

FIRES ON MOBILE PLANT

January – March 2020



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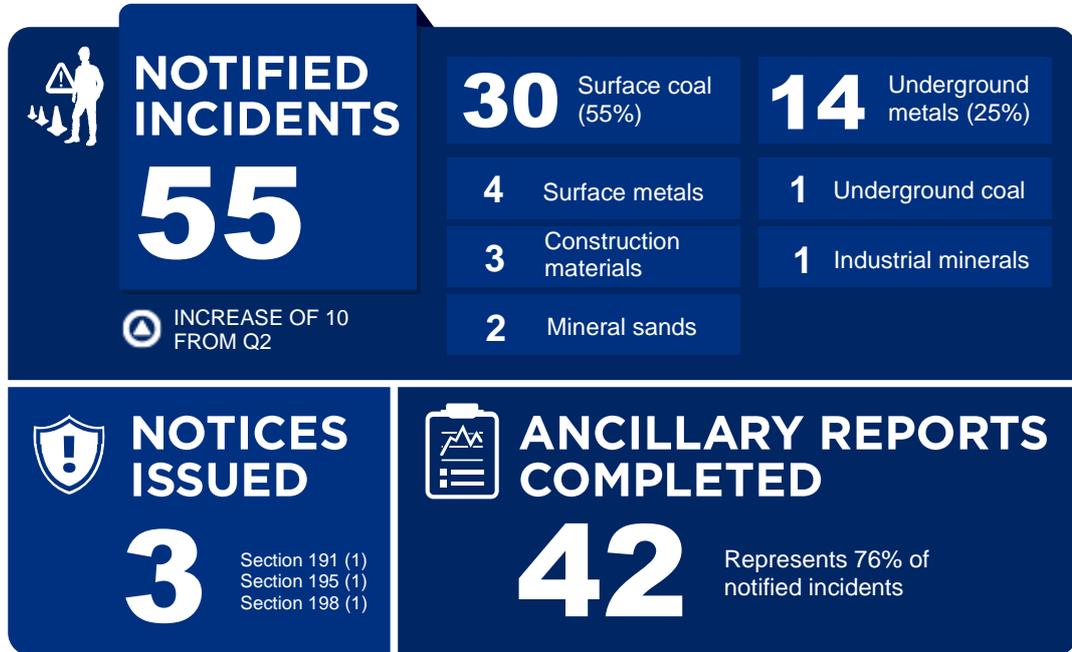
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Overview

In FY 2020 Q3, 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 40 of 55	29 of 40 Accumulated flammable leaks and spills	29 of 40 Flammable fluid containment
Fire or explosion underground 15 of 55	12 of 15 Mechanical energy in the presence of fuel	8 of 15 Manage fuel sources

FY2020 Q3 Of the 55 related incidents, 41 were classified against these two threats (37 were classified against these two critical controls).

Ancillary reports summary



Foreword

This report has been prepared by the NSW Resources Regulator for mine operators in NSW. It contains quarterly data of notified incidents involving fires on mobile plant (FOMP) for the period 1 January to 31 March 2020.

The Regulator's [position](#) is that all fires on mobile plant are avoidable and preventable and the Regulator has 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 impact on the safety of workers and have potentially catastrophic consequences. Despite a focus on the issues in recent years, the number of incidents remains unacceptably high and without further action, the number of fires occurring on mobile plant will continue to be elevated.

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.

For further information visit our [fires on mobile plant web page](#).

Note that the information in this report is based on the date the incident occurred rather than the date the incident was notified to the Regulator.

During the reporting period a legislation change was enacted requiring all fires on mobile plant to be reported to the Regulator. As part of this change, the requirement to complete an ancillary report was mandated after the requirement to report was introduced.

Changes to duty to notify the Regulator

In February 2020, amendments to the Work Health and Safety (Mines and Petroleum Sites) Regulation 2014 saw a change to the duty to notify incidents involving fires on mobile plant to the NSW Resources Regulator.

In the definitions of 'high potential incidents' there was an additional incident added to clause 128(5):

128(5)(t) an uncontrolled fire on mobile plant that is in operation (whether operated directly, remotely or autonomously)

An uncontrolled fire on mobile plant is any fire or ignition that is not intended as part of the normal function of that item of mobile plant. This applies regardless of the level of damage or means of extinguishing the fire. Examples of fires and ignitions that are intended include internal combustion, flame heaters, such as on bitumen tankers, and maintenance works, such as welding and oxy cutting (unless control is lost during the task).

This clause also requires fires to be notified when they occur on autonomous plant operating without a worker present.

Any fire underground in a mine, including a fire on mobile plant, must still be reported as a dangerous incident under clause 179 (b).

Where a worker or any other person is exposed to a serious risk to the person's health or safety from fire, the incident must be notified as a dangerous incident under clause 179(a)(ii).

For further information refer to the factsheet - [Changes to Work Health and Safety \(Mines and Petroleum Sites\) notifications to the Regulator](#).

Significant incident

Hose failure destroys cab

At a quarry, a dump truck operator observed oil on the ground under a Volvo L250G front-end loader and advised the operator. Approximately 30 seconds later, the excavator operator, who was loading the dump truck, saw flames on the loader and instructed the operator to get out of the loader. The fire suppression system was activated, and a water cart was used to extinguish the flames. The loader was extensively damaged.

A non-genuine engine oil hose was poorly installed in the engine bay and had rubbed through. When the hose failed, it sprayed engine oil through the engine bay which ignited. Due to the extent of the damage, the loader had to be craned onto a truck to remove it from site for major repairs.

