
Fires on mobile plant

2023-24

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Resources Regulator

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NOTIFY AN INCIDENT 24/7
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1 **2** **3** **4** **5**

2 AUTHORISATIONS, PLANT REGISTRATION, LICENCES AND EXEMPTIONS PRESS 2

3 COMPETENCE, PRACTISING CERTIFICATES AND MUTUAL RECOGNITION PRESS 3

4 MINE SAFETY GENERAL PRESS 4

5 MINING ACT COMPLIANCE PRESS 5

Document control

Published by NSW Resources
 Title: Fires on mobile plant 2023–24
 First published: January 2025
 Authorised by: Chief Inspector, Resources Regulator
 CM10 Reference: RDOC24/114202

Amendment schedule

Date	Version	Amendment
January 2025	1	First published

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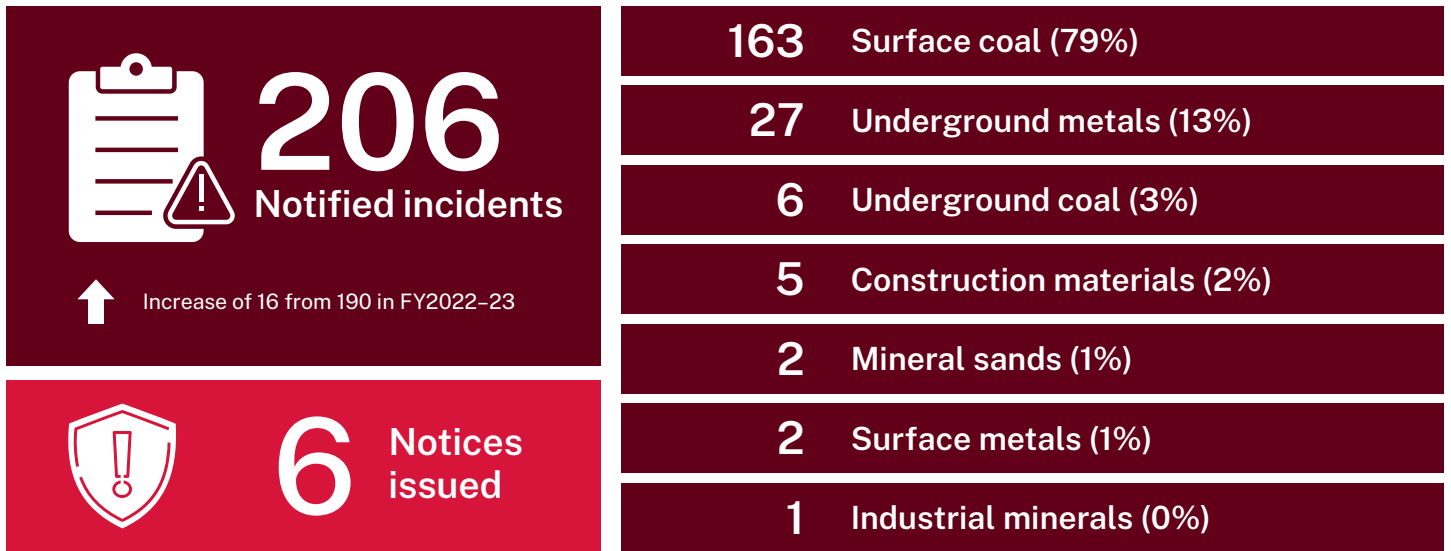
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Overview

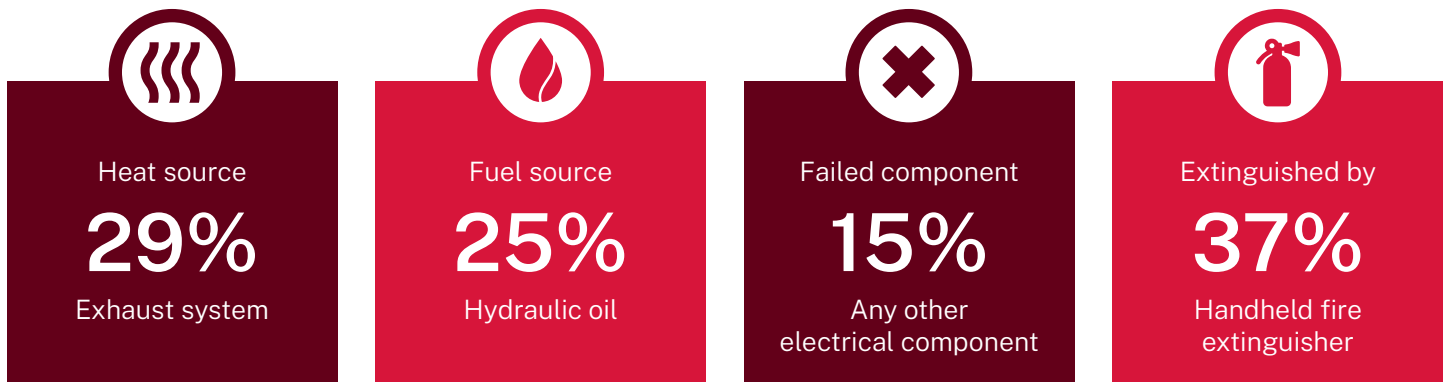
In FY 2023–24, there were:



Incident notifications classified against material unwanted events (MUE)

MUE	Most common threat with failed critical control		Most common failed critical control	
Fire or explosion surface 183	92 of 183	Accumulated flammable leaks and spills	92 of 183	Flammable fluid containment
Fire or explosion underground 23	17 of 23	Mechanical energy in the presence of fuel	12 of 23	Flammable fluid containment

Ancillary reports summary



Executive summary

This report has been prepared by the NSW Resources Regulator for the NSW mining industry, original equipment manufacturers and suppliers. It contains annual data of notified incidents involving fires on mobile plant (FOMP) for the period 1 July 2023 to 30 June 2024.

The Regulator's position is that all fires on mobile plant are avoidable and preventable and we have adopted a zero-tolerance approach where mine operators have not taken appropriate steps to manage this risk.

Fires on mobile plant are inherently dangerous. They affect the safety of workers and have potentially catastrophic consequences. Despite a focus on the issues in recent years, the number of incidents remains high. The Regulator is committed to working with industry to ensure health and safety obligations are being met to reduce the number of fires on mobile plant and to prevent potentially catastrophic events.

Since 2018, the Regulator has published reports on fire on mobile plant incidents (quarterly until FY 2022 and then annually). Information on mobile plant fires will continue to be provided at industry engagement forums such as scheduled quarterly engineers and managers forums, plus published in the weekly incident summary.

Annual data for 1 July 2023 to 30 June 2024 identified the following:

- There was an 8% increase in notified fire on mobile plant incidents compared to the previous year. The number of FOMP incidents (206) notified was the third highest recorded over the last 10 years and only 2 fewer than the highest total of 208 in FY 2021.
- Notified fire on mobile plant incidents occurring at surface coal mines account for 79% of all FOMPs in FY 2024, which is the highest percentage in the past 5 years. Since 2020 the percentage of FOMP incidents occurring at underground metals mines has decreased from 32% to 13%, however FOMP incidents occurring underground in underground metals mines continued to be the second most common (21 in FY 2024).
- Notices issued in response to a FOMP incident decreased by more than half from 13 in FY 2023 to 6 in FY 2024. WHSA s191 improvement notices accounted for two-thirds of all notices (4) with one each for s23 notices of concern and s195 prohibition notices.
- The most common combination of heat and fuel source in notified FOMP incidents in FY 2024 was exhaust system/hydraulic oil, accounting for 19 of the 206 incidents (9%).

Significant incidents

July 2023 – IncNot0045084

A haul truck was at the dump and had started to lift its tray. A nearby dozer operator noticed flames and called the truck operator instructing him to lower the tray. The dozer operator called emergency over the radio and told the truck operator to hit the fire suppression and exit the truck. The truck operator pulled the plastic tie on the fire suppression and attempted to activate it but was unsuccessful. The truck operator exited the cab through the passenger door, descended the primary egress, and waited with the dozer operator. The haul truck was engulfed in flames following the failure of the fire suppression system to operate. The apparent cause was the failure of hose HA8721 steer pump to HP filter housing adjacent to the pump end ferrule. Hydraulic oil was sprayed under pressure to the underside of the truck, most likely contacting a hot exhaust through a gap or seam in exhaust lagging.

Picture 1. Haul truck during fire event



August 2023 – IncNot0045182

While refilling the tank on a water cart, the operator could smell something burning and found a small fire around the exhaust system. The operator extinguished the fire with a handheld extinguisher. Diesel residue was found below the fuel filters above the DPF unit on the water cart. Damaged gaskets and loose bolts were found on the exhaust unit. During earlier maintenance on the vehicle, a fuel leak occurred which wasn't properly cleaned up resulting in residual fuel being left in the vicinity of the DPF.

