Fires on mobile plant

April - June 2018

Preventing fires on mobile plant

The Resources Regulator has developed a discussion paper as a first step in consultation about the use and possible regulation of mitigation strategies for the prevention of fires on mobile plant. The Resources Regulator seeks your feedback on the existing and future use of fire-resistant fluid in mobile plant in NSW mines and other solutions, for example surface temperature control by water jacketing and other methods, to reduce the occurrence of fires on mobile plant.

You are invited to respond to some or all the questions posed in this discussion paper and provide any additional information on matters you think should be considered in relation to the use of fire-resistant fluids in mobile plant in mining applications.

→ Discussion paper: Preventing fires on mobile plant

→ Feedback form: Fires on mobile plant discussion questions

Please provide your submissions by **14 September 2018**

Key observations

Underground fires: Several significant fires have occurred in the second quarter of 2018, including three fires in underground metalliferous mines. Fires on mobile plant in underground mines represent a risk to all workers who may be exposed to the products of combustion and the loss of safe egress from the underground parts of a mine during a fire. In one event, a 60 tonne underground mine dump truck caught fire, blocking a main decline and contaminating the ventilation in the mine. This resulted in an emergency evacuation and mines rescue response.

Hot surface fires: Fires related to escaping fluid onto hot surface (diesel exhaust/turbo) continue to dominate mobile plant fire statistics.

Planned inspections

In relation to fire risk assessments (FRA), the planned inspections have commonly found:

- → FRAs are prepared by fire suppression system providers without consultation with key stakeholders involved in the lifecycle management of the plant as recommended by AS5062.
- → FRAs typically focus on the suppression of fires after the event rather than preventative controls.
- → Many controls and controls supports likely to come from the risk management process are present in the safety management system but are not necessarily driven from the FRA.
- → FRAs have only listed exhaust lagging as a control over and above whatever the OEM has provided.
- → The FRA only uses the collective corporate memory of attendees as the source of fire experience and knowledge rather than previous fire events.
- → The FRA has not defined specific control measures for the prevention of fires.
- → Exhaust lagging is not verified for effectiveness after installation by the use of thermography etc or routine inspection.
- → Mines generally have systems for engineering change management and to review safety alerts and bulletins from regulators and OEMs however do not review FRAs themselves in response to updates to mining design guidelines (MDGs) and Australian Standards.

On equipment:

- → Inspections play a vital role in keeping equipment safe. Three of the most common equipment fires reported are from the most common equipment used at open cut coal mines but also have areas of most difficult access for inspection.
- → Lagging on turbo chargers and exhaust manifolds are commonly found to be in poor condition. Discussions with workers appears to recognise the need for lagging and its purpose but do not appear to report poor lagging. Sites do not have communicated acceptable standards well to workers for this purpose.
- → Lagging manufacturers and suppliers may not consider fluid flow and gravity when designing the overlapping joints between sections of a multi-piece lagging kit often working in reverse to roof tiles. Lagging often does not fully wrap turbos in the area of the wastegate controller.

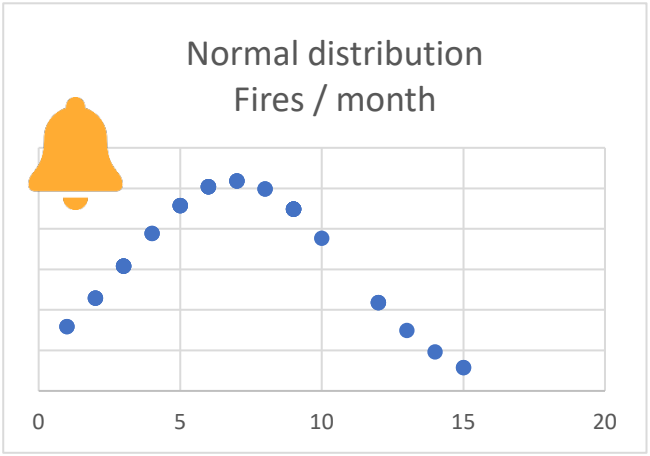
- → Mines have not used thermography or temperature measurement techniques to:
  - o measure surface temperatures for the identification of ignition sources
  - o measure the effectiveness of lagging installations
  - o measure areas of double walled exhaust determine if lagging is warranted, but have found to be lagged in some cases.
- → Hose segregation and rubbing particularly in dozer 'hell hole' appears to be challenging for mines to manage. Contributing to the difficult access has been the positioning of fire suppression system manifolds in the access hole of dozers.
- → Areas of attention for excavators include lagging standards and the firewall between the engine flywheel housing and the pump drive area.