FIGURE 1. HOSE FAILURE DESTROYS CAB

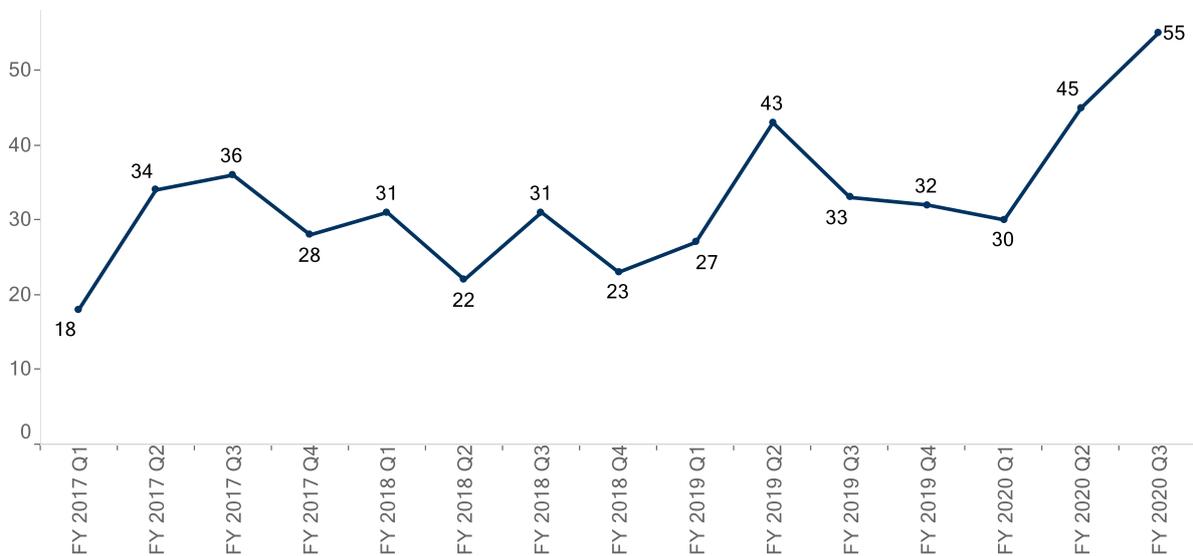


Notified incidents

Notified incidents for January to March 2020

Figure 2 relates to incidents involving fires on mobile plant notified in each quarter since July 2017. These incidents continue to increase with 55 incidents notified in this quarter compared to 45 in the previous quarter (FY2020 Q2). The introduction of clause 128(5)(t) of the Work Health and Safety (Mines and Petroleum Sites) Regulation 2014 in February 2020 has contributed to the increased number of FOMP incidents notified by mine operators from FY2020 Q2.

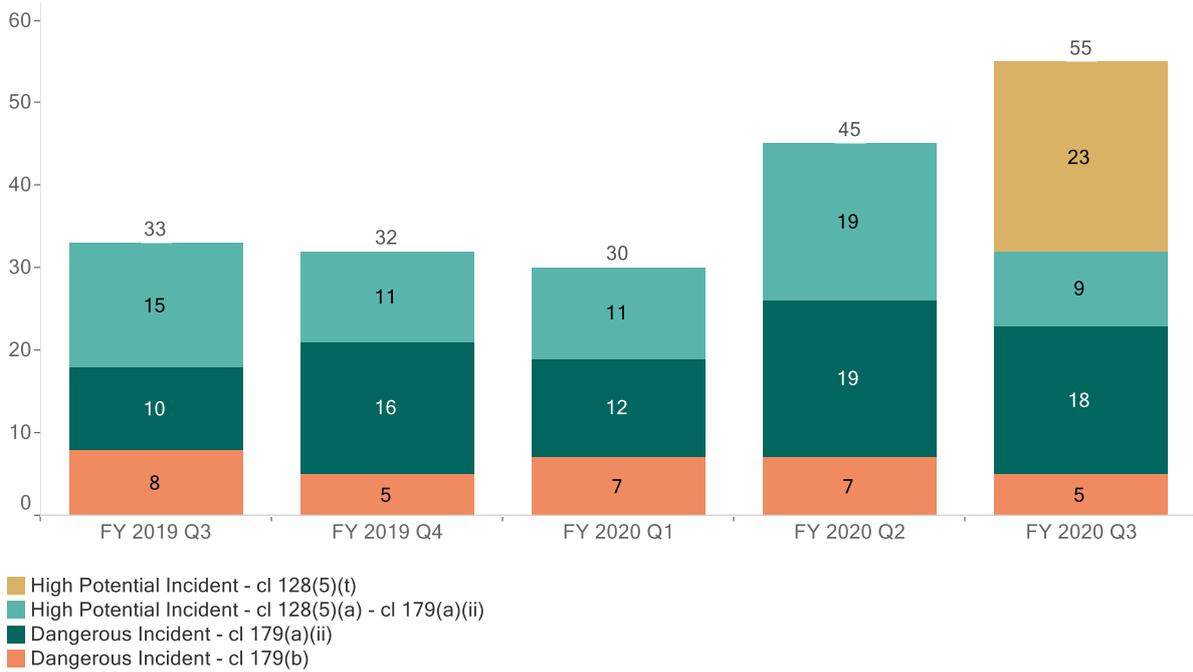
FIGURE 2. NOTIFIED INCIDENTS – FROM 1 JULY 2017 TO 31 MARCH 2020



Notified incidents by legislative requirement to report

Figure 3 highlights the inclusion of clause 128(5)(t) to the Work Health and Safety Regulation 2014 in FY20 Q3. There was also an observed shift from notifying under high potential incident clause 179(a)(ii) to 128(5)(t).

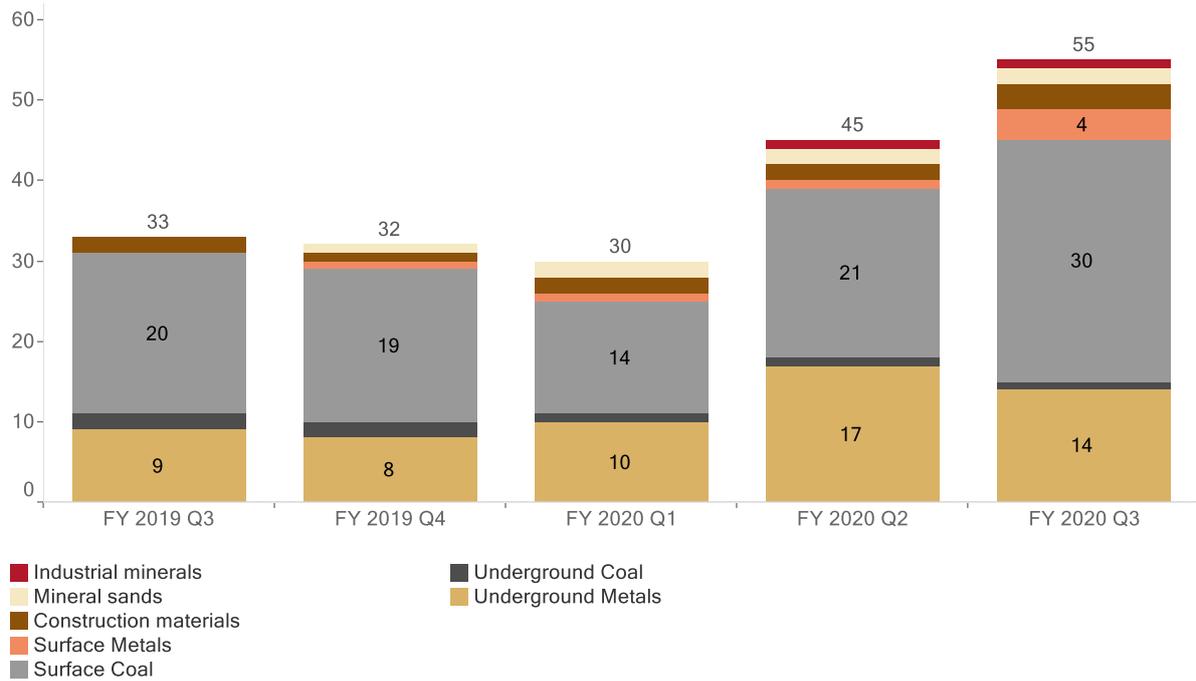
FIGURE 3. NOTIFIED INCIDENTS BY LEGISLATIVE REQUIREMENT TO REPORT – JANUARY 2019 TO MARCH 2020