Picture 2. Exhaust system aftermath



August 2023 – IncNot0045278

A light vehicle was being driven to a drill rig when it stopped about 80 metres from the drill site. A worker proceeded to the drill rig and commenced work. The worker heard a bang and turned to see the vehicle on fire. The worker used an extinguisher and found the fire suppression system had already activated. This did not extinguish the fire. The worker retreated and raised the alarm. All workers then proceeded to refuge chambers. The mine's emergency rescue team responded to the fire. The fire was deemed to have occurred due to an internal cell failure or short circuit within the battery.

Picture 3. Fire damage to cab and engine bay



August 2023 – IncNot0045290

A worker was cleaning up in a decline and noticed a red glow at the back of a loader. The worker activated the fire suppression system, which extinguished the fire. A fire extinguisher was also used to ensure the fire was extinguished. An inspection determined the fire was caused by a failed O-ring on the brake charge accumulator relief valve. The stream of oil from the failed O-ring passed through an opening in the OEM guarding into the engine fan. This created a fine mist which was blown onto the hot exhaust/turbocharger area resulting in the fire.

Picture 4. Oil spray on wall and stricken loader



May 2024 – IncNot0046876

An excavator operator noticed excess oil on top of the stairs and the engine compartment of the excavator. Fitters attended to degrease the oil spill, which occurred from a failed hose. The fitters put degreaser on the roof of the engine compartment to clean up the excess oil. When they went into the engine room, they saw degreaser dripping through the roof. The degreaser fell onto a hot exhaust manifold and started a fire. The fitters exited the engine room, passed the fire and activated the fire suppression system.

Picture 5. Engine compartment fire damage



May 2024 – IncNot0047015

A worker was refilling a water cart at the refill point on the main decline when they saw the glow of a flame. The worker removed the wheel chock and drove forward under the flowing water to extinguish the flame. The investigation showed that water ingress corroded an electrical connector. The connector combusted due to excessive heat generated due to the poor connection.

Picture 6. Fire damaged electrical connector



June 2024 – IncNot0047118

An operator noticed sparks coming from the grid box of an oncoming truck and notified the driver who immediately called an emergency and hit the E-stop in the truck, then safely drove position 1 tyre against the windrow to make the truck fundamentally stable. The operator safely exited the truck via normal egress. A workshop maintenance worker opened the grid box cabinet and found there was no flame. A water cart sprayed the grid box for about 5 minutes to cool it down. The investigation showed the grids were aligned in incorrect positions.

Picture 7. Incorrectly aligned grids



Notified incidents

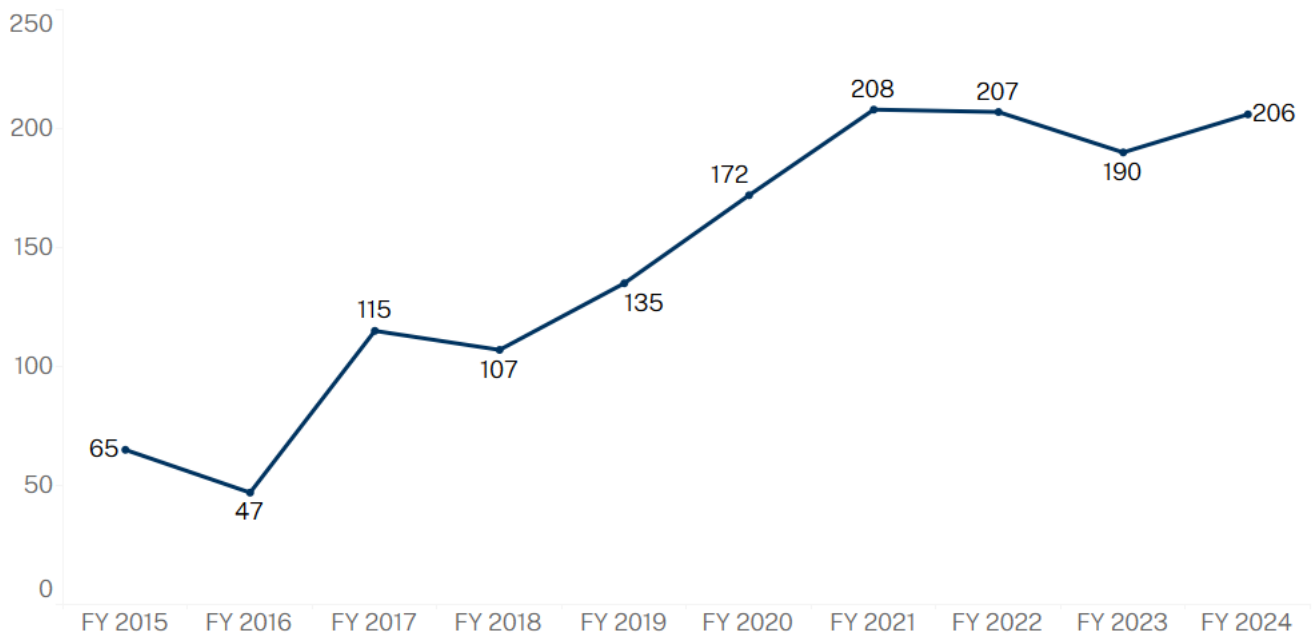
Notified incidents between FY2015 and FY2024

Figure 1 relates to incidents involving fires on mobile plant notified to the Regulator each financial year since FY 2015, based on the date the incident occurred.

Figure 1 shows an 8% increase in notified incidents in FY 2024 compared to the previous year, returning to a similar figure (206) as in FY 2021 (208) and FY 2022 (207).

The overall increase in notified FOMP incidents over the past 5 years can be explained in part by amendments to the Work Health and Safety (Mines and Petroleum Sites) Regulation 2014 in February 2020 to include a duty to notify all incidents where there was ‘an uncontrolled fire on mobile plant that is in operation (whether operated directly, remotely or autonomously)’ (clause 124(5)(u)).

Figure 1. Notified incidents between FY2015 and FY2024



Notified incidents by legislative requirement to report

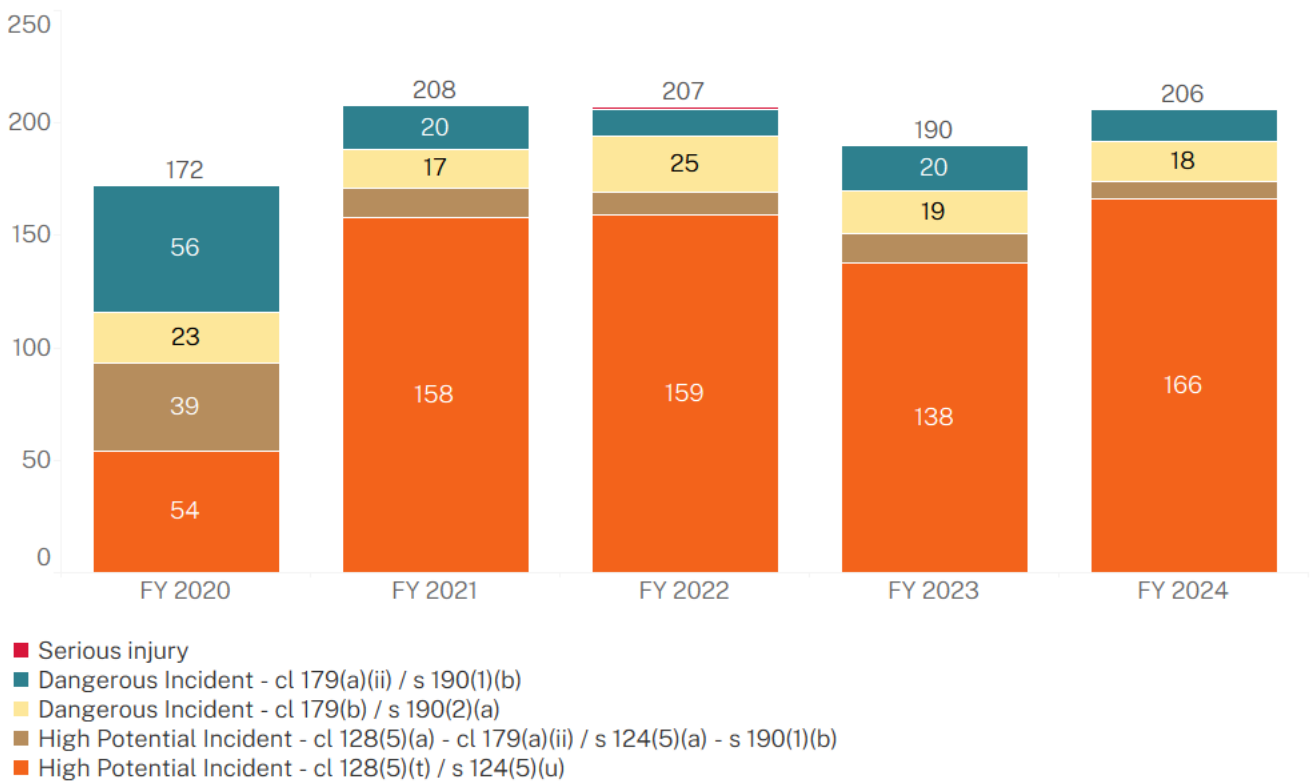
Figure 2 highlights the number of notified incidents recorded, by the legislative requirement to report.