Fleet census: A census of NSW mines and quarries mobile plant fleet was conducted in the second quarter of 2018. The census information will be used to normalise fire event data allowing the regulator to develop objective and targeted strategies to help reduce the incidence of fires on mobile plant.

Data summary

2015	2016	2017	2018
49	67	112	47
			94

Extrapolated 2018



Jan	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*
12	*8*	*8*	*6*	*10*	*3*	*5*					

Mine Type	January	February	March	April	May	June
Underground coal	0	0	0	0	0	0
Underground metex	3	0	1	1	1	1
Open cut coal	7	7	4	3	8	3

Surface operation	0	1	0	1	0	0
Quarry	2	0	2	1	1	0

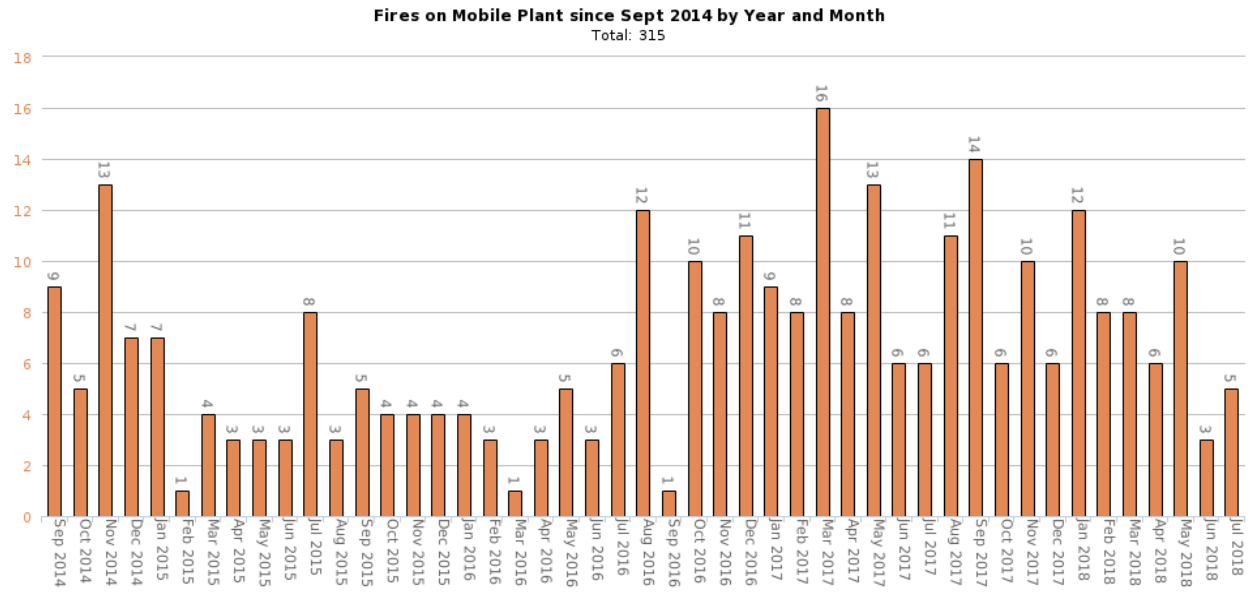
Title Safety Ancillary Reports - Fires on Mobile Plant **Report date** 27/07/2018 15:06:20

