goods transport incidents in 2010 10

Major hazard facility incident reports in 2010 11

Statistical analysis of incident data for 2001–2010 12

Overview of 2010 incident reports

This report describes dangerous goods and explosives incidents that occurred in 2010. The report also compares the 2010 incident data with comparable data collected since 1991, and provides some statistical analysis of incident data for that period.

Looking at 20 years of data, the total number of reported incidents, excluding major hazard facility (MHF) incident reports, has remained relatively constant over the period. It is acknowledged that the actual number incidents is greater than the number reported, so year-to-year variations should not be over-interpreted. For example, the significant increase in explosives incident reports is probably more attributable to increased awareness of reporting responsibilities by mining companies.

There was one very serious and one serious injury and some minor injuries arising from dangerous goods incidents in 2010, but fortunately no fatalities.

As a direct result of increased economic activity, the quantity of dangerous goods is increasing over time. More and more people, many of them inexperienced, are coming into contact with these products.

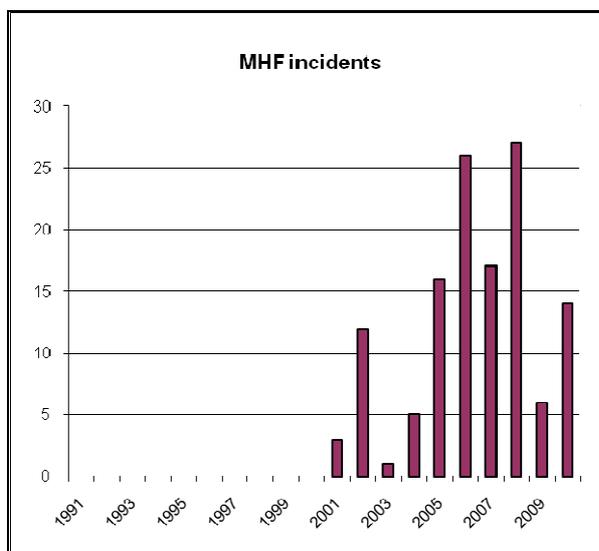
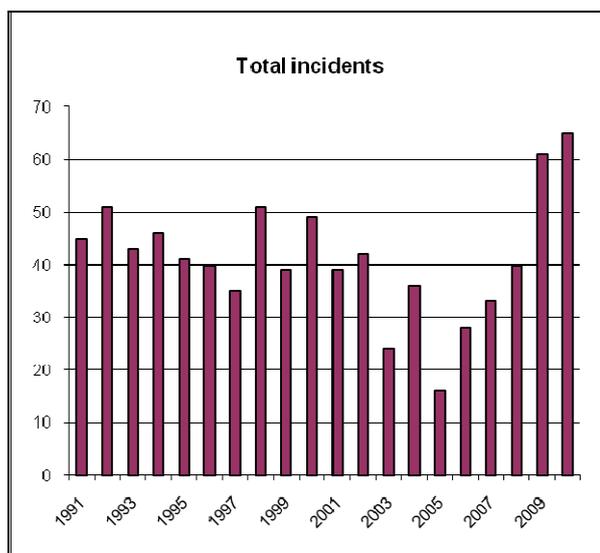
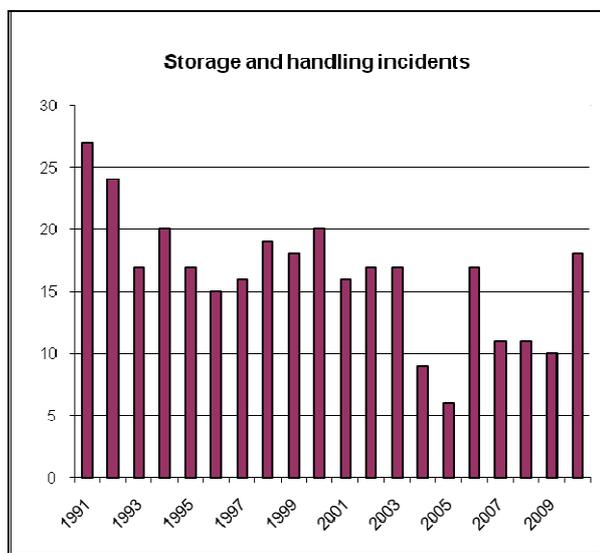
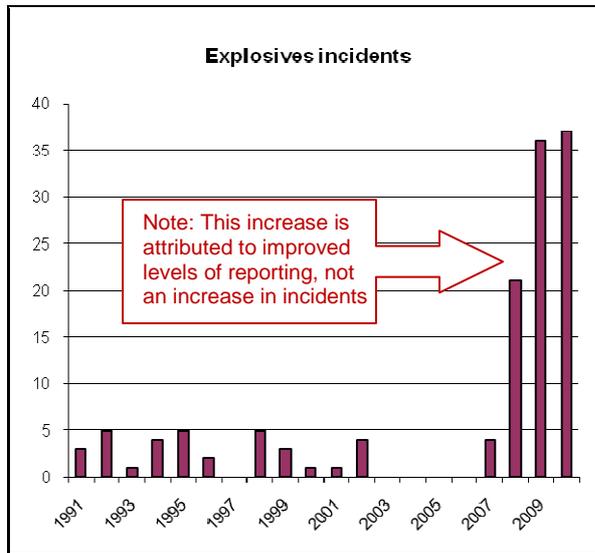
Overall, the statistics indicate that the controls established over the manufacture, transport, storage and use of dangerous goods in Western Australia are succeeding.