Most fires on mobile plant notified to the Regulator in FY 2024 (81%) were recorded as high potential incidents. The remainder were recorded as dangerous incidents. This aligns with the previous 4 years except for FY 2022 where one serious injury was recorded.

Incidents recorded as a dangerous incident occur where there was ‘a fire in the underground parts of a mine, including where the fire is in the form of an oxidation that releases heat and light’ (s190(2)(a)).

Incidents recorded as a high potential incident occur where the incident would have been a dangerous incident if a person were reasonably in or could have been in the vicinity at the time (s124(5)(a)). In the case of fire on mobile plant, a high potential incident is also where there is an uncontrolled fire on mobile plant that is in operation, whether operated directly, remotely or autonomously (s124(5)(u)).

Figure 2. Notified incidents by legislative requirement to report between FY2020 and FY2024



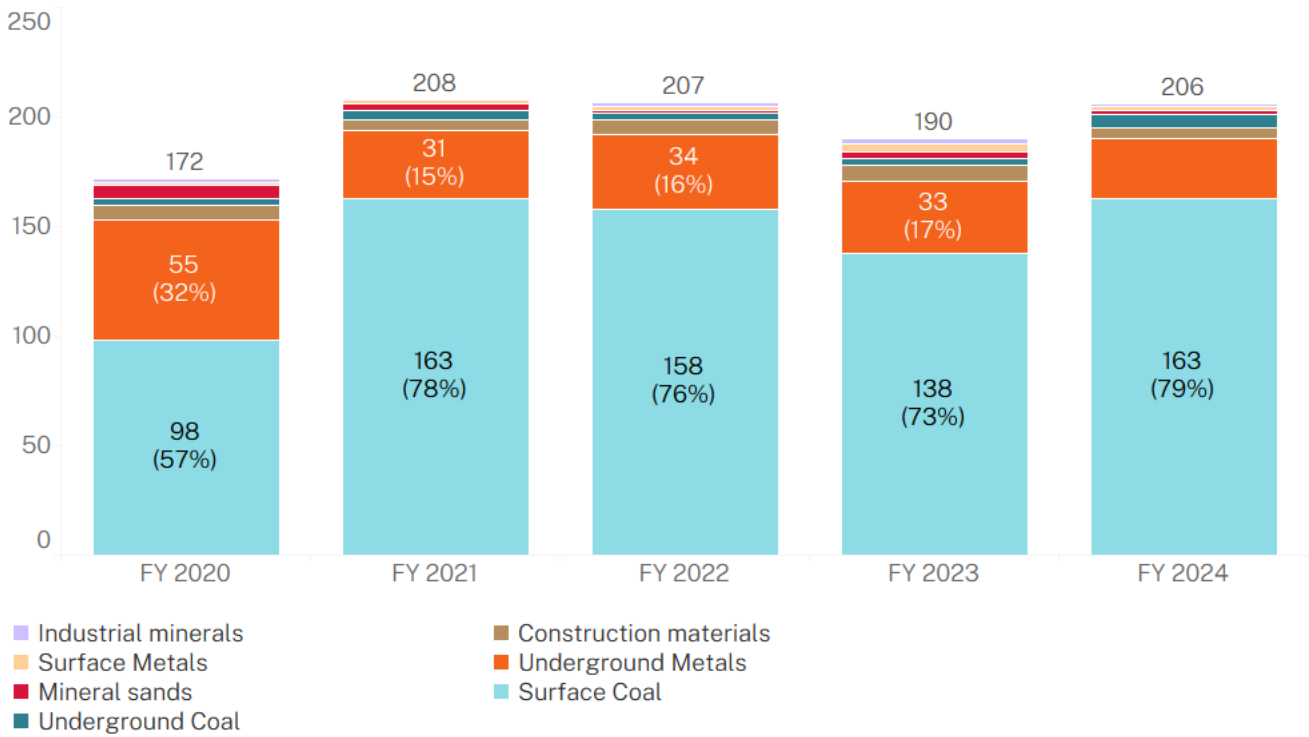
Notified incidents by mine and operation type

Figure 3 shows the number of notified FOMP incidents by mine type and operation type.

The breakdown has remained consistent over the last 3 years with most notified incidents occurring at mines categorised as surface coal mines followed by underground metals mines. In FY 2024 these 2 categories accounted for 92% of notified FOMP incidents.

Small increases were observed in notified incidents occurring at mines categorised as underground mines.

Figure 3. Notified incidents by mine and operation type between FY2020 and FY2024

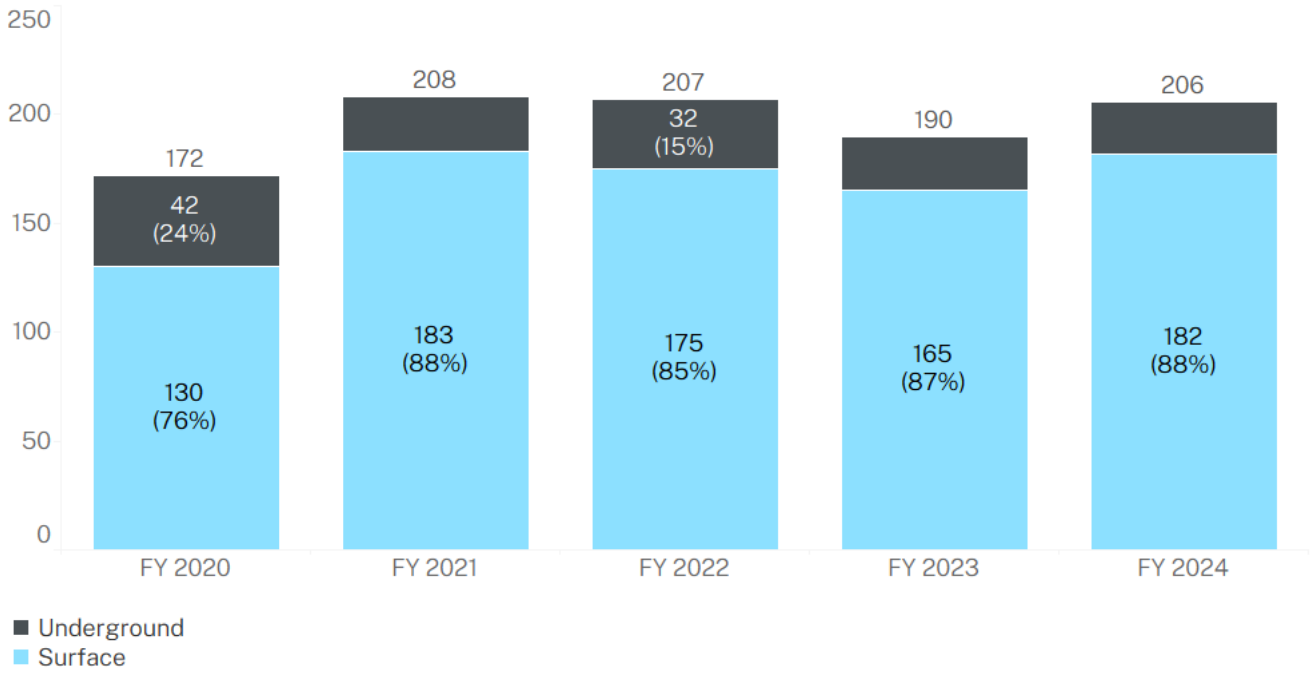


Notified incidents by incident location

Figure 4 shows that the actual location of FOMP incidents, irrespective of the mine operation type, typically occurs on the surface rather than underground.

Surface incidents increased from 165 to 182 (10%) compared to FY 2023, and underground incidents decreased slightly.

Figure 4. Notified incidents by incident location between FY2020 and FY2024



Notified incidents by mine type, operation type and incident location

Fires on mobile plant at surface coal mines have accounted for most notified FOMP incidents every year for the past 5 years (79% in FY 2024). FOMPs occurring in an underground location in underground metals mines continue to be the second highest category with 10% of incidents in FY 2024.

Of the 983 notified FOMP incidents since FY 2020, only 1% occurred underground at an underground coal mine.