Report details

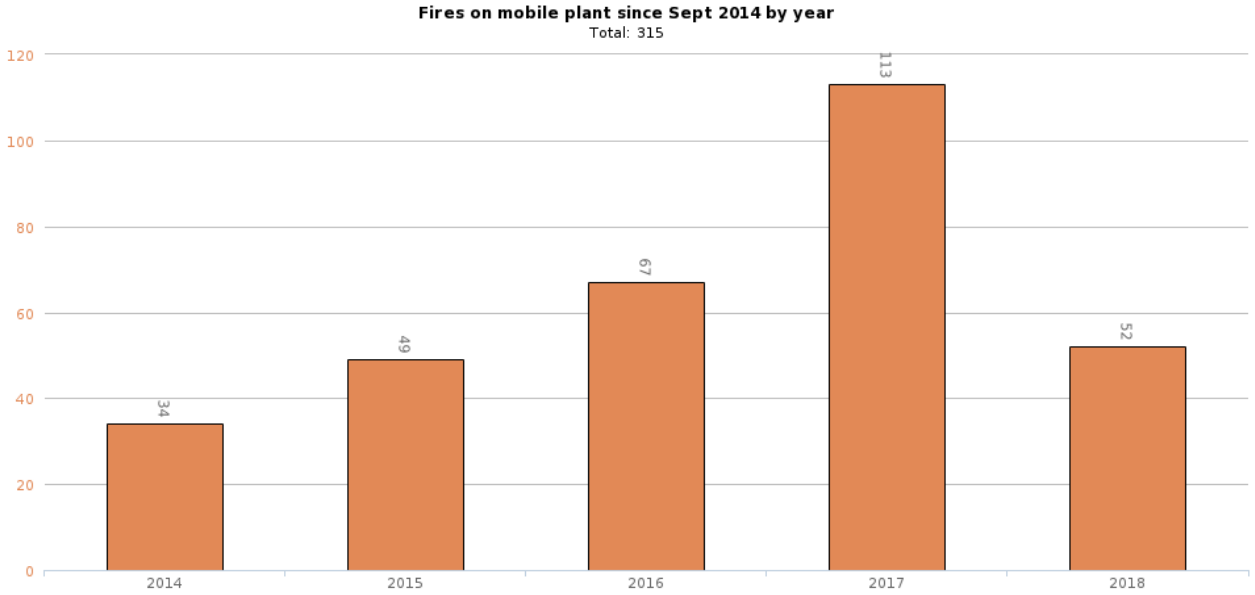
Fires on mobile plant since September 2014 - Last three complete calendar months and total

	Last 3 complete calendar months	Total
Safety incident - ancillary (fire related to mobile plant)	19	315

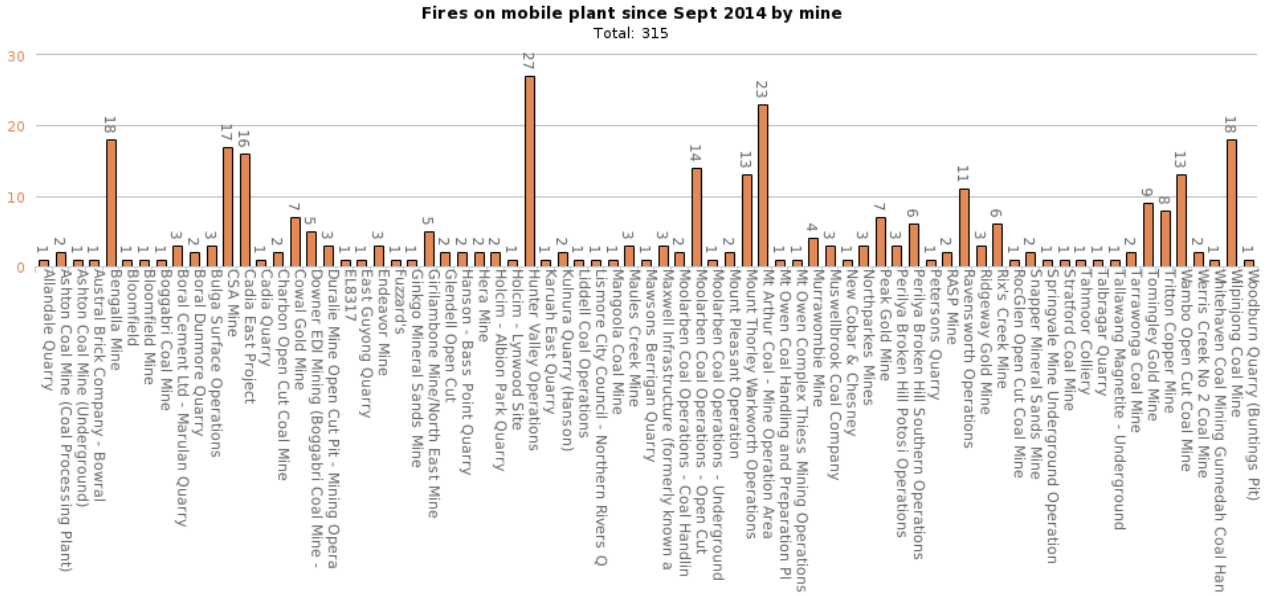
Fires on mobile plant since Sept 2014 by year and month



