



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

Overview of dangerous goods reportable situations and incidents 2015

May 2016

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Overview of 2015 reportable situations and incidents

This report describes dangerous goods and explosives incidents that occurred in 2015 and are required to be reported to the Resources Safety Division of the Department of Mines and Petroleum under the *Dangerous Goods Safety Act 2004* and associated regulations. The report also compares the 2015 incident data with comparable data collected since 1996 and provides some statistical analysis of incident data for that period.

The quantity of dangerous goods being stored, handled and transported across the State continues to increase with economic activity. 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 of incidents is likely to be greater than the number reported, so year-to-year variations should not be over-interpreted. For example, rather than indicating an increase in the number of incidents, the significant increase in the number of explosives incident reports since 2008 most likely reflects an increased awareness of reporting responsibilities by mining companies and users.

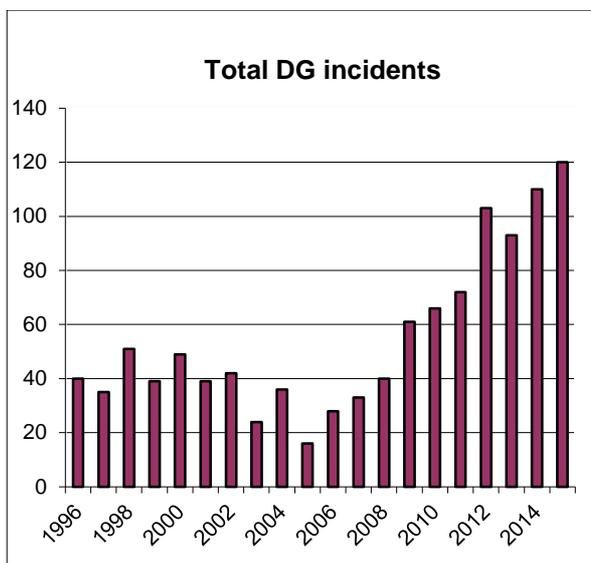
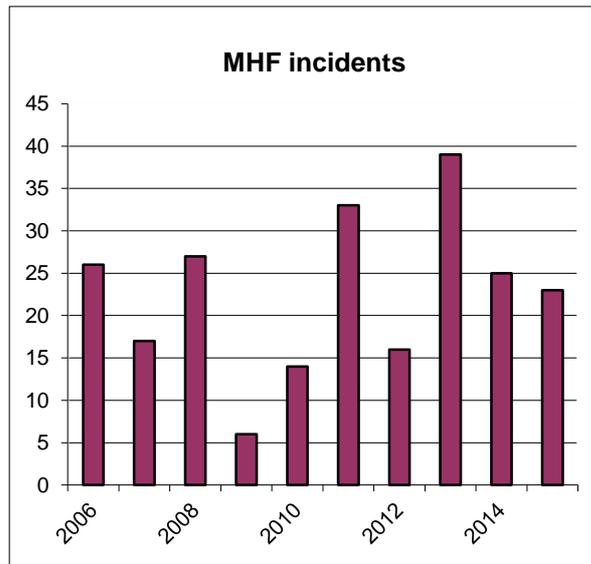
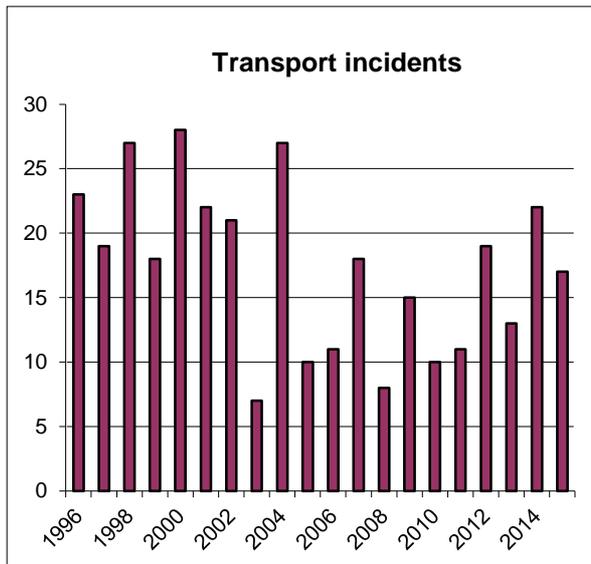
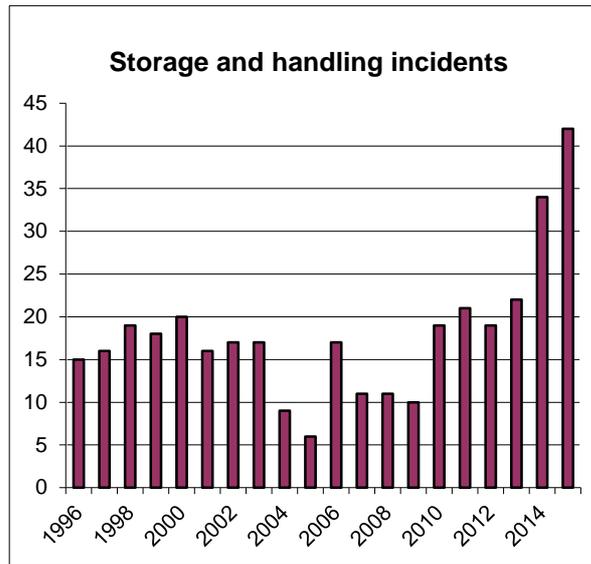
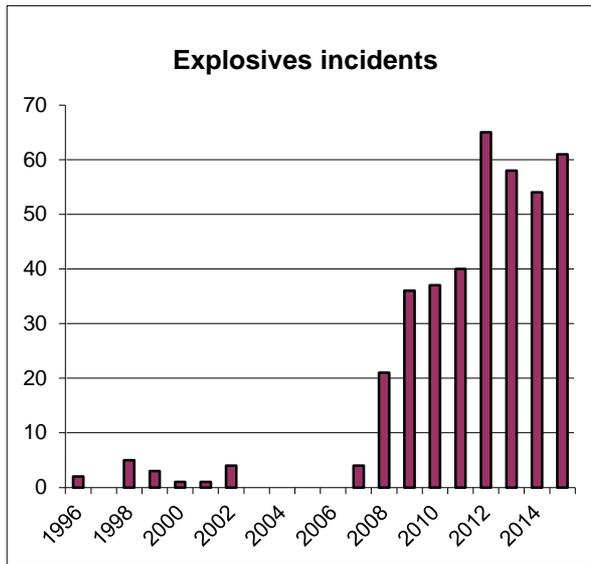
There were no fatalities in 2015. While one injury received was serious, the majority were minor.