Table 1. Notified incidents by mine type, operation type and incident location FY2020 to FY2024

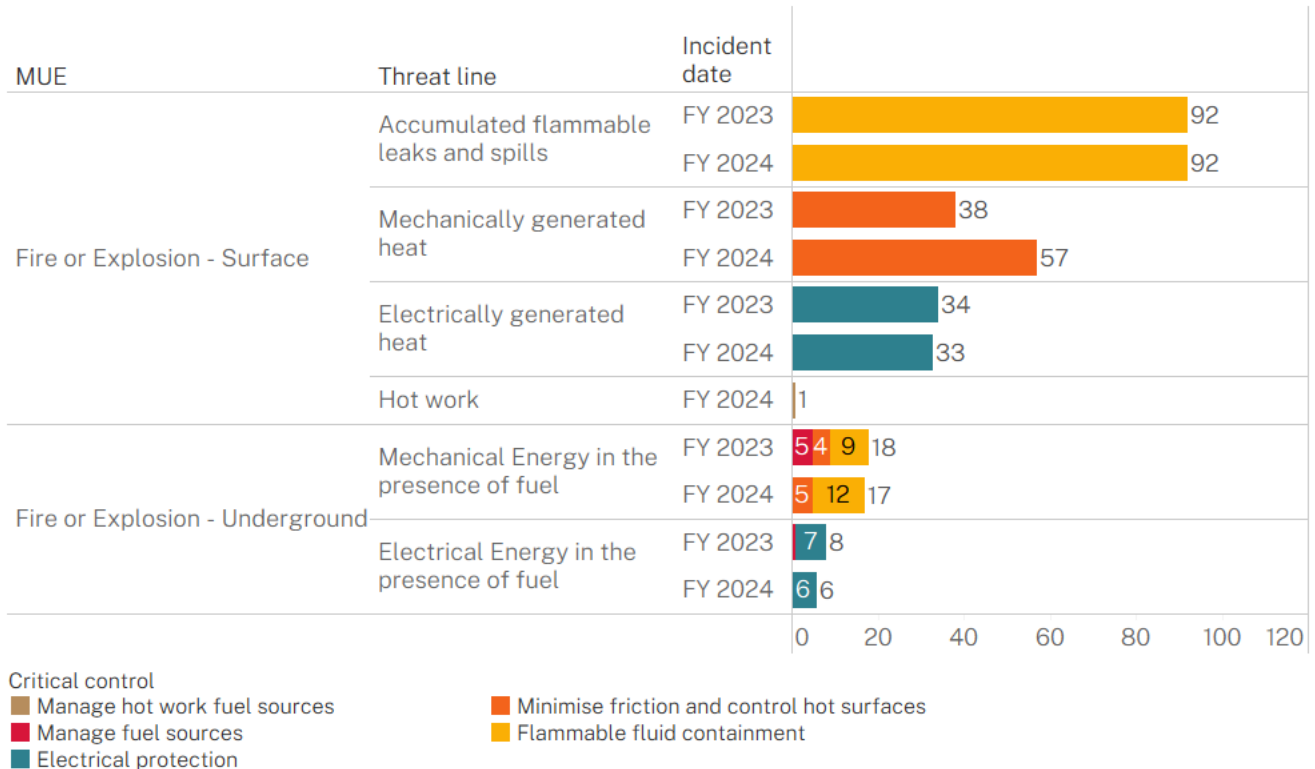
Mine type / Operation type / Incident location	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	Grand total
Surface coal	98	163	158	138	163	720
Underground metals – Underground location	40	24	30	24	21	139
Construction materials	15	7	4	9	6	41
Surface metals	7	5	7	7	5	31
Underground metals – Surface location	6	3	1	3	2	15
Mineral sands	1	2	2	4	2	11
Underground coal – Surface location	1	3	1	2	3	10
Underground coal – Underground location	2	1	2	1	3	9
Industrial minerals	2	0	2	2	1	7
Grand total	172	208	207	190	206	983

Notified incidents classified by hazard, MUE, threat and critical control

Hazard management bowties are a widely used risk management tool that incorporates preventative and mitigating controls onto threat lines that relate to a material unwanted event (MUE). The Regulator uses MUE bowtie frameworks when proactively assessing how mine sites manage their principal hazards. Since October 2019, these MUE bowtie frameworks have also been used to classify notified incidents. Classifications highlight increased areas of risk at hazard, MUE, threat and critical control levels.

Most threats associated with notified FOMP incidents have plateaued from FY 2023. The main exception was surface mechanically generated heat which increased by 50% from 38 in FY 2023 to 57 in FY 2024.

Figure 5. Notified incidents classified by MUE, threat and critical control FY 2023 and FY 2024

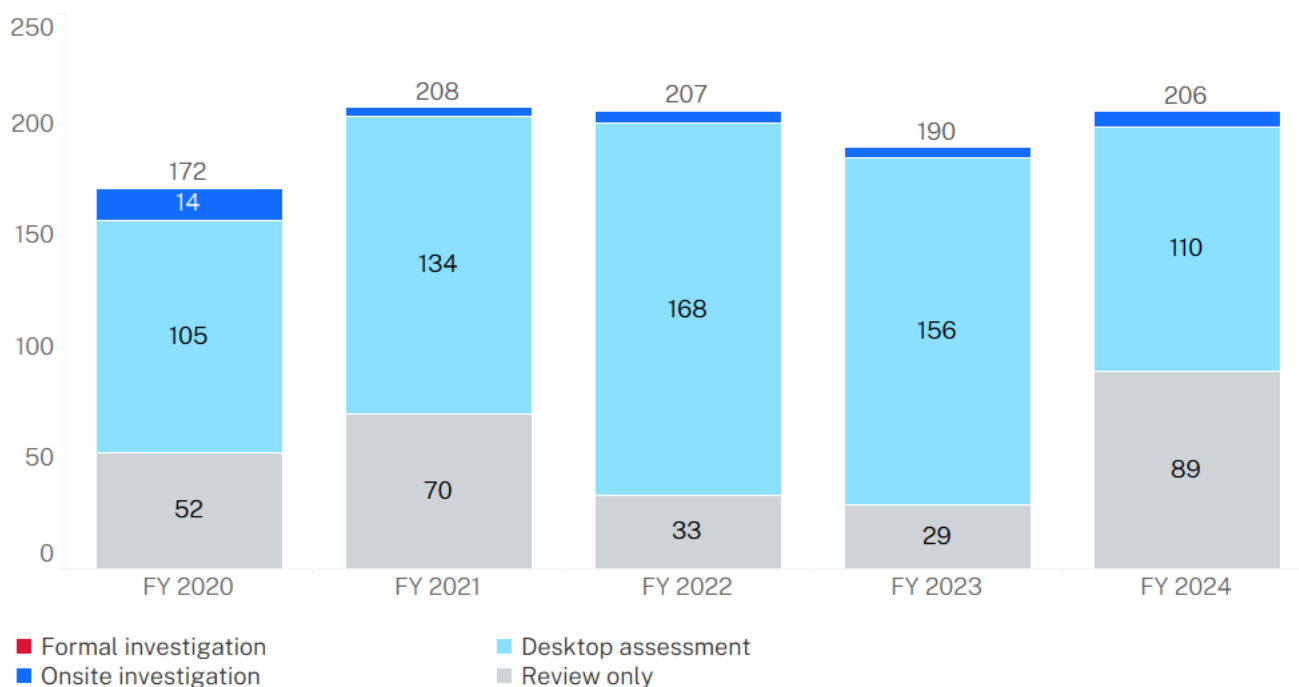


Our response to notified incidents involving FOMP

The Regulator holds the position that all fires that occur on mobile plant are preventable (see [position paper](#)). Each incident reported is assessed and outcomes reviewed. This process involves an inspector attending the mine (onsite investigation) or reviewing investigation findings and actions (desktop assessment).

Figure 6 shows that in FY 2024, desktop assessments were the Regulator's response to 54% (110) of notified fire on mobile plant incidents, 43% (89) were reviewed and 7 onsite investigations were commenced during the year.