Notified incidents by mine and operation type

Figure 4 shows the number of notified incidents by mine type and operation type. The primary source of the fire is not identified.

FIGURE 4. NOTIFIED INCIDENTS BY MINE TYPE AND OPERATION TYPE – JANUARY 2019 TO MARCH 2020

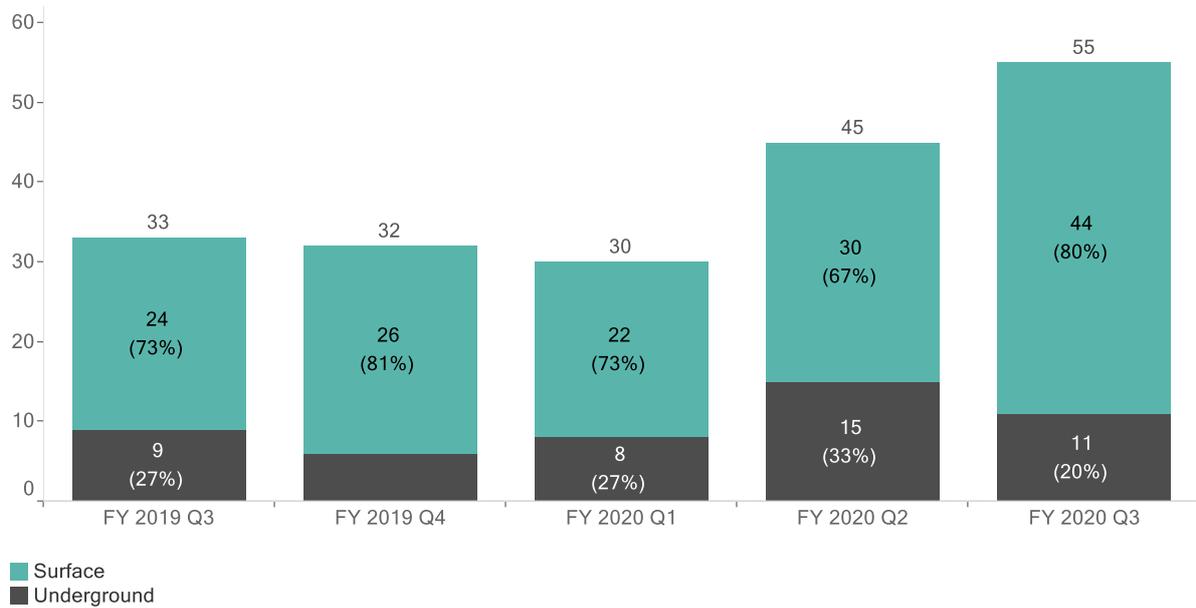


Notified incidents by primary location

Figure 5 shows that the primary location of the majority of fires on mobile plant occur on the surface and these have increased by 14 (from 30 to 44) this quarter.

Note that the primary location of the fire is the actual location where the fire occurred, irrespective of the mine operation type.

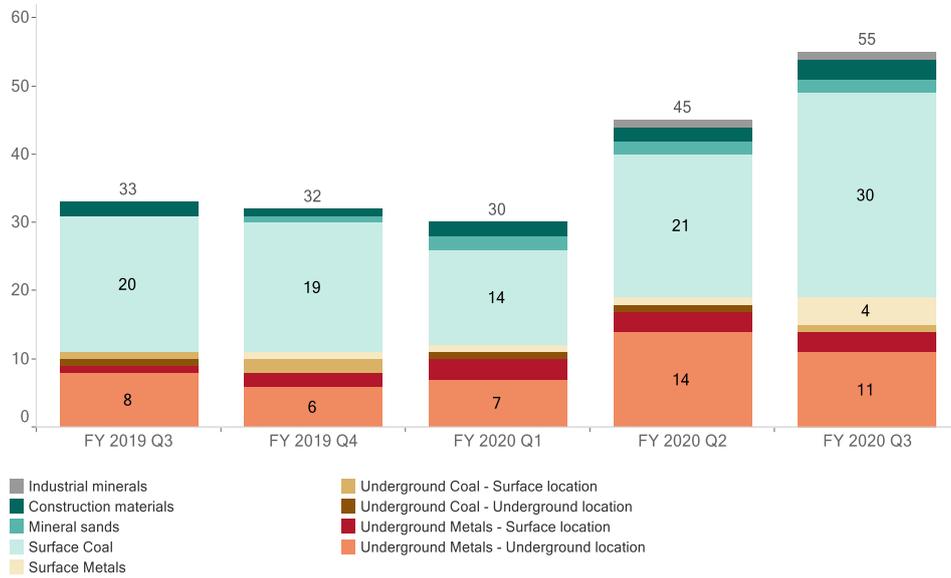
FIGURE 5. NOTIFIED INCIDENTS BY PRIMARY LOCATION – JANUARY 2019 TO MARCH 2020



Notified incidents by mine type, operation type and primary location

FOMP incidents notifications at surface coal operations continue to increase for this quarter (from 21 to 30). There was a slight decrease in FOMP incident notifications in underground locations at underground metals mines.