Ross Stidolph

CHIEF DANGEROUS GOODS OFFICER

6 May 2016

Number of reportable situations and incidents for 1996–2015



Explosives and Security Risk Substance (SRS) reportable situations in 2015

There were 61 explosives and SRS incidents reported to Resources Safety in 2015. Nine of these were only reported to the mines inspectorate, with the balance reported to the dangerous goods inspectorate.

The number of incidents reported for 2015 is slightly higher than for 2014.

The reports cover a wide range of incident types. The number of incidents involving losses of detonators, primers or boosters at mine sites is higher than previously reported. Mine site operators are expected to continue to improve their accounting and reconciliation processes to eliminate this problem. During the next inspection cycle, Resources Safety will undertake targeted education or enforcement actions so sites will better manage their accounting and reconciliation of explosives and demolition accessories. Other than this, there is no identifiable pattern to the incidents listed.

None of the reported incidents resulted in a fatality, but some caused minor injuries as well as damage to mine equipment, vehicles and plant.

Serial	Date	Location	Goods	Incident details
1	02/01/2015	Pilbara	Blasting explosives	While digging a face, a shovel operator identified misfired blasting explosives.
2	10/01/2015	Pilbara	Detonator	A misfired detonator was discovered after a blast.
3	10/01/2015	Pilbara	Detonator and booster	A misfired detonator and booster were discovered after a blast.
4	11/01/2015	Pilbara	Detonator	A digger operator discovered an unfired detonator.
5	18/01/2015	Goldfields	Blasting explosives	A blast crew remained inside the exclusion zone at the time of initiation.
6	28/01/2015	Pilbara	Blasting explosives	A discrepancy was identified when reconciling a shot.
7	01/02/2015	Northern Goldfields	Boosters	Two boosters remained unaccounted for when reconciling a shot.
8	04/02/2015	Pilbara	Ammonium nitrate	While travelling downhill, the brakes failed on a mobile processing unit (MPU). There were no injuries or loss of product.
9	05/02/2015	Pilbara	Detonator	During a crew changeover, one detonator remained unaccounted for.
10	09/02/2015	Pilbara	Blasting explosives	While digging a face, a loader operator discovered unfired explosives.
11	10/02/2015	Pilbara	Detonator and booster	During tie-in reconciliation, a booster and detonator were unaccounted for.
12	18/02/2015	Pilbara	Detonating cord	A haul truck ran over detonating cord that was part of a tied in shot.
13	23/02/2015	Pilbara	Blasting explosives	A machinery operator discovered a quantity of misfired ANFO.