Figure 6. Notified incidents by response level between FY2020 and FY2024

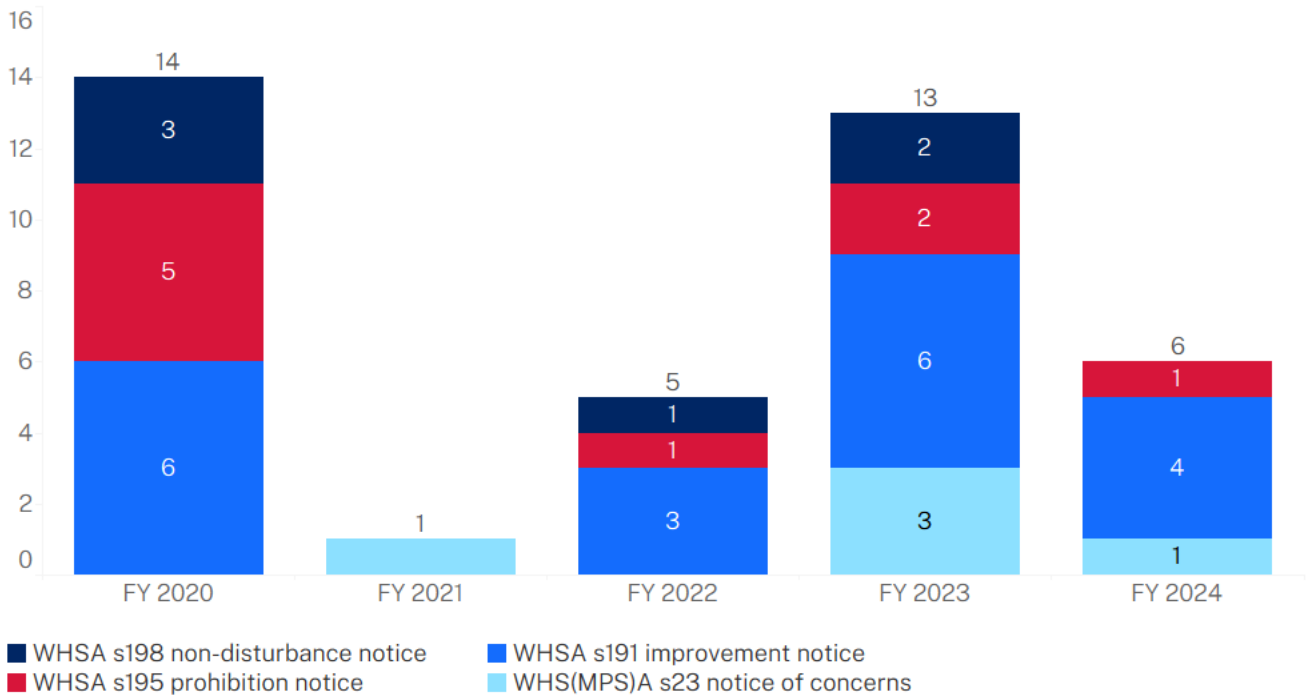


Notices issued

As part of the Regulator’s position paper on preventing fires on mobile plant – where a mine operator has not taken appropriate steps to manage the risk of fires on mobile plant, escalated enforcement action will be taken.

Figure 7 shows that 6 notices were issued in relation to notified FOMP incidents in FY 2024, with 4 s191 improvement notices, one s23 notice of concern and one s195 prohibition notice issued under the *Work Health and Safety (Mines and Petroleum Sites) Act 2013*. This is a decrease of 54% compared to the 13 notices issued in FY 2023.

Figure 7. Notices issued in relation to FOMP incidents between FY 2020 and FY 2024



Fires on mobile plant ancillary reports

When an incident involving fires on mobile plant is notified to the Regulator, additional information must be submitted in an ancillary report via the Regulator Portal no later than 30 days after the incident was required to be notified. There were 206 ancillary reports completed for FY 2024.

Ancillary reports – combination heat/fuel sources

Data recorded in ancillary reports in notified FOMP incidents in FY 2024 indicated that the most common heat source/fuel source combination was exhaust system/hydraulic oil, accounting for 19 of the 206 incidents (9%).

The second most common was turbo system/engine oil which accounted for 17 incidents. Joint third were turbo system/hydraulic oil and electrical fault/electrical insulation materials with 16 incidents each.

The only other heat source/fuel source combinations to record double figures were engine oil/exhaust system (12) and exhaust system/diesel (10).

Figure 8. Ancillary reports – fuel sources combined with heat sources – FY2024

Heat sources	Fuel sources																			Grand Total
	Not classified	Brake fluid	Paint	Coal dust	Exhaust system lagging	Tyre	Hydrocarbon contaminated exhaust system lagging	Plastic	Rags, cartons or other debris	Grease	Rubber	Sound suppression or insulation material	Coolant	Gear oil	Diesel	Other	Electrical insulation materials	Engine oil	Hydraulic oil	
Exhaust system					2	1	1		2		2	4	2	1	10	4		12	19	60
Turbo					1		2					1	5	1	1	2		17	16	46
Friction		1				1		2		3	3			2		4		2	6	24
Electrical fault				2								1				2	16	1	1	23
Electrical component			1					2	2				1			6	9		1	22
Engine							1						1		3			2	4	11
Other						1					1			1	2	2			2	9
Bearing failure										1				4			1		2	8
Not classified	1																			1
Battery																1				1
Hot work (welding or grinding)										1										1
Grand Total	1	1	1	2	3	3	4	4	4	5	6	6	9	9	16	21	26	34	51	206



Table 2. Ancillary reports – top 10 fuel source combined with heat source – FY 2020 to FY 2024

Heat source and fuel source	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	Grand total
Exhaust system + Hydraulic oil	19	20	26	32	19	116
Turbo + Engine oil	15	30	21	18	17	101
Electrical component + Electrical insulation materials	16	24	21	18	9	88
Turbo + Hydraulic oil	19	16	18	9	16	78
Exhaust system + Engine oil	10	15	16	11	12	64
Exhaust system + Diesel	5	9	11	14	10	49
Exhaust system + Other	6	8	16	5	4	39
Turbo + Other	8	10	6	4	2	30
Electrical component + Other	4	5	5	6	6	26
Engine + Hydraulic oil	6	6	5	2	4	23
Engine + diesel	4	5	2	9	3	23

Ancillary reports – extinguished by

Figure 9 shows that a handheld fire extinguisher was the most common method of extinguishment for fires on mobile plant (37%) in FY 2024. The second most common method of extinguishment was a manually deployed fire protection system (18%). In 11% of incidents (22 of 206), the FOMP was extinguished by water tanker.

Figure 9. Ancillary reports – extinguished by and fire protection system – FY2024

Extinguished by	Fire protection system								Grand Total
	Null	Engineered - Foam	Engineered - Water mist	No permanent fire suppression system installed	Pre-engineered - Aerosol	Pre-engineered - Dual agent	Pre-engineered - Foam water spray	Pre-engineered - Powder	
Hand-held fire extinguisher		19	1	17		14	12	14	77
Fire protection system (manually deployed)		15				10	6	7	38
Water tanker		6		1		3	3	9	22
Combination fire protection system and hand-held fire extinguisher		6	1			5	3	2	17
Self-extinguished		5		1		3	4	2	15
Fire protection system (automatically deployed)		1				2	4	3	10
Burnt out		1		1			3	3	8
Combination fire protection system and water-tanker					1	2	2	2	7
Fire truck				2		1			3
Emergency Services							1	1	2
Miscellaneous water hose		1					1		2
Other		2							2
Not classified	1								1
Fire hose / hydrant						1			1
Smothered		1							1
Grand Total	1	57	2	22	1	41	39	43	206



Table 3. Ancillary reports — extinguished by — FY 2020 to FY 2024

Heat source and fuel source	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	Grand total
Hand-held fire extinguisher	66	83	84	85	77	395
Fire protection system (manually deployed)	47	55	56	43	38	239
Self-extinguished	14	19	19	21	15	88
Fire protection system (automatically deployed)	18	19	26	11	10	84
Water tanker	6	13	16	13	22	70
Other	7	14	4	3	2	30
Combination fire protection system and hand-held fire extinguisher		1		9	17	27
Combination fire protection system and water-tanker				3	7	10
Burnt out					8	8
N/A		3	2			5
Fire truck					3	3
Miscellaneous water hose				1	2	3
Not classified		1			1	2
Emergency Services					2	2
Smothered				1	1	2
Fire hose / hydrant					1	1
Grand Total	158	208	207	190	206	969

Ancillary reports – failed component

The 'Any other electrical component' was the most common single failed component in FY 2024, being involved in nearly 15% of FOMP incidents (30) and double the figure (15) it recorded the previous year. Other notable increases from FY 2023 were observed in failed components of 'Any other part of the engine' (21 to 26), 'Drive train component' (9 to 15) and 'Any part of the braking system' (7 to 11). Notable decreases from FY 2023 included 'Hose' (35 to 25) and 'Any electrical cabling or wiring' (21 to 14).