FIGURE 6. QUARTERLY INCIDENTS NOTIFIED BY MINE TYPE, OPERATION TYPE AND PRIMARY LOCATION – JANUARY 2019 TO MARCH 2020

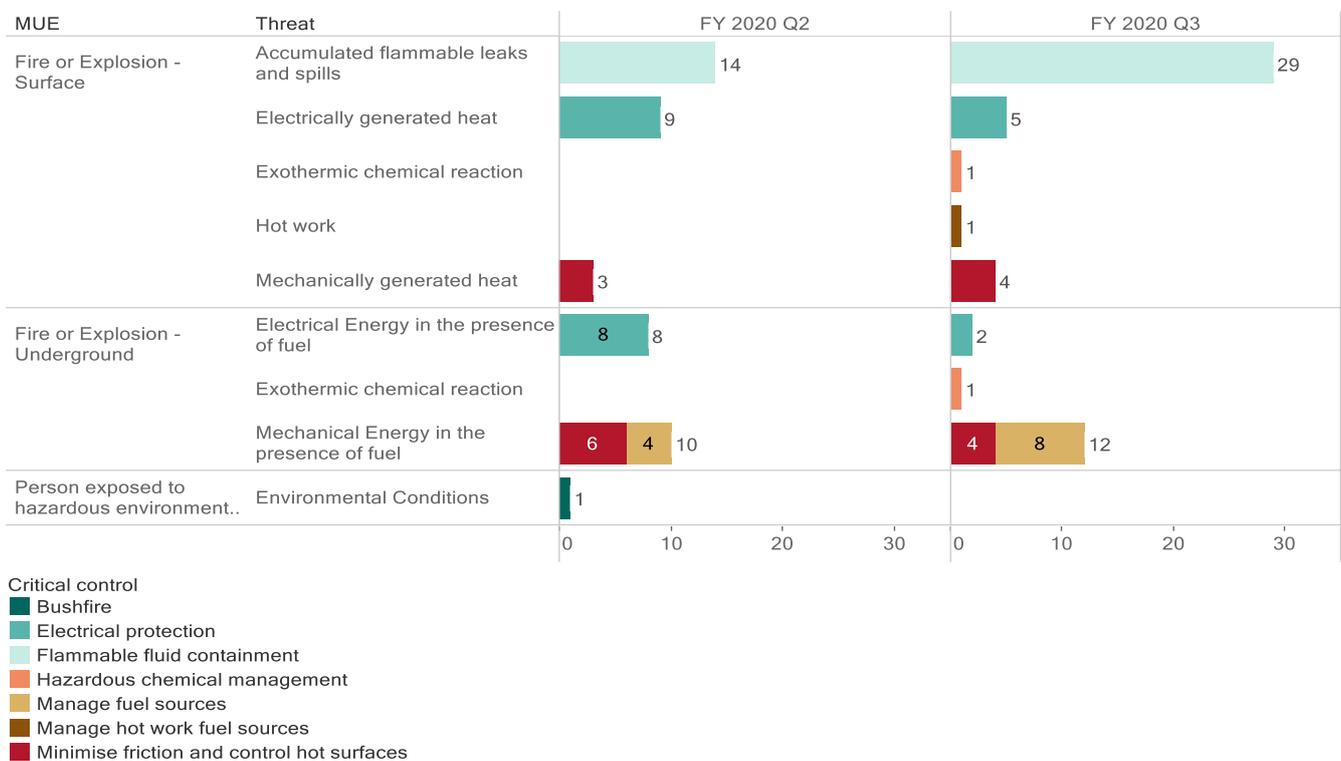


Notified incidents by material unwanted event, threat and critical control

Hazard management bowties are a widely used risk management tool that incorporate 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 and since October 2019, these MUE bowtie frameworks have also been used to classify notified incidents. Classifications highlight increased areas of risk at the hazard, MUE, threat and critical control level.

Figure 7 below shows notified incidents classified by MUE, threat and critical control.

FIGURE 7. NOTIFIED INCIDENTS BY MUE, THREAT AND CRITICAL CONTROL FOR OCTOBER 2019 TO MARCH 2020

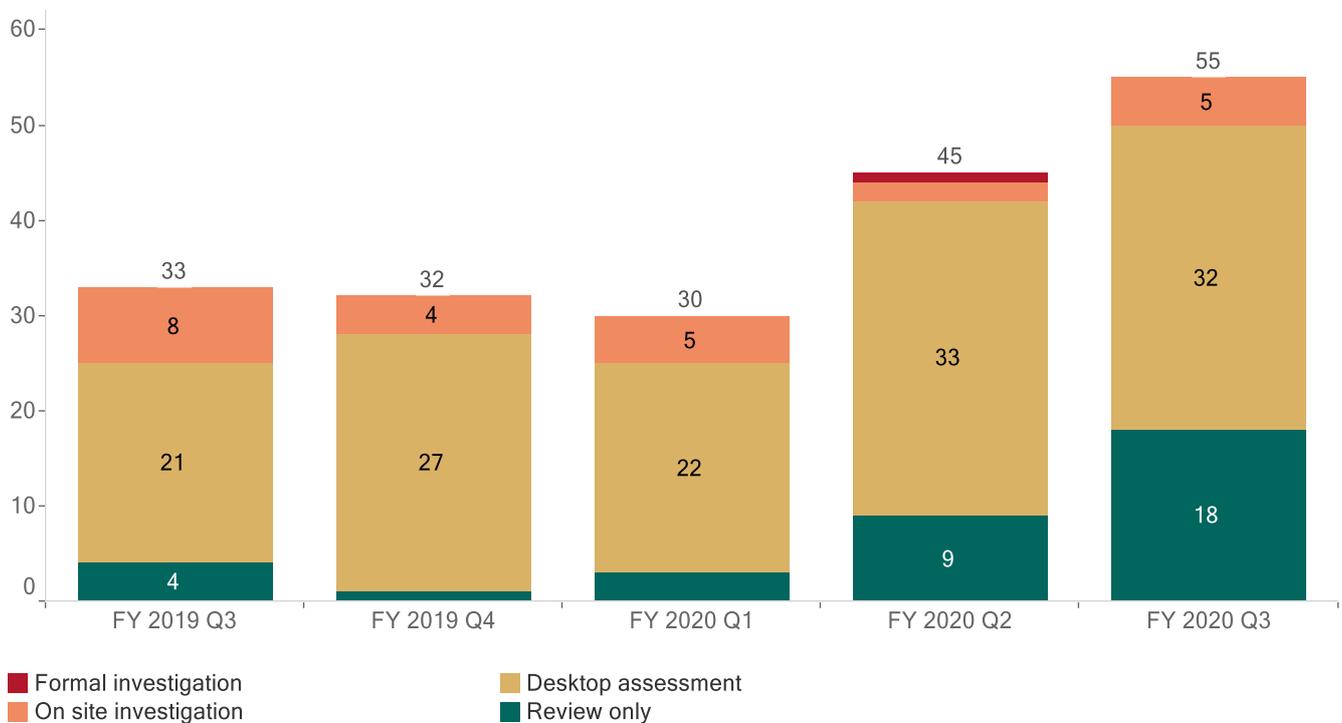


Our response to notified incidents involving FOMP

As part of the Regulator’s position paper on preventing fires on mobile plant, all fires that occur on mobile plant at a mine site in NSW will be subject to heightened assessment and investigation.