Serial	Date	Location	Goods	Incident details
14	26/02/2015	Goldfields	Detonator	An excavator drove over a misfired detonator causing it to function. There was no damage or injury.
15	03/03/2015	Pilbara	Blasting explosives	A lightning strike initiated a primed blast hole(s).
16	04/03/2015	Northern Goldfields	Detonating cord	A quantity detonating cord was unaccounted for during a magazine stock check.
17	13/03/2015	Pilbara	Blasting explosives	A MPU was driven over a shot.
18	15/03/2015	Pilbara	Blasting explosives	An excavator operator discovered unfired explosives while clearing a dig face.
19	17/03/2015	Pilbara	Blasting explosives	While clearing product, an unfired detonator and booster were discovered.
20	22/03/2015	Pilbara	Blasting explosives	While clearing a face, an excavator operator discovered unfired ANFO.
21	24/03/2015	Pilbara	Detonator	A detonator was unaccounted for during tie-in operations.
22	25/03/2015	Pilbara	Boosters	A box of boosters was left unsecured.
23	31/03/2015	Kalgoorlie	Booster	A booster was discovered in the carry box of an explosives vehicle, just after welding equipment had been used on it.
24	23/04/2015	Pilbara	Blasting explosives	During drilling operations, unfired explosives from a previous pattern were discovered.
25	05/05/2015	Goldfields	Blasting explosives	A mine site employee stole a quantity of explosives.
26	08/05/2015	Southern Goldfields	Detonators and boosters	Following an audit, a number of boosters and detonators were unaccounted for.
27	12/05/2015	Pilbara	Blasting explosives	When clearing a face, an excavator operator discovered multiple misfired holes.
28	15/05/2015	Goldfields	Booster	On opening and counting a factory-sealed box of boosters, an additional booster was discovered.
29	29/05/2015	Kalgoorlie	Blasting explosives	One cartridge of blasting explosive was unaccounted for.
30	04/06/2015	Perth	Detonator	While loading a shot a detonator was lost down a hole.
31	08/06/2015	Pilbara	Detonator and booster	A detonator and booster were unaccounted for during a shot reconciliation.
32	15/06/2015	Pilbara	Primer	A primer remained unaccounted for after a shot was fired.
33	15/06/2015	Pilbara	Detonator and booster	While digging a face, an operator discovered an unfired booster and detonator.
34	25/06/2015	Perth	Fireworks	A person's jacket was burned by a firework ember.

Serial	Date	Location	Goods	Incident details
35	26/06/2015	Pilbara	Detonator and booster	An excavator operator discovered an unfired booster and detonator.
36	27/06/2015	Pilbara	Blasting explosives	A grader operator discovered a quantity of unfired explosives when grading a shot.
37	27/06/2015	South West	Blasting explosives	When drilling a new shot, a quantity of detonating cord and unfired explosives was discovered.
38	29/06/2015	South West	Detonator	When drilling a blast hole, a damaged detonator was found.
39	06/07/2015	Goldfields	Primers	A box of primers fell from the back of an explosives vehicle.
40	10/07/2015	Pilbara	Primer and detonator	A primer and detonator were lost down a hole.
41	10/07/2015	Pilbara	Detonator	During priming a detonator was lost down a hole.
42	16/07/2015	Pilbara	Explosives	An explosives compound was left unsecured.
43	18/07/2015	Pilbara	Booster	After loading a shot an additional booster remained.
44	27/07/2015	Perth	Fireworks	Illegal fireworks were set off and started a scrub fire. A power pole was damaged in the fire.
45	15/08/2015	Kimberley	Detonator	Four detonators were unaccounted for during stock reconciliation.
46	06/09/2015	Pilbara	Blasting explosives	A MPU drove over a blast pattern and cut a line.
47	12/09/2015	Pilbara	Ammonium nitrate emulsion	A fire started on the exhaust shroud of a MPU.
48	25/09/2015	Goldfields	Blasting explosive	A quantity of ALANFO was left unsecured at the end of a shift.
49	26/09/2015	Pilbara	Blasting explosives	A primer and lead were found when excavating product.
50	07/10/2015	Pilbara	Primer	A digger operator found a primer in the bucket of his excavator while clearing product.
51	10/10/2015	Pilbara	Booster and detonator	A detonator and booster were unaccounted for.
52	16/10/2015	South West	Blasting explosives	An electronic detonator misfired and was discovered during product clearing.
53	16/10/2015	Southern Goldfields	Blasting explosives	A stock discrepancy was identified in newly delivered explosives. The discrepancy was a supplier error.
54	23/10/2015	Pilbara	Detonator	A downhole delay detonator was lost on a shot.
55	25/10/2015	Pilbara	Detonator and booster	An unfired booster and detonator were discovered by a dozer operator.