Malcolm P Russell

CHIEF DANGEROUS GOODS OFFICER

8 March 2011

Number of dangerous goods incidents for 1991–2010



Explosives incidents in 2010

There were 37 explosives incidents reported to Resources Safety in 2010, most of which were reported to the mines inspectorate but were also incidents reportable under the *Dangerous Goods Safety Act 2004*.

The number of reported incidents was consistent with 2009. This is mostly attributed to greater awareness in industry of the requirement to report all incidents, including near-misses.

The reports cover a wide range of incident types. Of some concern is the number of incidents involving losses of detonators or boosters. Mine sites are expected to improve their reconciliation processes to eliminate this problem. Apart from this issue, there was no particular pattern to the incidents that would cause Resources Safety to undertake targeted education or enforcement actions.

One of the reported incidents involved a serious injury, and a few caused minor injuries. Fortunately, there were no fatalities.

| Date | Location | Goods | Incident details |
|-------------------------|--|----------------------------------|--|
| 4/01/2010 | Abandoned mine shaft near Ravensthorpe | Explosives and detonators | A cache of explosives was found at the bottom of an abandoned shaft. They were collected by a shotfirer and safely destroyed. |
| 14/01/2010 | Mine site, Goldfields | Detonators | Four unexploded detonators were found on an old waste dump at the mine along with some safety tube and previously destroyed detonators. All were made safe and disposed of by a shotfirer. |
| 30/01/2010 - 02/02/2010 | Swan River foreshore, Perth | Fireworks | Four unexploded aerial shells were recovered following the 2010 Skyworks. |
| 5/02/2010 | Mine site, Pilbara | Booster | One booster was unaccounted for on a shot. |
| 6/02/2010 | Geographe Bay, Busselton | Fireworks | Fireworks were illegally fired on the beach at a campsite. |
| 8/02/2010 | Hovea | Explosives | A fire in a shed at a residential property caused detonation of a small quantity of stored explosives. One man was seriously injured by shrapnel and another suffered minor injuries. |
| 15/02/2010 | Mine site, Goldfields | Booster and detonator | A primer was left in a box in the charge basket of the loading arm for an integrated telehandler. |
| 11/03/2010 | Mine site, Goldfields | Explosives | The A and B trailers on a B-double road train carrying explosives uncoupled while cornering. |
| 5/04/2010 | Mine site, Goldfields | Booster | A Quickdraw booster detonated inside a cannon. There were no injuries. |
| 6/04/2010 | Mine site, Pilbara | Detonator | A detonator was unaccounted for on a shot. |
| 18/04/2010 | Mine site, Goldfields | Explosives, detonators, boosters | Loaded explosives initiated during a severe thunderstorm. There were no injuries. |
| 20/04/2010 | Kalgoorlie | Explosives | Explosive were found in a magazine being auctioned following a bankruptcy. They were removed and destroyed by a shotfirer. |