Figure 10. Ancillary reports – failed components – FY 2024

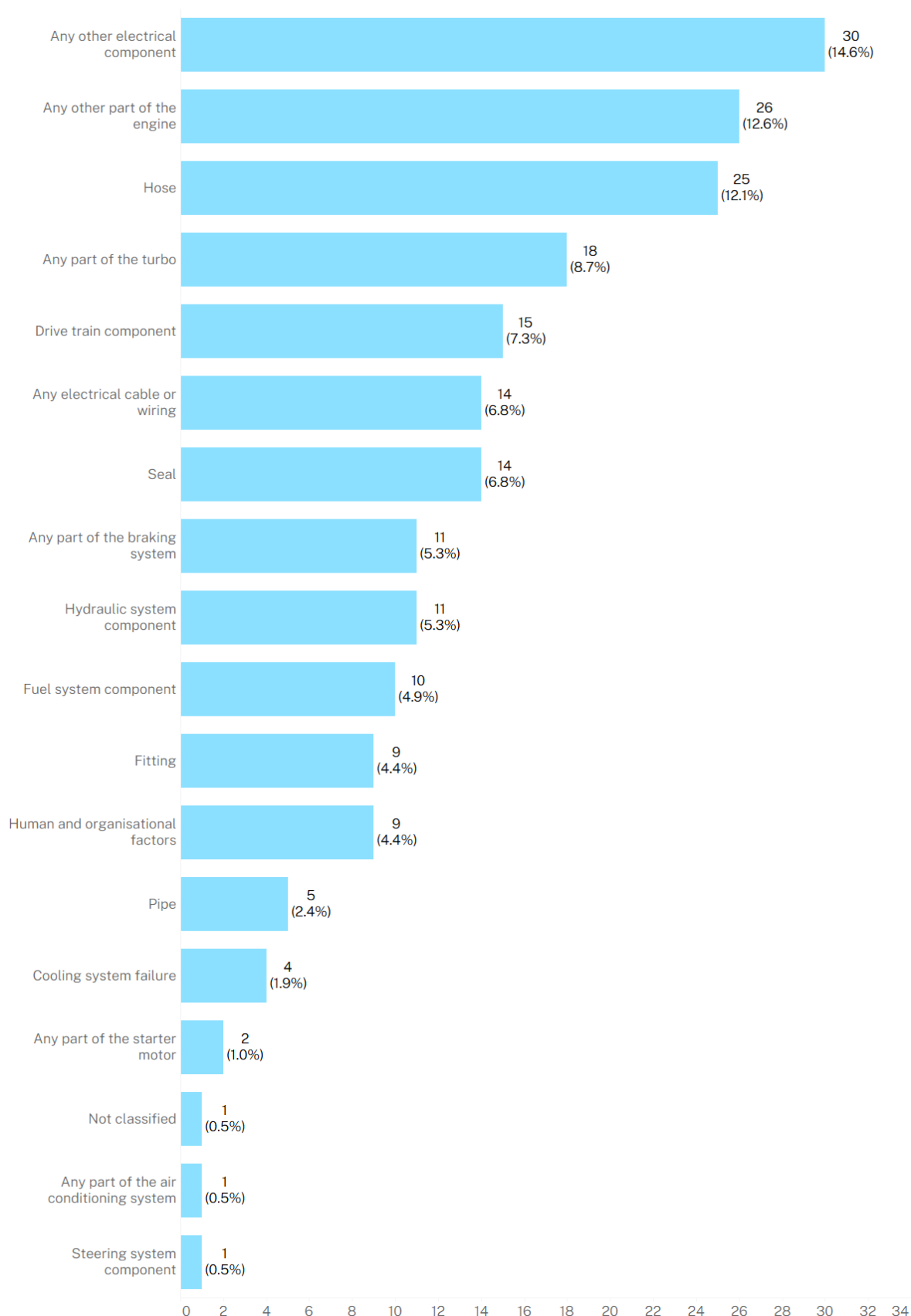


Table 4. Ancillary reports — failed component — FY2020 to FY2024

Heat source and fuel source	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	Grand total
Hose	31	45	49	35	25	185
Any electrical cable or wiring	18	26	23	21	14	102
Any other part of the engine	15	20	19	21	26	101
Any part of the turbo	13	27	23	16	18	97
Seal	18	14	15	14	14	75
Any other electrical component	7	10	9	15	30	71
Fitting	14	11	16	6	9	56
Drive train component	8	12	11	9	15	55
Any part of the braking system	5	8	7	7	11	38
Fuel system component	2	6	5	10	10	33
Pipe	5	8	7	7	5	32
Human and organisational factors	4	6	3	6	9	28
N/A	6	3	8	11		28
Hydraulic system component	4	2		5	11	22
Any part of the starter motor	5	5	5	4	2	21
Cooling system failure	3	3	5	2	4	17
Any part of the air conditioning system		1	2		1	4
Not classified		1			1	2
Steering system component				1	1	2
Grand Total	158	208	207	190	206	969

Ancillary reports – combination failed component and cause of component failure

The most common combinations of failed component and cause of component failure in FY 2024 were ‘Any other electrical component’ and ‘Failure of electrical component’ (17 incidents) and ‘Hose’ and ‘Wear and tear’ (11 incidents). These combinations accounted for 14% of all FOMP incidents in FY 2024.

Categories may be recorded as ‘Other’ for several reasons including human error, unknown or uncategorised component failure.

Figure 11. Ancillary reports – failed component and cause of component failure – FY 2024

Failed component	Null	Corrosion	Failure of electrical component	Fatigue	Frictional heating	Human and organisational factors	Incorrect component fitted	Loose fitting	N/A	Oil contamination	Other	Physical damage	Poor lubrication	Poorly manufactured and assembled component	Thermal degradation	Wear and tear	Grand Total
Any other electrical component			17		1	3	2				2	2		1		2	30
Any other part of the engine			1	3	1		2	2	1	1	9	2	1		1	2	26
Hose		3		1				3			1	5			1	11	25
Any part of the turbo				3		2					2			5		6	18
Drive train component					6			2	1		4	1				1	15
Any electrical cable or wiring		3	3	2				1			1	2			1	1	14
Seal				1				5			3			2	2	1	14
Any part of the braking system				1	3						3					4	11
Hydraulic system component				3				1	1			3			1	2	11
Fuel system component				1		1		1	1		1	1		1	1	2	10
Fitting				1		1	1	3			2	1					9
Human and organisational factors						4		1	1		2	1					9
Pipe				2				1						2			5
Cooling system failure								2			1					1	4
Any part of the starter motor			1								1						2
Not classified	1																1
Any part of the air conditioning system											1						1
Steering system component														1			1
Grand Total	1	6	22	18	11	11	5	22	5	1	33	18	1	12	7	33	206



Table 5. Ancillary reports — top 10 failed component and cause of component failure FY 2020 to FY 2024

Failed component and cause	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	Grand total
Hose + wear and tear	11	18	13	13	11	66
Any other part of the engine + other	6	10	8	6	9	39
Hose + physical damage	7	9	10	4	5	35
Any part of the turbo + fatigue	6	12	9	4	3	34
Any electrical cable or wiring + other	9	10	8	3	1	31
Hose + other	7	5	13	3	1	29
Hose + fatigue	3	7	6	11	1	28
Any other electrical component + other	7	10	4	3	2	26
Any part of the turbo + other	1	8	6	7	2	24
Seal + loose fitting	9	2	5	3	5	24

Incident details

The information in the table provides a summary of the fire on mobile plant incidents reported in FY 2024.

Table 6. Fires on mobile plant incidents reported in FY 2024

Equipment type	Equipment model	Failed component	Heat source	Fuel source	Extinguished by
Coal / open cut					
Dozer	930E-4	Seal	Exhaust system	Hydrocarbon contaminated exhaust system lagging	Hand-held fire extinguisher
	D10T	Drive train component	Friction	Other	Water tanker
		Fitting	Turbo	Other	Fire protection system (automatically deployed)
		Fuel system component	Exhaust system	Diesel	Water tanker
		Hose	Exhaust system	Hydraulic oil	Fire protection system (manually deployed)
	D10T-2	Hydraulic system component	Turbo	Hydraulic oil	Combination fire protection system and hand-held fire extinguisher
			Seal	Turbo	Hydraulic oil
				Bearing failure	Gear oil
	D11	Any other part of the engine	Exhaust system	Engine oil	Fire protection system (manually deployed)
			Turbo	Engine oil	Hand-held fire extinguisher
		Drive train component	Friction	Grease	Water tanker
			Bearing failure	Gear oil	Hand-held fire extinguisher
		Hose	Turbo	Hydraulic oil	Combination fire protection system and hand-held fire extinguisher

Equipment type	Equipment model	Failed component	Heat source	Fuel source	Extinguished by
	D11T	Any electrical cable or wiring	Electrical fault	Electrical insulation materials	Burnt out
		Any other electrical component	Electrical fault	Electrical insulation materials	Hand-held fire extinguisher
		Any other part of the engine	Exhaust system	Engine oil	Fire protection system (automatically deployed)
		Drive train component	Turbo	Hydrocarbon contaminated exhaust system lagging	Hand-held fire extinguisher
		Fitting	Turbo	Hydraulic oil	Hand-held fire extinguisher
		Hose	Exhaust system	Hydraulic oil	Fire protection system (manually deployed)
			Turbo	Hydraulic oil	Hand-held fire extinguisher
		Hydraulic system component	Turbo	Hydraulic oil	Hand-held fire extinguisher
Seal	Other	Hydraulic oil	Hand-held fire extinguisher		
	KSN	Drive train component	Bearing failure	Gear oil	Hand-held fire extinguisher
Drill rig and/or bolter	ATLPV235	Any electrical cable or wiring	Electrical fault	Coal dust	Combination fire protection system and hand-held fire extinguisher
	D50KI	Any part of the turbo	Turbo	Engine oil	Hand-held fire extinguisher
	DML	Seal	Exhaust system	Engine oil	Fire protection system (automatically deployed)
	Driltech D40K	Seal	Exhaust system	Hydraulic oil	Hand-held fire extinguisher
	MD6250	Any other electrical component	Electrical fault	Electrical insulation materials	Self-extinguished
		Fitting	Exhaust system	Hydraulic oil	Fire protection system (manually deployed)
	MD6310	Hose	Turbo	Hydraulic oil	Hand-held fire extinguisher
QXR1320	Seal	Other	Gear oil	Hand-held fire extinguisher	