Serial	Date	Location	Goods	Incident details
56	23/11/2015	Kalgoorlie	Blasting explosive	An aluminium dust explosion occurred in an explosives manufacturing plant. There were no injuries.
57	28/11/2015	Pilbara	Blasting explosives	A magazine compound was left insecure.
58	02/12/2015	Pilbara	Blasting explosives	A wheeled roller was damaged by fly rock.
59	06/12/2015	Pilbara	Booster and blasting explosives	A booster and unfired column of explosive were discovered by a grader operator.
60	09/12/2015	Southern Goldfields	Detonator	A misplaced detonator was recovered.
61	30/12/2015	Pilbara	Blasting explosives	An excavator operator discovered a column of unfired explosives.

Dangerous goods storage and handling reportable situations in 2015

There were 42 reported dangerous goods storage and handling incidents in 2015, an increase on the previous year. There was no general pattern or trends identified with the incidents, with causes ranging from mechanical equipment failure to human error. There continued to be reported a higher number of incidents involving ammonia and chlorine and, additionally, a larger number of incidents involving liquefied petroleum gas (LPG). Resources Safety will continue targeting these industries in the coming reporting period.

Three operations within the State are particularly prone to loss of containment. These operations reported a further 129 spill incidents that involved 1 kL or more and all losses were contained on-site. Before March 2008, such incidents had not been considered or reported as dangerous goods incidents. The 2015 figure is similar to that reported for 2014 (130). A range of preventative actions is being undertaken to reduce the likelihood of recurrence.

Serial	Date	Location	Goods	Incident details
1	05/02/2015	Welshpool	Acetylene	A fire occurred involving acetylene gas cylinders. There were no injuries.
2	10/02/2015	Welshpool	Hydrogen peroxide	An intermediate bulk container (IBC) started to leak. The product was diluted but about 500 L was lost. There were no injuries or environmental damage.
3	11/02/2015	Wagin	Liquefied petroleum gas	Gas was released to the atmosphere.
4	24/02/2015	Northam	Combustible liquid	An oil leak caused an explosion at an electricity substation.
5	05/03/2015	Kwinana	Hydrogen peroxide	Leaking hydrogen peroxide and other combustible materials spontaneously ignited. The fire was quickly extinguished.
6	10/03/2015	Bassendean	Sulphuric acid	Product overflowed into a bunded area. An operator stepped into the bund's sump and received burns to his leg.
7	20/03/2015	Dampier	Acetylene	A fire involving acetylene gas occurred on a barge. There were no injuries.
8	28/03/2015	Pilbara	Ammonium nitrate emulsion	About 3,500 L of product overflowed from an ISO tank due to valve failure. All product was recovered.
9	07/04/2015	O'Connor	Combustible liquid	An electrical transformer containing about 21 kL of combustible liquid failed explosively. There was no loss of product.
10	19/04/2015	Northbridge	Various	A shop storing various dangerous goods was consumed by fire. There were no injuries.
11	20/04/2015	Collie	Corrosive liquid	A worker received a small chemical burn to their lower leg.