Figure 8 below shows that five onsite investigations and 32 desktop assessments were conducted in response to notified incidents involving fires on mobile plant this quarter. The increase in an additional nine incidents where a review was required corresponds with the additional high potential incidents reported for this period, which were determined to require no assessment.

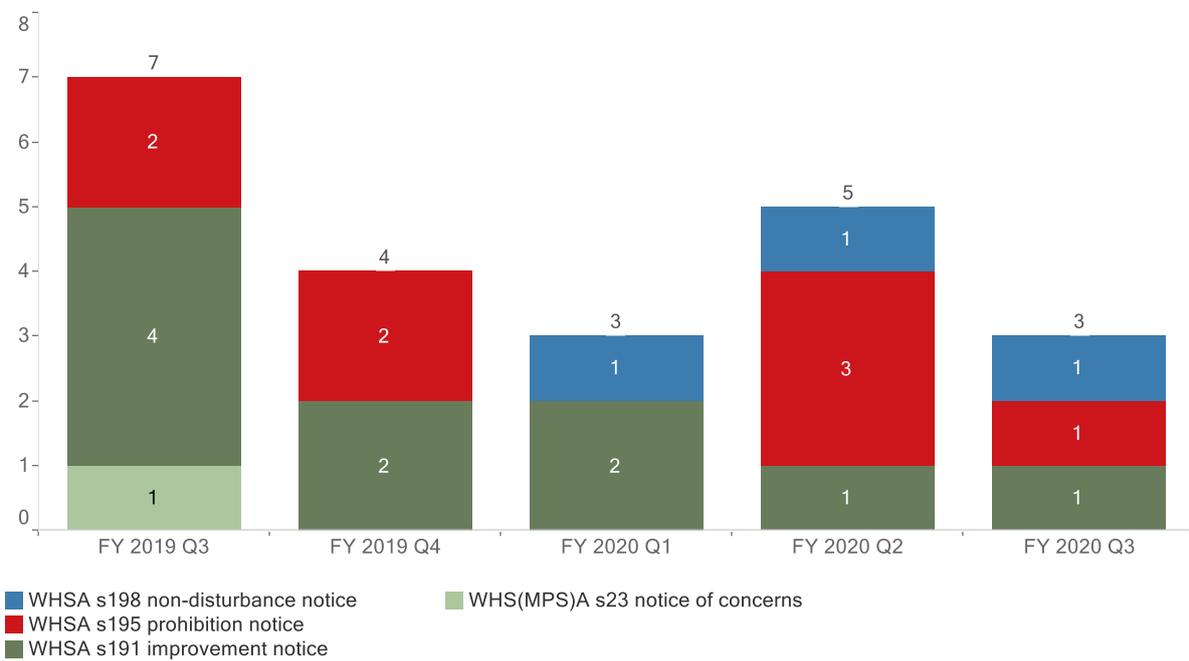
FIGURE 8. NOTIFIED INCIDENTS BY RESPONSE LEVEL – JANUARY 2019 TO MARCH 2020



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 9 below shows that three notices were issued in relation to notified incidents involving FOMP this quarter.

FIGURE 9. NOTICES ISSUED IN RELATION TO FOMP INCIDENTS – JANUARY 2019 TO MARCH 2020



Fires on mobile plant ancillary reports

When an incident involving fires on mobile plant is notified to the Regulator, additional information, known as an ancillary report, must be submitted via the Regulator Portal no later than 30 days after the incident was required to be notified.

Ancillary reports – heat sources

FIGURE 10. ANCILLARY REPORTS – HEAT SOURCES – JANUARY 2020 TO MARCH 2020

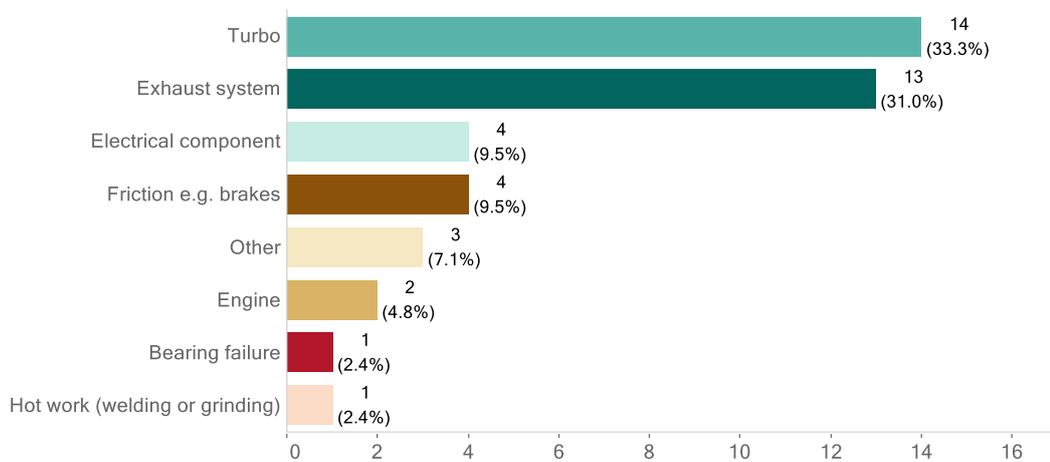
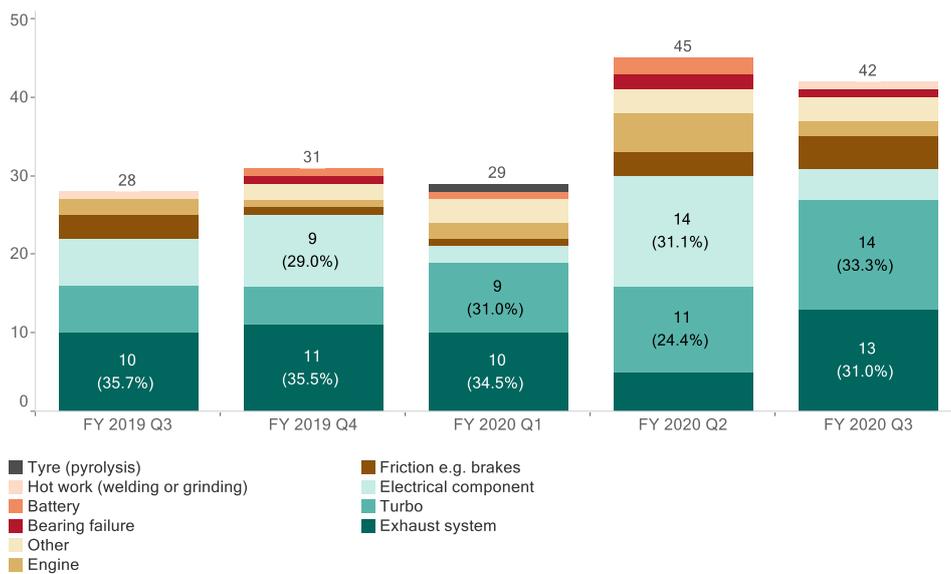