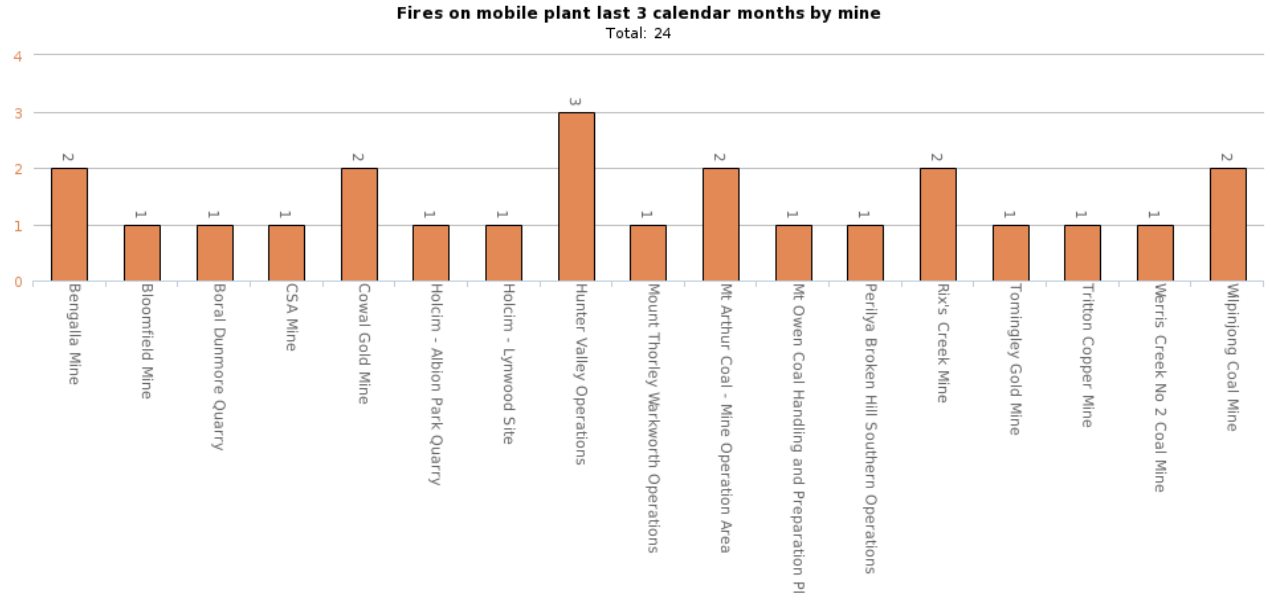
Fires on mobile plant since September 2014 by year