Serial	Date	Location	Goods	Incident details
12	14/05/2015	Pinjarra	Chlorine	During a cylinder change, chlorine leaked from an inadequately sealed regulator allowing residual gas in the line to escape. There were no injuries.
13	21/05/2015	Dumbarton	Diesel	A transfer hose failed and product spilled. All the product was recovered.
14	26/05/2015	Belmont	Chlorine	A chlorine detector activated at a swimming pool. There were no injuries.
15	31/05/2015	Bunbury	Ammonia	Ammonia vapour was released when an isolation valve became unseated.
16	05/06/2015	Boulder	Liquefied petroleum gas	Vandals entered a tank compound and pulled apart the valve piping. Product was lost but there were no injuries.
17	10/06/2015	Wanneroo	Chlorine	Gas leaked at a water treatment plant.
18	15/06/2015	Middle Swan	Diesel	A vehicle crashed into a diesel fuel dispenser. There was no loss of product.
19	16/06/2015	Morley	Ammonia	During scheduled maintenance, a lock nut was over tightened and gave way, allowing a release of gas. There were no injuries.
20	08/07/2015	Welshpool	Liquefied petroleum gas	A worker was refilling cylinders when the gas ignited, probably as a result of poor earthing. The worker received minor burns.
21	08/07/2015	Waikiki	Combustible liquid	An electrical transformer developed a fault that led to an explosive failure. There were no injuries.
22	16/07/2015	Kwinana	Various	Fertiliser chemicals that had been mixed in an IBC led to a build-up of gases, which caused the IBC to fail catastrophically. There were no injuries.
23	16/07/2015	Fremantle	Xanthates	A strong smell of xanthates was identified by the dock crew. The source of the odour could not be confirmed.
24	17/07/2015	South Lake	Liquefied petroleum gas	Gas leaked due to corrosion of the needle valve on the pump chamber. There were no injuries.
25	23/07/2015	Palmyra	Ammonia	Gas leaked at a meat processing plant. There were no injuries.
26	27/07/2015	Newman	Chlorine	Gas leaked at a swimming pool. The system alarmed and shutdown as intended. There were no injuries.
27	10/08/2015	Singleton	Liquefied petroleum gas	A gas leak was discovered on an auto gas tank at a service station. The fault was quickly repaired.
28	22/08/2015	Bulla Bulling	Chlorine	Chlorine leaked, probably due to a faulty regulator. About 16 kg of product was lost. There were no injuries.
29	01/09/2015	Kwinana	Fluorosilicic acid	Following a level indicator failure, about 10 kL of acid flowed into a bund. All product was recovered and there were no injuries.

Serial	Date	Location	Goods	Incident details
30	05/09/2015	Morley	Ammonia	A high pressure valve failed during maintenance work.
31	07/09/2015	Karrinyup	Liquefied petroleum gas	A bleed valve was not fully closed and product leaked. There were no injuries.
32	17/09/2015	Malaga	Acetylene and liquefied natural gas	A fire started in shed that contained acetylene and gas cylinders. One cylinder valve failed. There were no injuries.
33	23/09/2015	Canning Vale	Carbon dioxide	There was an explosion in machinery that was being cleaned, due to an excessively high concentration of gas and dust. A running motor providing an ignition source.
34	02/10/2015	Narrogin	Chlorine	Operator error at a water treatment plant led to an uncontrolled release of gas.
35	03/10/2015	Bayswater	Various gases	There was a fire at premises storing various gases. Some cylinders exploded. There were no injuries.
36	09/10/2015	Karratha	Acetylene	A cylinder caught fire due to an equipment failure. There were no injuries.
37	09/11/2015	Rockingham	Liquefied petroleum gas	A cylinder was drilled into in order to facilitate removing the valve. Gas was released. There were no injuries.
38	14/11/2015	Mandurah	Combustible liquid	An electricity substation was struck by lightning, resulting in a spillage of combustible liquid.
39	23/11/2015	Barrow Island	Hydrochloric acid	There was a leak from an ISO tank into a bunded area. The product was neutralised, and there were no injuries.
40	27/11/2015	Barrow Island	Hydrochloric acid	A second ISO tank failed and about 18,000 L of product leaked in to a bunded area. The product was neutralised, and there were no injuries.
41	18/12/2015	Collie	Corrosive, not otherwise specified (NOS)	When opening a port flange, liquid sprayed into an operator's face, resulting in minor burns.
42	29/12/2015	Collie	Sodium hydroxide	A pump failed, allowing the release of product into a non-bunded area. About 100 L of product was lost. There were no injuries.