FIGURE 11. ANCILLARY REPORTS – HEAT SOURCES – JANUARY 2019 TO MARCH 2020



Ancillary reports – fuel sources

As an ongoing improvement, additional categories will be periodically added to reduce the number of fuel sources reported as other.

FIGURE 11. ANCILLARY REPORTS – FUEL SOURCES – JANUARY 2020 TO MARCH 2020

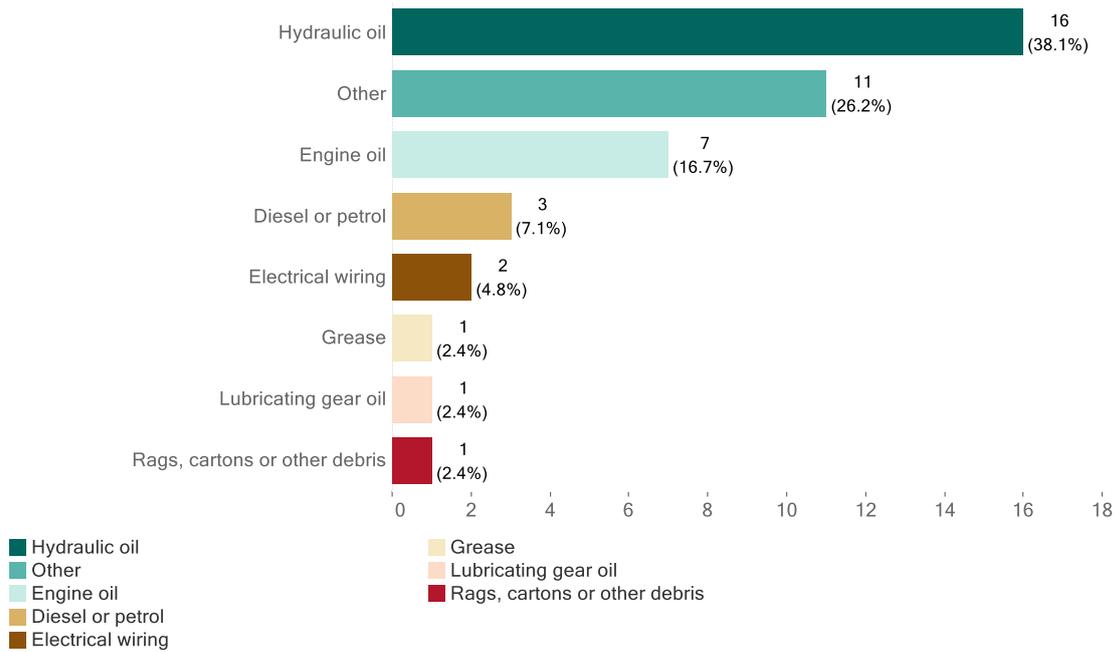
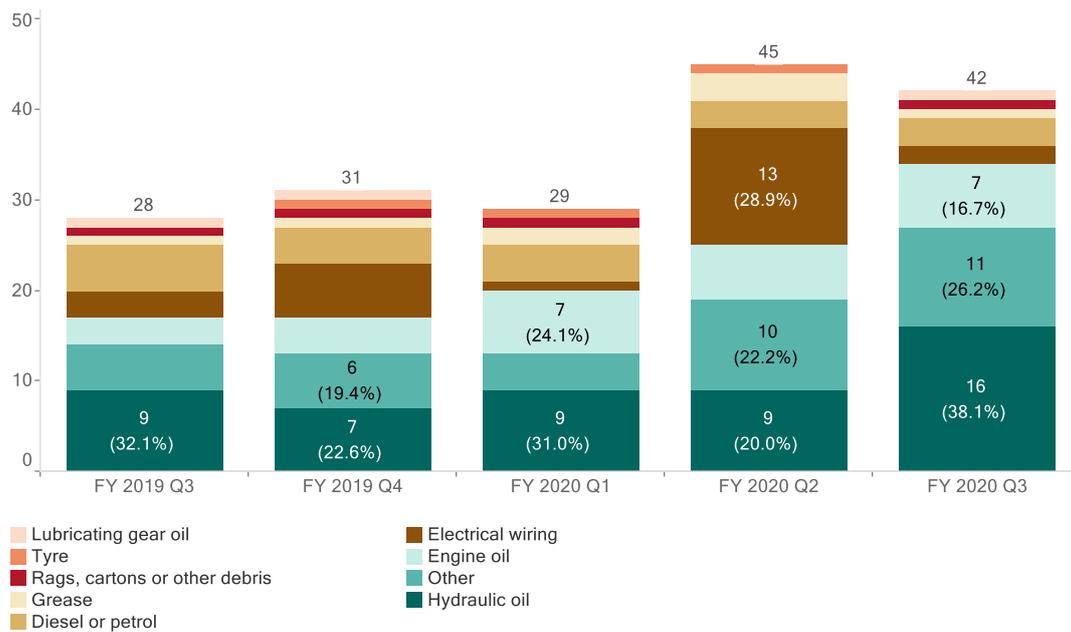