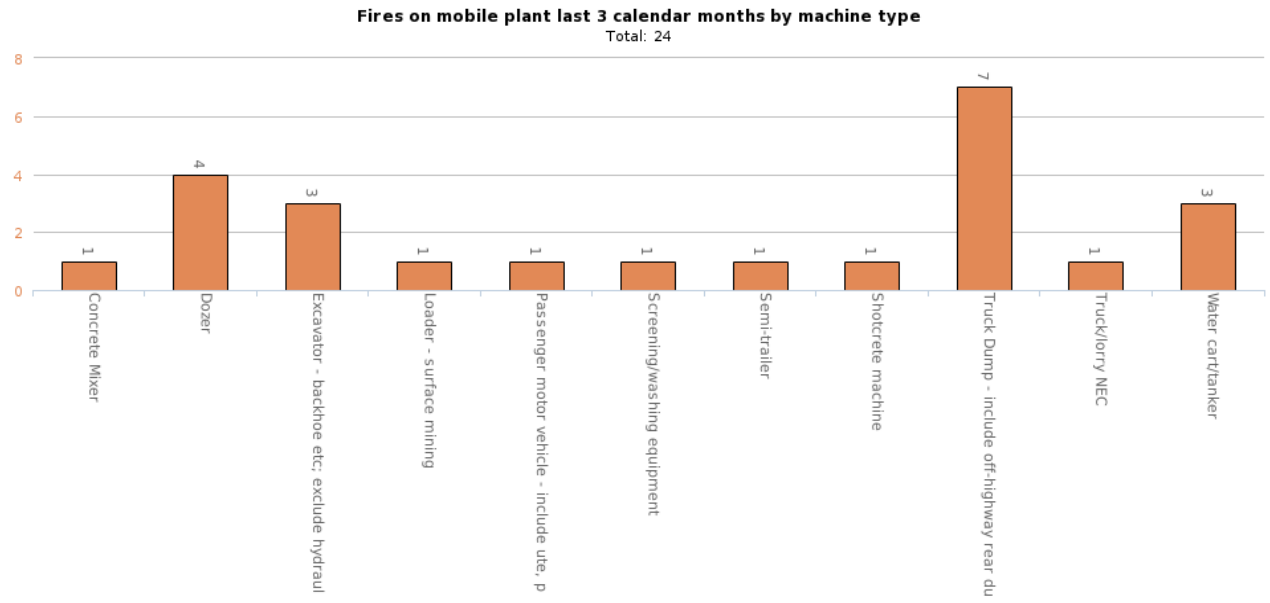
Fires on mobile plant since September 2014 by mine



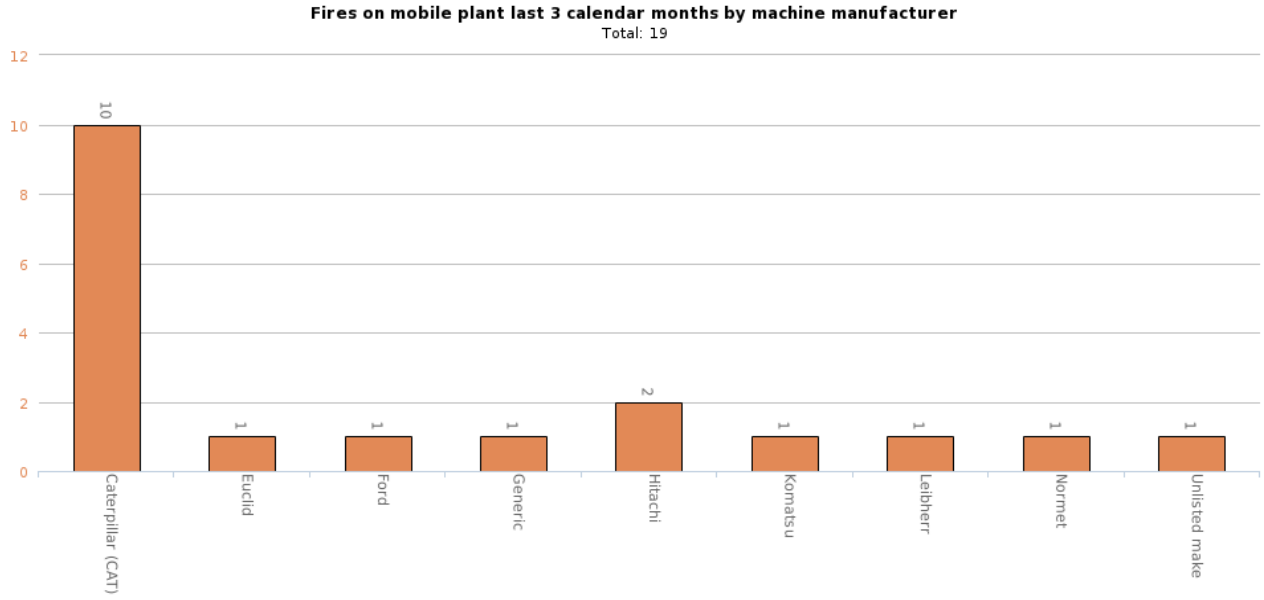
Fires on mobile plant last three calendar months by mine