Equipment type	Equipment model	Failed component	Heat source	Fuel source	Extinguished by
	SK50	Any other electrical component	Electrical component	Hydraulic oil	Fire protection system (manually deployed)
	SKF75	Hose	Exhaust system	Hydraulic oil	Fire protection system (manually deployed)
	SKS75	Any other part of the engine	Electrical fault	Engine oil	Hand-held fire extinguisher
		Drive train component	Bearing failure	Gear oil	Hand-held fire extinguisher
	SKS-15	Seal	Exhaust system	Hydraulic oil	Fire protection system (manually deployed)
Dump truck or haul truck	777D	Any part of the braking system	Friction	Other	Combination fire protection system and hand-held fire extinguisher
	789C	Hose	Turbo	Coolant	Hand-held fire extinguisher
		Human and organisational factors	Battery	Other	Hand-held fire extinguisher
	789D	Any other electrical component	Electrical fault	Electrical insulation materials	Hand-held fire extinguisher
		Any other part of the engine	Exhaust system	Other	Hand-held fire extinguisher
		Any part of the turbo	Turbo	Engine oil	Fire protection system (manually deployed)
	793B	Any part of the turbo	Turbo	Gear oil	Burnt out
	793C	Pipe	Exhaust system	Coolant	Other
	793D	Any other part of the engine	Exhaust system	Sound suppression or insulation material	Hand-held fire extinguisher
			Engine	Engine oil	Fire protection system (manually deployed)
		Any part of the turbo	Exhaust system	Engine oil	Fire protection system (manually deployed)
		Cooling system failure	Turbo	Coolant	Fire protection system (automatically deployed)
		Fitting	Turbo	Engine oil	Water tanker

Equipment type	Equipment model	Failed component	Heat source	Fuel source	Extinguished by
		Seal	Exhaust system	Hydraulic oil	Combination fire protection system and hand-held fire extinguisher
			Engine	Hydraulic oil	Fire protection system (manually deployed)
	793D XQC	Any part of the turbo	Turbo	Engine oil	Self-extinguished
	797F	Any electrical cable or wiring	Electrical component	Electrical insulation materials	Self-extinguished
		Seal	Turbo	Hydrocarbon contaminated exhaust system lagging	Fire protection system (manually deployed)
		Any other electrical component	Electrical component	Paint	Hand-held fire extinguisher
		Any other part of the engine	Exhaust system	Sound suppression or insulation material	Hand-held fire extinguisher
		Drive train component	Bearing failure	Hydraulic oil	Combination fire protection system and water-tanker
		Human and organisational factors	Exhaust system	Rags, cartons or other debris	Hand-held fire extinguisher
		Cooling system failure	Electrical component	Coolant	Hand-held fire extinguisher
	830E	Any other electrical component	Electrical component	Other	Self-extinguished Water tanker
		Any other part of the engine	Engine	Engine oil	Burnt out
		Any part of the braking system	Exhaust system	Hydraulic oil	Water tanker
	Friction		Plastic	Water tanker	
	830E-AC	Any electrical cable or wiring	Electrical fault	Electrical insulation materials	Hand-held fire extinguisher
		Any other electrical component	Electrical component	Electrical insulation materials	Hand-held fire extinguisher
					Water tanker
			Other	Self-extinguished	
			Other	Rubber	Water tanker
		Any other part of the engine	Turbo	Engine oil	Fire truck
				Engine oil	Fire protection system (manually deployed)

Equipment type	Equipment model	Failed component	Heat source	Fuel source	Extinguished by
		Pipe	Other	Diesel	Combination fire protection system and water-tanker
	930E	Fitting	Exhaust system	Engine oil	Fire hose / hydrant
		Hose	Turbo	Coolant	Combination fire protection system and hand-held fire extinguisher
		Human and organisational factors	Exhaust system	Tyre	Water tanker
	930E-3	Any electrical cable or wiring	Electrical component	Rags, cartons or other debris	Self-extinguished
		Any other electrical component	Electrical component	Other	Self-extinguished
	930E-4	Hose	Turbo	Engine oil	Hand-held fire extinguisher
	930E-5	Fitting	Exhaust system	Hydraulic oil	Fire protection system (automatically deployed)
	3900D	Hose	Turbo	Diesel	Combination fire protection system and hand-held fire extinguisher
	CAT 740B	Cooling system failure	Exhaust system	Coolant	Hand-held fire extinguisher
	CAT 789C	Any other part of the engine	Turbo	Sound suppression or insulation material	Fire protection system (manually deployed)
	CAT 789D	Pipe	Exhaust system	Sound suppression or insulation material	Hand-held fire extinguisher
	EH3500AC2	Fitting	Friction	Hydraulic oil	Water tanker
		Fuel system component	Exhaust system	Diesel	Combination fire protection system and hand-held fire extinguisher
	EH4000	Human and organisational factors	Other	Tyre	Water tanker
	EH4500-2	Any other part of the engine	Exhaust system	Rubber	Water tanker
	EH5000	Drive train component	Friction	Tyre	Water tanker

Equipment type	Equipment model	Failed component	Heat source	Fuel source	Extinguished by
	EH5000AC-3	Any other electrical component	Bearing failure	Grease	Fire protection system (manually deployed)
	Komatsu	Hose	Exhaust system	Rubber	Combination fire protection system and water-tanker
	MT4400	Any other electrical component	Electrical fault	Electrical insulation materials	Self-extinguished
	T282C	Any part of the braking system	Friction	Hydraulic oil	Combination fire protection system and water-tanker
Excavator or shovel	996B	Any electrical cable or wiring	Electrical fault	Electrical insulation materials	Hand-held fire extinguisher
		Hose	Turbo	Hydraulic oil	Combination fire protection system and water-tanker
	6040	Any electrical cable or wiring	Electrical component	Electrical insulation materials	Hand-held fire extinguisher
		Fitting	Exhaust system	Hydraulic oil	Water tanker
	6060	Hose	Turbo	Hydraulic oil	Fire protection system (manually deployed)
	6060-1	Human and organisational factors	Exhaust system	Other	Fire protection system (manually deployed)
	6090	Any other electrical component	Electrical fault	Hydraulic oil	Fire protection system (manually deployed)
		Seal	Exhaust system	Hydraulic oil	Fire protection system (manually deployed)
	9350	Any other part of the engine	Exhaust system	Other	Self-extinguished
		Human and organisational factors	Turbo	Engine oil	Fire protection system (automatically deployed)
	9800	Hose	Engine	Hydraulic oil	Hand-held fire extinguisher
	EX1200	Pipe	Turbo	Engine oil	Hand-held fire extinguisher
	EX3600	Seal	Friction	Gear oil	Water tanker
	EX3600-6	Drive train component	Friction	Other	Hand-held fire extinguisher

Equipment type	Equipment model	Failed component	Heat source	Fuel source	Extinguished by
	EX3600-7	Hose	Turbo	Engine oil	Fire protection system (manually deployed)
	EX8000-6	Any other electrical component	Bearing failure	Electrical insulation materials	Hand-held fire extinguisher
		Cooling system failure	Engine	Coolant	Fire protection system (manually deployed)
		Hose	Turbo	Coolant	Fire protection system (manually deployed)
	PC5500	Any part of the turbo	Turbo	Engine oil	Hand-held fire extinguisher
	R969	Hose	Turbo	Hydraulic oil	Fire protection system (manually deployed)
	R996	Any other part of the engine	Exhaust system	Exhaust system lagging	Fire protection system (automatically deployed)
			Friction	Engine oil	Fire protection system (manually deployed)
		Any part of the turbo	Exhaust system	Engine oil	Hand-held fire extinguisher
		Hose	Exhaust system	Diesel	Combination fire protection system and water-tanker
	R996B	Any other electrical component	Friction	Engine oil	Hand-held fire extinguisher
	R9400	Any electrical cable or wiring	Electrical fault	Electrical insulation materials	Hand-held fire extinguisher
	R9600	Any part of the turbo	Turbo	Engine oil	Fire protection system (manually deployed)
	ZX690	Any part of the turbo	Turbo	Engine oil	Hand-held fire extinguisher
Forklift or telehandler	MT-X1440	Any other electrical component	Electrical component	Plastic	Hand-held fire extinguisher
Grader	16M	Fuel system component	Exhaust system	Diesel	Hand-held fire extinguisher
	18	Any other electrical component	Electrical component	Electrical insulation materials	Burnt out
	24M	Drive train component	Exhaust system	Engine oil	Burnt out