| Date | Location | Goods | Incident details |
|------------|--------------------------|----------------------------------|---|
| 1/05/2010 | Mine site, South West | Explosives | A detonator left on the blast site was unsupervised in an office for over six hours. |
| 8/06/2010 | Mine site, Pilbara | Explosives – suspect booster | A dozer clearing the pit floor hit an unexploded booster. The operator suffered a suspected perforated eardrum. |
| 11/06/2010 | Mine site, Pilbara | Explosives | A grader entered an area of unfired holes adjacent to blast. |
| 13/06/2010 | Mine site, Pilbara | Explosives | A booster was unaccounted for on a shot. |
| 9/07/2010 | Mine site, Goldfields | Explosives | An employee gained unauthorised access to the underground magazine. No stock discrepancies were reported. |
| 15/07/2010 | Mine site, Goldfields | Explosives | An excavator severed a detonator. There was no initiation of explosives or injuries. |
| 30/07/2010 | Mine site, Goldfields | Ammonium nitrate | An employee entered the bin of a mobile manufacturing unit to free ammonium nitrate from the walls with a metal shovel while the auger pump was in use. |
| 6/08/2010 | Northam | Ground fireworks | A ground cake malfunctioned sending a clay base plug into the safety zone. A spectator received minor injuries. |
| 28/08/2010 | Mine site, South West | Detonator cord | A light truck drove through blast signs and over loaded blast holes. |
| 2/09/2010 | Mine site, Pilbara | Detonators | Suspected loss of detonators, but all found after investigation. |
| 6/09/2010 | Mine site, Goldfields | Explosives | An underground pattern initiated prematurely. There were no injuries. |
| 22/09/2010 | Mine site, Koolan Island | Explosives | An excavator set off a misfired explosive. The windows of the cab shattered, causing lacerations to the driver. |
| 22/09/2010 | Mine site, Koolan Island | Explosives | A drill fitter's utility drove through the blast cones onto a loaded shot. |
| 2/10/2010 | Mine site, South West | Detonators | Two detonators were unaccounted for following the loading of a shot. |
| 6/10/2010 | Mine site, Pilbara | One 400 g cast booster explosive | An excavator driver found a booster near a window. |
| 11/10/2010 | Mine site, Pilbara | Explosives | A lead was dislodged during stemming, causing the primer to fall down the blast hole. |
| 24/10/2010 | Mine site, Pilbara | Explosives and detonators | A digger unearthed an unfired blast hole during a cutback operation. An entire row of explosives on the bench had not initiated. |

| Date | Location | Goods | Incident details |
|------------|---------------------------|------------------|---|
| 26/10/2010 | Mine site, Pilbara | | Fly rock smashed the windscreen of a bomb-ute 440 m from pattern. There were no injuries. |
| 5/11/2010 | Mine site, Pilbara | Missing booster | A 450 g booster was lost. |
| 23/11/2010 | Swan River Bassendean | Explosives | 12 Powergel cartridges were found in the river. Police recovered them and arranged destruction. |
| 23/11/2010 | Mine site, Pilbara | Missing boosters | Two 400 g boosters were lost. |
| 24/11/2010 | Mine site, Pilbara | Explosives | ANFO and shot tube were found in drill cuttings. |
| 7/12/2010 | Kalgoorlie Nickel Smelter | Magnum plugs | 10 out of 204 plugs were lost. |
| 14/12/2010 | Mine site, Murchison | Fire | A rag in the engine of a charge vehicle caught fire. There was no serious damage. |
| 17/12/2010 | Mine site, South West | Detonator cord | A Caterpillar D10 dozer pushed rock over a bund wall into a loaded blast area. |

Dangerous goods storage and handling incidents in 2010

The number of reported dangerous goods storage and handling incidents in 2010 (18) was consistent with the annual average for the last 20 years (16) but more than the number for the three previous years.

Ten of the incidents apparently resulted from human error, and seven from mechanical failure, but there was no general pattern to the incidents.

Unfortunately, one storage and handling incident resulted in a very serious injury, and another in a serious injury.

Three operations are particularly prone to loss of containment. In addition to the two refinery incidents listed below, these operations reported a further 328 spill incidents that involved 1 kL or more and were contained on-site. Before March 2008, such incidents had not been considered or reported as dangerous goods incidents. The 2010 figure for the three operations is slightly higher than the 325 spills they reported for 2009, despite the considerable investment in spill reduction measures being undertaken. A significant improvement is expected in 2011.