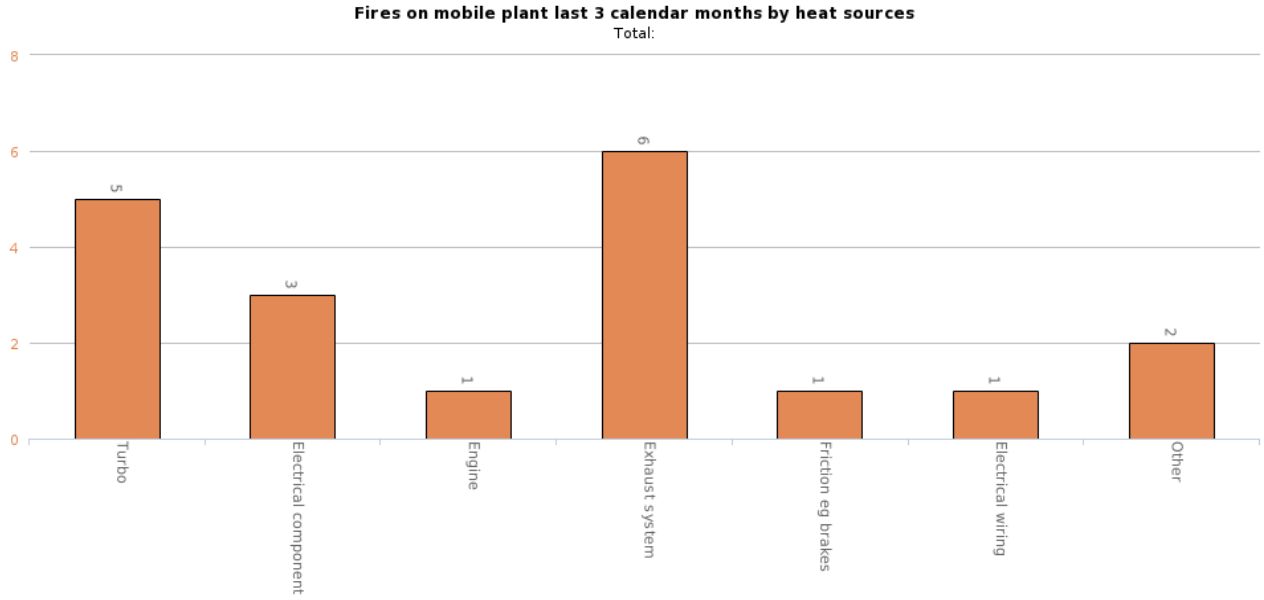
Fires on mobile plant last three calendar months by machine type



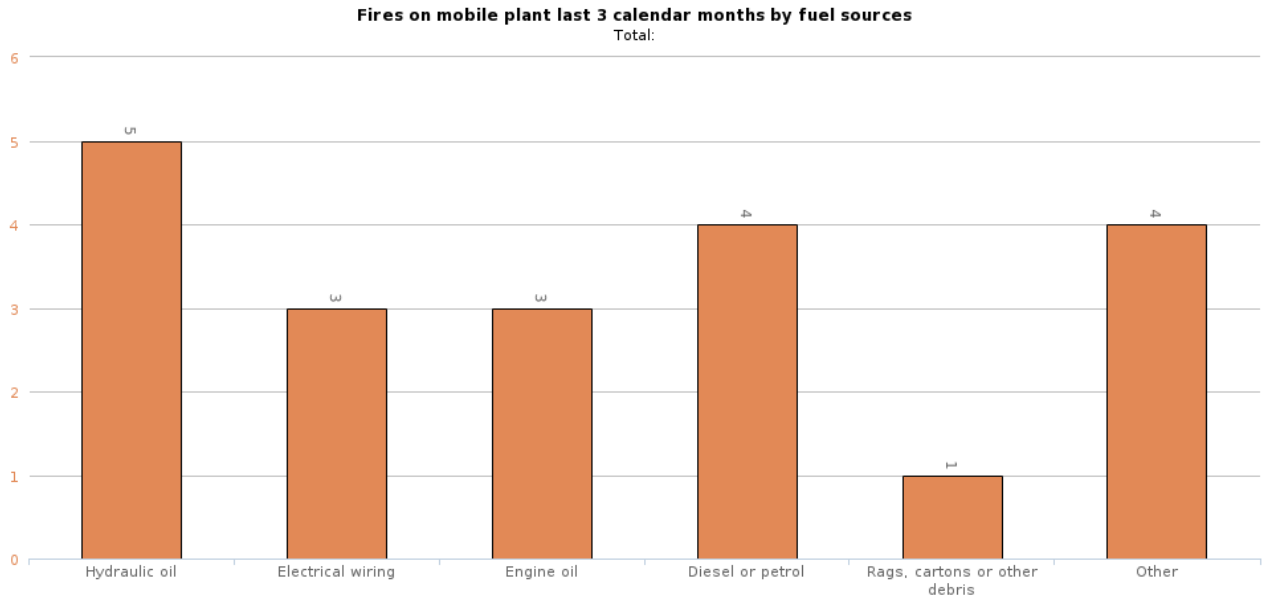
Fires on mobile plant last three3 calendar months by machine manufacturer