Equipment type	Equipment model	Failed component	Heat source	Fuel source	Extinguished by
Heavy/special purpose vehicle (eg crane)	24M	Not classified	Not classified	Not classified	Not classified
	160T drake transporter trailer	Any part of the braking system	Friction	Grease	Hand-held fire extinguisher
	637G	Any part of the braking system	Friction	Brake fluid	Self-extinguished
	830E-AC	Any other electrical component	Electrical fault	Other	Self-extinguished
	CA5000PD	Hose	Engine	Hydraulic oil	Burnt out
	Caterpillar 777F water cart	Hose	Exhaust system	Hydraulic oil	Combination fire protection system and water-tanker
	Caterpillar 930H wheel loader	Any other part of the engine	Exhaust system	Hydraulic oil	Hand-held fire extinguisher
	D10M-36H-TO	Fuel system component	Other	Diesel	Hand-held fire extinguisher
	D50KI	Hydraulic system component	Exhaust system	Hydraulic oil	Combination fire protection system and hand-held fire extinguisher
	Dmax	Any other electrical component	Electrical fault	Electrical insulation materials	Hand-held fire extinguisher
	EH3500	Hose	Turbo	Coolant	Hand-held fire extinguisher
	Komatsu	Hose	Exhaust system	Other	Emergency Services
	M50	Hydraulic system component	Exhaust system	Hydraulic oil	Hand-held fire extinguisher
SVE truck tyre handler model 28120-46	Any part of the turbo	Exhaust system	Engine oil	Hand-held fire extinguisher	
Track type dozer	Hydraulic system component	Turbo	Hydraulic oil	Fire protection system (manually deployed)	
Loader	992K	Any part of the turbo	Turbo	Engine oil	Fire protection system (manually deployed)
	994D	Any part of the starter motor	Electrical component	Rags, cartons or other debris	Hand-held fire extinguisher
	994F	Any part of the turbo	Exhaust system	Engine oil	Fire protection system (manually deployed)

Equipment type	Equipment model	Failed component	Heat source	Fuel source	Extinguished by
	994k	Any part of the turbo	Turbo	Engine oil	Combination fire protection system and hand-held fire extinguisher
	L1850	Any other electrical component	Electrical fault	Coal dust	Hand-held fire extinguisher
	L1850-2	Any other part of the engine	Friction	Rubber	Hand-held fire extinguisher
	WA900-3E	Any part of the braking system	Friction	Gear oil	Hand-held fire extinguisher
Service truck / lube truck	773B	Fuel system component	Engine	Diesel	Fire protection system (manually deployed)
	773F	Drive train component	Friction	Hydraulic oil	Burnt out
		Hose	Turbo	Hydraulic oil	Water tanker
	773G	Drive train component	Exhaust system	Hydraulic oil	Hand-held fire extinguisher
		Fuel system component	Exhaust system	Diesel	Fire protection system (manually deployed)
	830E	Any part of the turbo	Turbo	Engine oil	Water tanker
	B50D	Any other part of the engine	Exhaust system	Engine oil	Hand-held fire extinguisher
	BD50D	Any other part of the engine	Exhaust system	Engine oil	Hand-held fire extinguisher
Shermac / Scania G400	Any part of the turbo	Exhaust system	Sound suppression or insulation material	Smothered	
Water truck	773D	Any part of the braking system	Friction	Hydraulic oil	Hand-held fire extinguisher
	777F	Any other electrical component	Electrical fault	Electrical insulation materials	Fire protection system (manually deployed)
		Fuel system component	Exhaust system	Diesel	Fire protection system (manually deployed)
		Human and organisational factors	Exhaust system	Rags, cartons or other debris	Hand-held fire extinguisher
785C	Any electrical cable or wiring	Electrical fault	Electrical insulation materials	Combination fire protection system and hand-held fire extinguisher	

Equipment type	Equipment model	Failed component	Heat source	Fuel source	Extinguished by
	CAT777F	Hose	Engine	Hydraulic oil	Fire protection system (manually deployed)
	FM1J	Any other part of the engine	Exhaust system	Gear oil	Hand-held fire extinguisher
Underground coal / surface location					
Dump truck or haul truck	FH16	Any other electrical component	Electrical fault	Electrical insulation materials	Hand-held fire extinguisher
Heavy/special purpose vehicle (eg crane)	BE-SEM 1.1	Any part of the braking system	Friction	Plastic	Hand-held fire extinguisher
	15SC	Any part of the braking system	Friction	Hydraulic oil	Hand-held fire extinguisher
	T190	Hydraulic system component	Turbo	Hydraulic oil	Hand-held fire extinguisher
Loader	992G	Fitting	Exhaust system	Hydraulic oil	Combination fire protection system and hand-held fire extinguisher
Underground coal / underground location					
Loader	FBL15	Drive train component	Friction	Grease	Miscellaneous water hose
Surface metals					
Excavator or shovel	3600-5	Any other part of the engine	Friction	Rubber	Hand-held fire extinguisher
Water truck	773F	Any electrical cable or wiring	Electrical component	Electrical insulation materials	Water tanker
Underground metals / surface location					
Dump truck or haul truck	FH16	Any other electrical component	Electrical fault	Electrical insulation materials	Hand-held fire extinguisher
Heavy/special purpose vehicle (eg crane)	BE-SEM 1.1	Any part of the braking system	Friction	Plastic	Hand-held fire extinguisher
Loader	992G	Fitting	Exhaust system	Hydraulic oil	Combination fire protection system and hand-held fire extinguisher
	15SC	Any part of the braking system	Friction	Hydraulic oil	Hand-held fire extinguisher
	T190	Hydraulic system component	Turbo	Hydraulic oil	Hand-held fire extinguisher

Equipment type	Equipment model	Failed component	Heat source	Fuel source	Extinguished by
Underground metals / underground location					
Agitator	718	Any part of the turbo	Exhaust system	Engine oil	Hand-held fire extinguisher
	Transmixer 120	Any part of the turbo	Turbo	Exhaust system lagging	Fire protection system (manually deployed)
Drill rig and/or Bolter	E7C	Any part of the air conditioning system	Electrical component	Plastic	Combination fire protection system and hand-held fire extinguisher
Dump truck or Haul truck	AD45B	Hose	Exhaust system	Hydraulic oil	Fire protection system (automatically deployed)
	TH663	Hydraulic system component	Engine	Hydrocarbon contaminated exhaust system lagging	Fire protection system (manually deployed)
Grader	140H	Fuel system component	Exhaust system	Diesel	Self-extinguished
Heavy/special purpose vehicle (eg crane)	HJ179	Any other electrical component	Electrical fault	Other	Emergency Services
	Landcruiser 70 series	Pipe	Exhaust system	Diesel	Fire protection system (automatically deployed)
	MX3 Maxijet	Any other part of the engine	Exhaust system	Exhaust system lagging	Hand-held fire extinguisher
	WR810	Any part of the braking system	Friction	Other	Combination fire protection system and hand-held fire extinguisher

Equipment type	Equipment model	Failed component	Heat source	Fuel source	Extinguished by
Loader	621	Hydraulic system component	Turbo	Hydraulic oil	Fire protection system (manually deployed)
	2900G	Any other electrical component	Electrical fault	Sound suppression or insulation material	Self-extinguished
	LH517i	Drive train component	Friction	Hydraulic oil	Hand-held fire extinguisher
	LH621	Any other part of the engine	Engine	Diesel	Hand-held fire extinguisher
	R2900G	Hydraulic system component	Turbo	Hydraulic oil	Fire protection system (manually deployed)
	R3000 Loader	Any other part of the engine	Other	Other	Self-extinguished
	R3000H	Any electrical cable or wiring	Electrical component	Electrical insulation materials	Hand-held fire extinguisher
	ST18	Drive train component	Bearing failure	Hydraulic oil	Burnt out
Water truck	730C2	Any electrical cable or wiring	Electrical component	Electrical insulation materials	Miscellaneous water hose
	WR820 water tank	Fuel system component	Exhaust system	Diesel	Hand-held fire extinguisher
		Seal	Exhaust system	Diesel	Hand-held fire extinguisher
Mineral sands					
Dump truck or haul truck	793F	Steering system component	Friction	Rubber	Other
Excavator or shovel	ZAXIS 470 LCH	Human and organisational factors	Turbo	Other	Fire protection system (automatically deployed)
Construction materials					
Dozer	D10T	Any electrical cable or wiring	Electrical fault	Electrical insulation materials	Hand-held fire extinguisher
Drill rig and/or Bolter	T40-11	Any electrical cable or wiring	Electrical fault	Electrical insulation materials	Hand-held fire extinguisher
Dump truck or haul truck	740B	Any other electrical component	Electrical fault	Electrical insulation materials	Combination fire protection system and hand-held fire extinguisher
Heavy/special purpose vehicle (eg crane)	Precoater	Any other electrical component	Electrical fault	Electrical insulation materials	Hand-held fire extinguisher
Loader	980G	Any part of the turbo	Turbo	Engine oil	Self-extinguished

Equipment type	Equipment model	Failed component	Heat source	Fuel source	Extinguished by
Industrial minerals					
Loader	780-9HL	Any other part of the engine	Other	Hydraulic oil	Water tanker

For further information refer to our dedicated [Fires on mobile plant web page](#).

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