FIGURE 12. ANCILLARY REPORTS - FUEL SOURCES – JANUARY 2019 TO MARCH



Ancillary reports - extinguished by

FIGURE 13. ANCILLARY REPORTS – EXTINGUISHED BY – JANUARY 2020 TO MARCH 2020

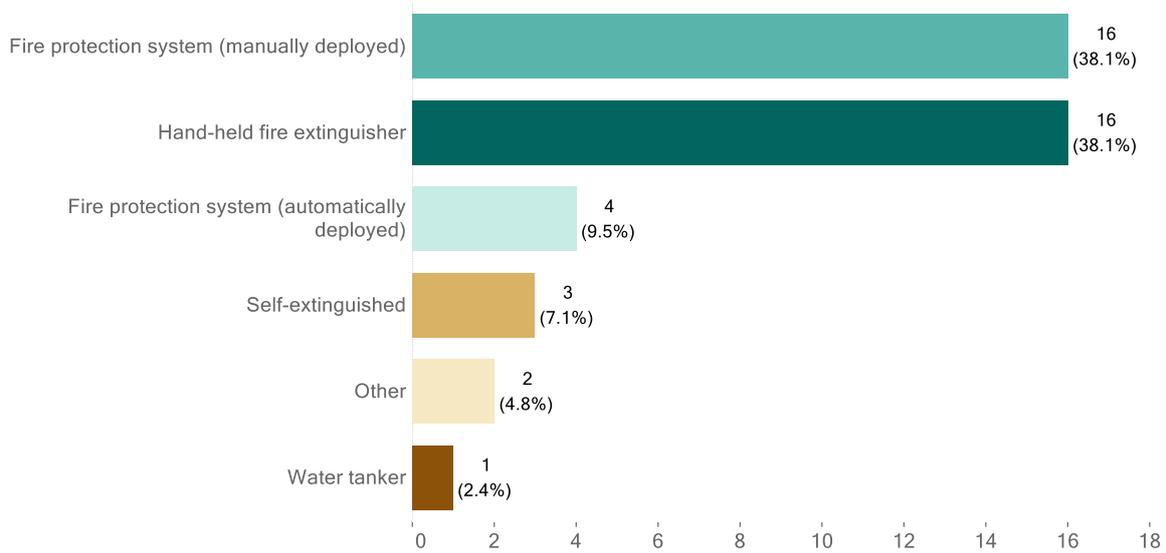
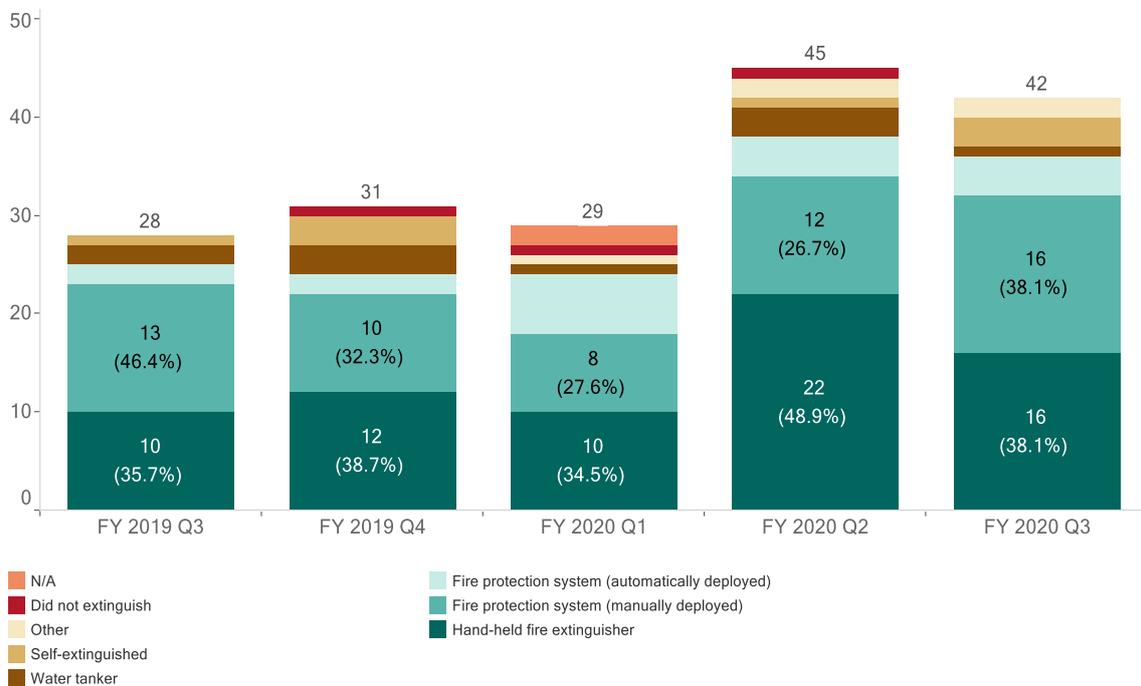