Dangerous goods transport reportable situations in 2015

Seventeen dangerous goods transport incidents were reported in 2015. This is fewer than the 2014 figure of 22. Resources Safety continued its safety campaign during 2015.

About half of the reported incidents can be attributed largely to human error, with no dangerous goods loads being the causal factor in any incident.

Serial	Date	Location	Goods	Incident details
1	06/03/2015	Newman	Ammonium nitrate	A road train was incorrectly loaded with a full container of ammonium nitrate when the load was meant to be empty.
2	23/03/2015	Naval Base	Residue sand (caustic mud and scale)	The tailgate on a vehicle was not secured properly, resulting in about 200 kg of product spilling on a public road.
3	12/04/2015	Bow River	Nickel concentrate	A vehicle carrying nickel concentrate caught fire. There was no injury or loss of product.
4	13/04/2015	Northam	Pesticide	20 L of pesticide was spilled on to the road. There were no injuries.
5	25/04/2015	Carnarvon	Sodium hypochlorite	There was a chemical reaction between dangerous goods and other contaminants, resulting in a gas leak.
6	26/04/2015	Esperance	Xanthates	A container was damaged during its journey to the port.
7	19/05/2015	Upper Swan	Radioactive	A consignment of radioactive product was labelled incorrectly.
8	02/06/2015	Menzies	Explosives	A driver discovered a wheel or tyre fire on his vehicle. The fire was quickly extinguished.
9	22/06/2015	Mount Barker	Pesticide	A road train carrying dangerous goods rolled over and product spilled onto the road. There were no injuries but emergency services personal were admitted to hospital for observation.
10	27/07/2015	Pilbara	Ammonium nitrate	A driver transported a consignment of ammonium nitrate without appropriate documentation.
11	02/08/2015	Mt Magnet	Ammonium nitrate	While in transit, a road train lost two wheels from a trailer. There were no injuries or loss of product.
12	01/09/2015	Boddington	Ammonium nitrate emulsion	Due to an improperly fitted drain plug, a MPU lost about 1,000 kg of product. All product was recovered safely.
13	16/09/2015	West Kimberley	Crude oil	The last trailer of a triple road train rolled and the product caught fire. The fire spread to the second trailer. About 83,000 L of product was lost.

Serial	Date	Location	Goods	Incident details
14	01/10/2015	Karratha	Carbon dioxide	A vehicle overturned. There were no injuries or loss of product.
15	08/10/2015	Eneabba	Various dangerous goods	A vehicle engine caught fire and the fire spread to the load. There were no injuries.
16	28/10/2015	Kellerberrin	Diesel	A tanker collided with a farm vehicle, and about 7,500 L of product was lost. There were no injuries.
17	25/11/2015	Nanutarra	Ammonium nitrate	Due to a fast approaching bushfire, about 74 tonnes of ammonium nitrate was abandoned to allow time for the vehicle driver to evacuate safely. There was no loss of product.

Major hazard facility reportable situations in 2015

Major hazard facility (MHF) incident reports and reportable situations cover circumstances involving injury, damage or near misses.

There were 23 reportable incidents in 2015, compared with 25 in 2014. All incidents were minor in nature and some workers received minor injuries.