Fires on mobile plant last three calendar months by heat sources

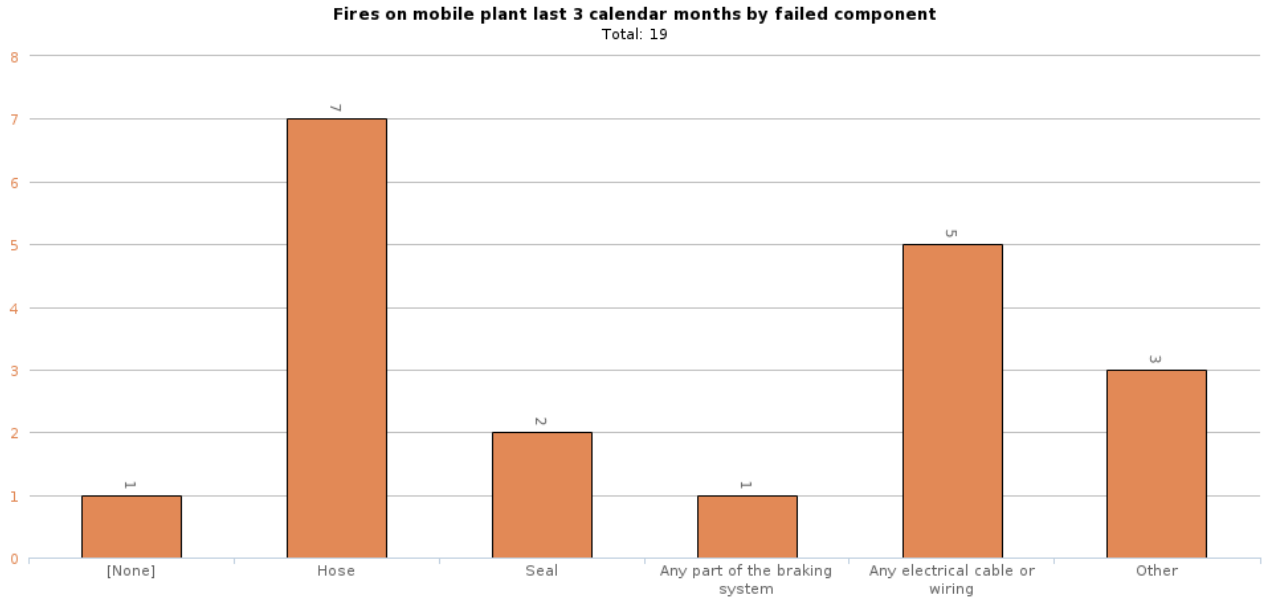


Fires on mobile plant last three calendar months by fuel sources



Report admin

Fires on mobile plant last three calendar months by failed component



Fires on mobile plant last three months causal factors details

	Date of Incident	Event ID	Machine type	Machine manufacturer	Machine model	Causal factors comments
1	28/06/2018	SInAnc-2018/00123	Excavator - backhoe etc; exclude hydraulic shovel	Leibherr	R9800	Loose turbo feed line fitting
2	22/06/2018	SInAnc-2018/00137	Passenger motor vehicle - include ute, panel van, bus (manhual), land cruiser/rover, etc	Ford	Ranger	On investigation it was identified that the positive cable running from the starter motor to the battery was rubbing with the oil line running from the engine block to the muirhead sensor. The rubbing led to the cable to short circuit via the oil line thus resulting in arcing to occur. The arcing present combined with fuel sources such as oil residue from the oil line most likely would have initiated the fire
3	04/06/2018	SInAnc-2018/00120	Dozer	Caterpillar (CAT)	D11T	Investigation still ongoing and will be provided.
4	30/05/2018	SInAnc-2018/00124	Dozer	Caterpillar (CAT)	D11T	
5	29/05/2018	SInAnc-2018/00116	Dozer	Caterpillar (CAT)	D11T	
6	26/05/2018	SInAnc-2018/00130	Truck dump - include off-highway rear dump truck and coal hauler dump truck	Caterpillar (CAT)	795F	Please refer to attached Investigation Report
7	17/05/2018	SInAnc-2018/00117	Water cart/tanker	Generic	3900G	Yet to be determined as investigation is not complete
8	16/05/2018	SInAnc-2018/00102	Truck dump - include off-highway rear dump truck and coal hauler dump truck	Caterpillar (CAT)	773G	Appears to be a faulty component. Equipment owner has been in touch with Cat regarding the problem
9	15/05/2018	SInAnc-2018/00101	Concrete mixer	Normet	LF600 UTIMEC	
10	10/05/2018	SInAnc-2018/00097	Loader - surface mining	Caterpillar (CAT)	994-D	Preliminary investigations have found that the No: 9 Fuel Injector hold down bolt has broken allowing the injector to move out of the cylinder head bore and punch a hole in the valve cover mechanism.