| Date | Location | Goods | Incident details |
|------------|-----------------------|------------------------------|---|
| 1/02/2010 | Wickepin | Diesel | About 12 kL of diesel leaked from an underground tank during filling. The spill entered a nearby creek. |
| 2/02/2010 | Canning Vale | LP Gas | A person suffered cold burns when there was a release of LP Gas while refuelling a vehicle. |
| 11/02/2010 | Newburn | Nitric and hydrochloric acid | A spill of waste acid (10%) was contained in a sump. |
| 16/02/2010 | Refinery, South West | Sodium hydroxide solution | 130 kL of caustic solution spilled from a pipeline on to a road verge while being dismantled. |
| 25/02/2010 | Australind | Sulphuric acid | Four people were injured by acid, one very seriously, after a valve failure. |
| 6/03/2010 | Rottnest Island | Diesel | A diesel day tank was overfilled during transfer process due to a closed valve. The spill was contained in a bund. |
| 22/03/2010 | Refinery, South West | Sodium hydroxide solution | About 100 kL of process liquor overflowed from a tank. About 50 kL of the liquor mixed with rainwater and overflowed from the containment system onto soil. |
| 23/03/2010 | Yalgoo | Sodium hydroxide solution | About 1,300 L leaked from an intermediate bulk container (IBC) into a bund. |
| 20/04/2010 | Mine site, Goldfields | Sodium cyanide solution | Due to a sensor failure, 35 kL of cyanide solution spilled into a tank compound during product transfer between two storage tanks. |
| 9/05/2010 | Mine site, Goldfields | Sodium hydroxide solution | An operator was seriously injured when he walked into a bund containing hot caustic solution and received burns to his feet and shins. |
| 12/05/2010 | Halls Creek | Diesel | A filter housing on a storage tank failed, allowing diesel to spill into the tank compound. About 11 kL leaked outside the bund on to soil. |

| Date | Location | Goods | Incident details |
|------------|--------------------------|---|--|
| 1/07/2010 | Mundaring | Sodium hydroxide solution | A storage tank system drain valve was left open and the contents emptied into the tank spill compound then a nearby creek. |
| 15/08/2010 | Mine site, Goldfields | Hydrochloric acid | A jet of acid leaked from a pipe through a corroded plug. |
| 29/09/2010 | Yacht club, Perth | Petrol | Due to a corroded valve, 10,000 L of petrol leaked from the base of an onshore petrol bowser. The underground plume reached the Swan River (the Department of Environment and Conservation is following up). |
| 20/11/2010 | Waroona | Diesel | An incorrect return line setup between a pump and a storage tank resulted in diesel-contaminated water spilling out of the spill compound into an earthen sump. |
| 6/12/2010 | Crawley | Sodium hydride, hexane and N,N-dimethyl formamide | Fire involving sodium hydride. A researcher was burnt on both hands and arms. |
| 11/12/2010 | High Wycombe | Diesel | A customer, car and dog at a self-serve service station were showered with diesel from a bowser damaged in an earlier drive-off. |
| 13/12/2010 | Landfill site, Henderson | Ammonium nitrate | 10 kg of technical grade ammonium nitrate was found at a landfill. |

Dangerous goods transport incidents in 2010

Ten dangerous goods transport incidents were reported in 2010, which is the annual average for the last 20 years (10). Given the significant increase in the amount of dangerous goods being transported over this time, this is a good result. Similarly, the number of accidents involving dangerous goods vehicles is below the average for heavy goods vehicles generally.

Half of the reported incidents can be attributed largely to human error, and four were traffic accidents involving dangerous goods, rather than the dangerous goods causing the incident.

Fortunately, no serious injuries or fatalities resulted from any of these incidents.

| Date | Location | Goods | Incident details |
|------------|-------------------------|--------------------------|--|
| 16/01/2010 | Rivervale | Petrol | A flash fire occurred around a petrol station fill point just after filling. The driver suffered minor burns. |
| 25/03/2010 | Welshpool | LP Gas | An LP Gas cylinder was being filled from a tanker vehicle when it was overfilled. |
| 23/04/2010 | Carnarvon | Hydrochloric acid | Due to a loose lid, about 200 L of acid leaked from a container. |
| 27/04/2010 | Kwinana | Crude oil | A tanker vehicle (pocket double) rolled over but the tanks remained intact with no loss of product. There were no injuries. |
| 13/06/2010 | Bindi Bindi | Ammonium nitrate | The third trailer of a combination vehicle rolled over resulting in a spill of 35 t of ammonium nitrate. There were no injuries. |
| 16/09/2010 | Near Moorine Rock | Ammonium nitrate, liquid | The rear trailer of a combination road vehicle rolled over resulting in a minor spill of product. There were no injuries. |
| 18/09/2010 | Brand Hwy, near Dongara | Crude oil | A crude oil tanker vehicle (pocket double) rolled over and spilled its entire contents. |
| 23/09/2010 | Hazelmere | Medical air | Two poorly restrained 15-cylinder manifold packs fell off a trailer resulting in some loss of gas. |
| 30/09/2010 | South of Kumarina | Ammonium nitrate | The axle bearings on a truck overheated and caught fire. No product was lost or ignited. |
| 2/11/2010 | Wangara | Sulfuric acid | Acid leaked from a tanker vehicle while in transit. Some of the acid spilled onto a car's bonnet. |

Major hazard facility incident reports in 2010

Major hazard facility (MHF) incident reports are a combination of those involving injury or damage, those that did not, and near misses.