Serial	Date	Location	Goods	Incident details
1	04/01/2015	Kemerton	Hydrochloric acid	Acid leaked from a valve into a bunded area. There were no injuries
2	07/01/2015	Burrup	Chlorine	Chlorine gas was released from a line when work was being conducted on a chlorine evaporation system.
3	09/01/2015	Pilbara	Sulphuric acid	Water was used to clear a pipe blockage. There were no injuries.
4	06/02/2015	Kwinana	Sulphur, molten	1,200 kg of molten sulphur leaked from a fertiliser manufacturing process filter lid after the valve was incorrectly aligned. Spillage was contained in a bunded area.
5	23/02/2015	Kwinana	Flammable liquid	10 L of flammable liquid was lost to a tank berm before the remaining 500 litres was captured with a spill tray.
6	25/02/2015	Pilbara	Sulphuric acid	A pipe containing concentrated sulphuric acid failed, resulting in acid spilling into a bunded area.
7	09/03/2015	Kwinana	Hydrogen sulphide	Hydrogen sulphide evolved after sodium bicarbonate was used on a spill of sodium hydrosulphide solution. There were no injuries.
8	10/03/2015	Kwinana	Sodium hydroxide	Sodium hydroxide spill contained within the bund.
9	31/03/2015	Kwinana	Bitumen	Hot bitumen struck a worker's face, which required first aid treatment.
10	02/04/2015	Pilbara	Sodium hydroxide	A contractor incorrectly cut a line containing sodium hydroxide, which splashed onto his face and neck. He was admitted to hospital and discharged the same day.
11	27/05/2015	Kwinana	Sulphuric acid	Due to a procedural failure, dilute sulphuric acid spilt onto an operator's back. Personal protective equipment (PPE) was incorrectly worn, but there was no injury.
12	12/06/2015	Karratha	Liquefied natural gas	Gas was found to be leaking from a flow control valve on the storage tank. There were no injuries.
13	16/06/2015	Pilbara	Ammonia	Ammonia was detected by personnel at neighbouring facility. No adverse health effects were reported.
14	16/06/2015	Karratha	Liquefied natural gas	Gas was found to be leaking from a flow control valve on the storage tank. There were no injuries.

Serial	Date	Location	Goods	Incident details
15	22/06/2015	Kwinana	Liquefied petroleum (LP) gas	A high-level switch failed to activate on a process unit. There was no loss of containment or injuries.
16	03/07/2015	Pilbara	Amines, liquid, corrosive, NOS	A process upset resulted in the release of diluted aMDEA from a carbon dioxide stack.
17	07/07/2015	Kwinana	Cyanide	Operator noticed large amount of liquid coming from the head area of storage location. The product tested positive for cyanide. There were no injuries.
18	10/07/2015	Kwinana	Ammonium Nitrate	There was a spill from a vehicle at a manufacturing plant. All product was recovered.
19	02/08/2015	Kwinana	LP gas, hydrofluoric acid	A heat exchanger failed, releasing LP gas. Hydrofluoric acid was also released into cooling water as a result of the failure.
20	06/08/2015	Karratha	Liquefied natural gas	Gas was found to be leaking from a flow control valve on the storage tank. There were no injuries.
21	19/08/2015	Kwinana	Combustible liquid	A tank was overfilled, resulting in the loss of product.
22	17/11/2015	Kwinana	Sodium cyanide	Product leaked from the vapour space of a storage tank. There were no injuries.
23	23/12/2015	Kwinana	Sodium hypochlorite	An IBC slipped from a fork lift tine, causing loss of product.

Statistical analysis of incident data for 2006–2015

The following table summarises storage and handling and transport incident data for the 10-year period between 2006 and 2015. The data have been analysed to identify the proportion of incidents nominally caused by mechanical failure or human error, and whether there was loss of product, serious injuries or fatalities.

Of the 197 *storage and handling incidents* over this period, 37 per cent are assessed as being caused by mechanical or design failure and 49 per cent by human error. Unfortunately, in 2015, as well as some incidents resulting in minor injuries, one serious injury was sustained. However, over the 10-year period, the incidence rate for serious injuries and fatalities has remained low.

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

Of the 145 *transport incidents*, 28 per cent are assessed as being 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, fatigue, excessive speed or a combination of these, although it should be noted that, in some cases, other vehicle drivers were at fault. Unfortunately, over the 10-year period, there have been four people seriously injured and five fatalities.

Further analysis of the transport data shows that 57 incidents (39%) involved double or triple road trains, and most were roll-overs. In addition, several other incidents involved standard single-tanker vehicles. This reflects 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 focus on ensuring road train drivers do not speed and they negotiate poor roads more carefully. Vehicle drivers should be well trained and provided with adequate rest breaks to maintain their alertness. No particular trend warranting further investigation has been identified.

Storage and handling and transport incident data 2006–2015

	Total number	Assessed cause			Loss of product	Serious injury	Fatality
		Material or design failure	Human error	Other causes			
Storage and handling (number of incidents)	197	72	97	28	153	10	2
		37%	49%	14%	78%	5%	1%
Transport (number of incidents)	145	41	86	18	94	4	5
		28%	59%	13%	65%	3%	3%