11	07/05/2018	SInAnc-2018/00093	Excavator - backhoe etc; exclude hydraulic shovel	Hitachi	EX5500-5	Electrical wiring and hose routing and support to be improved in the air conditioning room. This routing issue was caused due to a previous relocation of the air conditioning compressors on the machine.
12	05/05/2018	SInAnc-2018/00110	Dozer	Caterpillar (CAT)	D11T	OEM Remanufactured Engine Assembly inclusive of engine oil filter housing has been delivered and installed with defect. Component was difficult to

						inspect due to dozer engine bay orientation.
13	02/05/2018	SInAnc-2018/00118	Truck dump - include off-highway rear dump truck and coal hauler dump truck	Komatsu	Komatsu 830E	Continuous vibration in the machine, including grid box and subsequent movement of the grid frame has allowed the centre cross brace of the grid to drop approximately 5mm. (see attached photo - 6835). The grid resistive elements have then been able to move within the grid frame assembly itself. (see attached additional photos).
14	26/04/2018	SInAnc-2018/00088	Truck dump - include off-highway rear dump truck and coal hauler dump truck	Caterpillar (CAT)	AD55B	No schedule change out for fuel return hoses.
15	26/04/2018	SInAnc-2018/00098	Excavator - backhoe etc; exclude hydraulic shovel	Hitachi	EX3600-6	Hose was left rubbing on exhaust system causing it to rubber through and rupture hose due to poor segregation
16	23/04/2018	SInAnc-2018/00107	Truck dump - include off-highway rear dump truck and coal hauler dump truck	Caterpillar (CAT)	777F	Introduction of lagging of the exhaust pipe system and hose segregation inspection,
17	18/04/2018	SInAnc-2018/00094	Water cart/tanker	Caterpillar (CAT)	777F	A loose fitting hose clamp has worn against the fuel hose causing the fire.
18	16/04/2018	SInAnc-2018/00082	Screening/washing equipment	Unlisted make	MSCR155	
19	01/04/2018	SInAnc-2018/00068	Truck dump - include off-highway rear dump truck and coal hauler dump truck	Euclid	EH4500	Fuel soaked lagging not identified and therefore changed following maintenance completed on the jet sensors earlier in the shift (on the day of the incident).

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