The number of MHF incident reports in 2010 (14) was greater than that reported in 2009 (6) but still considerably lower than the number reported in 2008 (27). All incidents were relatively minor, and none involved injuries, reflecting improved safety management at these facilities.

| Date | Location | Goods | Incident details |
|------------|--------------------------|---|--|
| 15/03/2010 | Refinery, Kwinana | Hydrogen gas | Gas leak from absorber tower. |
| 15/03/2010 | Chemical plant, Kwinana | Chlorine/ titanium tetrachloride | Minor release of chlorine/titanium tetrachloride. There were no injuries. |
| 22/03/2010 | Refinery, Kwinana | Petrol | Minor petrol leak during ship unloading. |
| 23/03/2010 | Refinery, Kwinana | LP Gas | Leak of about 2 t of LP Gas. There were no injuries. |
| 28/03/2010 | Gas plant, Karratha | LNG | Release of LNG during ship loading. A crew member suffered cold burns. |
| 7/04/2010 | Chemical plant, Kwinana | Ammonia | Release of ammonia vapour when a manual pressure relief valve was left open. |
| 27/04/2010 | Petrol terminal, Kwinana | Unleaded petrol (ULP) and diesel slop mixture | Due to operator error, about 750 L of ULP and diesel slops overflowed from a tank into a bund. |
| 7/05/2010 | Chemical plant, Kwinana | Sulphur (liquid) | A carryover of sulphur from a reactor caught fire as it left the flare causing spot fires on the ground. There were no injuries. |
| 1/06/2010 | Chemical plant, Kwinana | Sodium cyanide solution | Release of weak sodium cyanide solution. |
| 29/06/2010 | Chemical plant, Kwinana | Sulphuric acid | Spill of acid from a failed hose fitting. The operator received slight burns. |
| 6/07/2010 | Refinery, Goldfields | Hydrogen sulphide | Release of up to 30 cubic metres of hydrogen sulphide. |
| 3/08/2010 | Chemical plant, Kwinana | Ammonia solution | An autoclave over-pressured during a descaling cycle. The relief valve failed to operate so the vessel was depressurised using a manual drain valve. |
| 22/09/2010 | Chemical plant, Kwinana | Nitric acid | Acid spill from a pump. |
| 9/10/2010 | Refinery, Goldfields | Sulphur waste Class 4.1 | Small sulphur fire at the waste disposal facility. |

Statistical analysis of incident data for 2001–2010

The following table summarises storage and handling and transport incident data for the period 2001 to 2010. The data have been analysed to identify the proportion of incidents nominally caused by mechanical failure or human error, and whether loss of product, serious injuries or fatalities were involved.

Of the 128 *storage and handling incidents* over the this period, 45 per cent were caused by mechanical or design failure and 46 per cent by human error. Unfortunately, there were two incidents in 2010 resulting in serious injuries. However, over the ten-year period, the incidence rate for serious injuries and fatalities has remained low.

Of the 149 *transport incidents*, 34 per cent were caused by mechanical or design failure and 59 per cent by human error. For the purposes of this analysis, incidents such as truck roll-overs were classified as due to human error on the assumption that the main cause of the incident was driver inattention, excessive speed or both, although it should be noted that, in some cases, other drivers were at fault. Unfortunately, over the ten-year period four incidents resulted in serious injuries and three involved fatalities. However, there were no serious injuries or fatalities during 2010.

For both storage and handling and transport incidents, there was a wide variety of mechanical failures involved that do not show any consistent pattern.

Further analysis of the transport data showed that 50 incidents (34%) involved double or triple road trains and most were roll-overs. In addition, several other incidents involved standard single tanker vehicles. This is indicative of the extensive use of these vehicles for dangerous goods transport and the inherently greater risk of driving these vehicles, particularly where long distance transport is involved. The data suggest that dangerous goods transport companies need to pay more attention to ensuring road trains do not speed and take corners more carefully, and drivers are well trained and provided with adequate rest breaks to optimise their alertness.

Storage and handling and transport incident data 2001–2010

| | Total number | Material or design failure | Human error | Loss of product | Serious injury | Fatality |
|--|--------------|----------------------------|-------------|-----------------|----------------|----------|
| Storage and handling (number of incidents) | 128 | 57 | 59 | 95 | 5 | 0 |
| | | 45% | 46% | 74% | 4% | 0% |
| Transport (number of incidents) | 149 | 51 | 88 | 108 | 4 | 3 |
| | | 34% | 59% | 72% | 3% | 2% |