FIGURE 14. ANCILLARY REPORTS – EXTINGUISHED BY – JANUARY 2019 TO MARCH 2020



Ancillary reports – failed component

FIGURE 15. ANCILLARY REPORTS – FAILED COMPONENT – JANUARY 2020 TO MARCH 2020

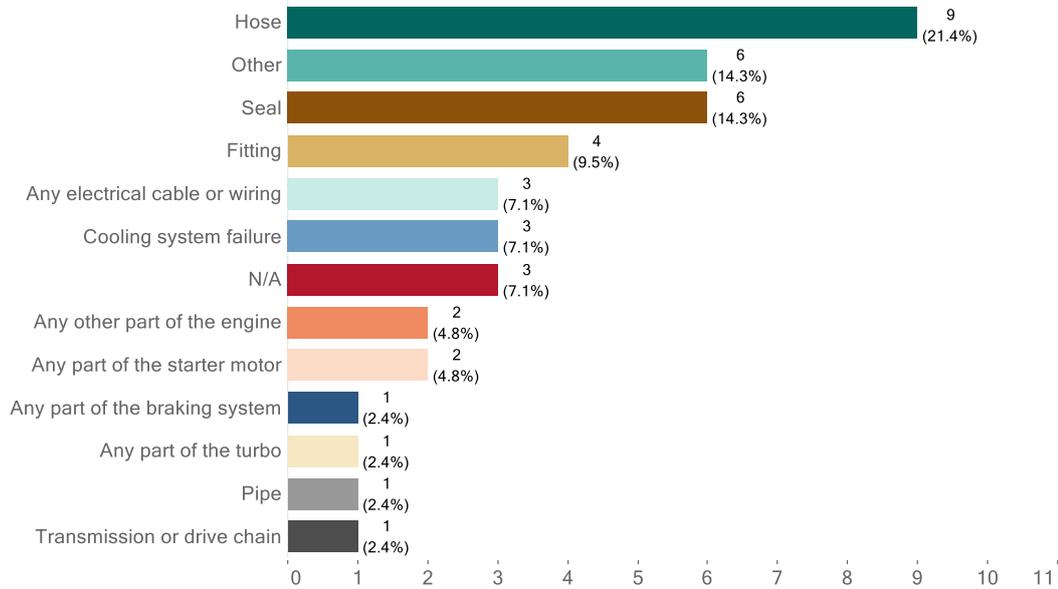
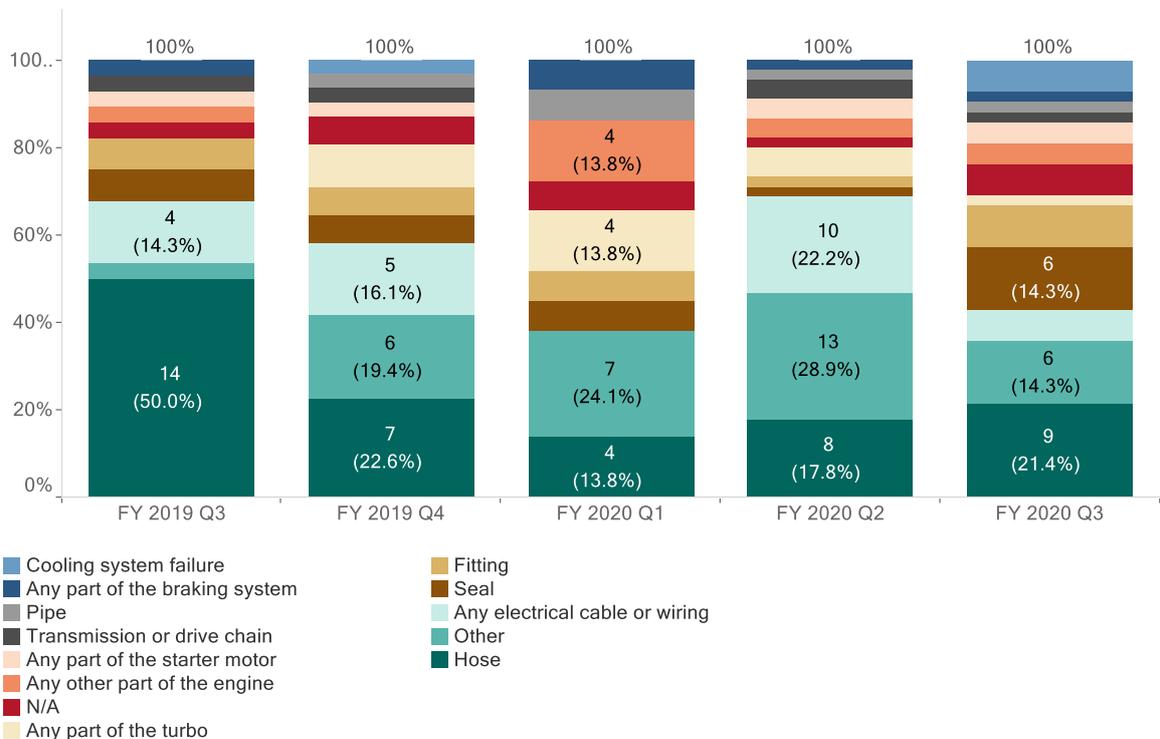


FIGURE 16. ANCILLARY REPORTS – FAILED COMPONENT – JANUARY 2019 TO MARCH 2020



Ancillary reports – cause of component failure

FIGURE 17. ANCILLARY REPORTS – CAUSE OF COMPONENT FAILURE– JANUARY 2020 TO MARCH 2020

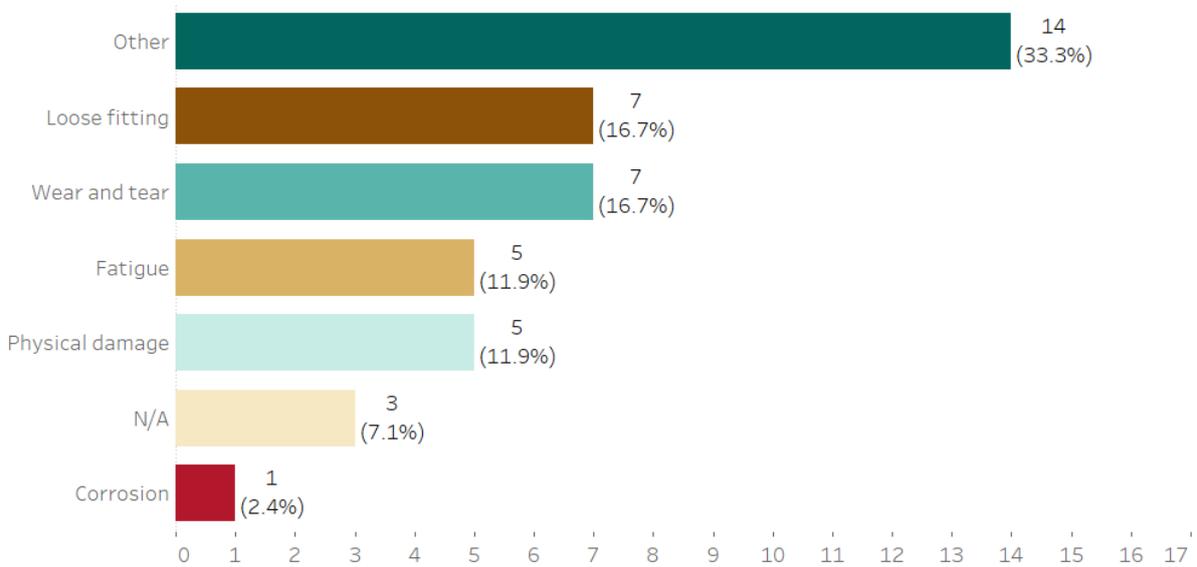
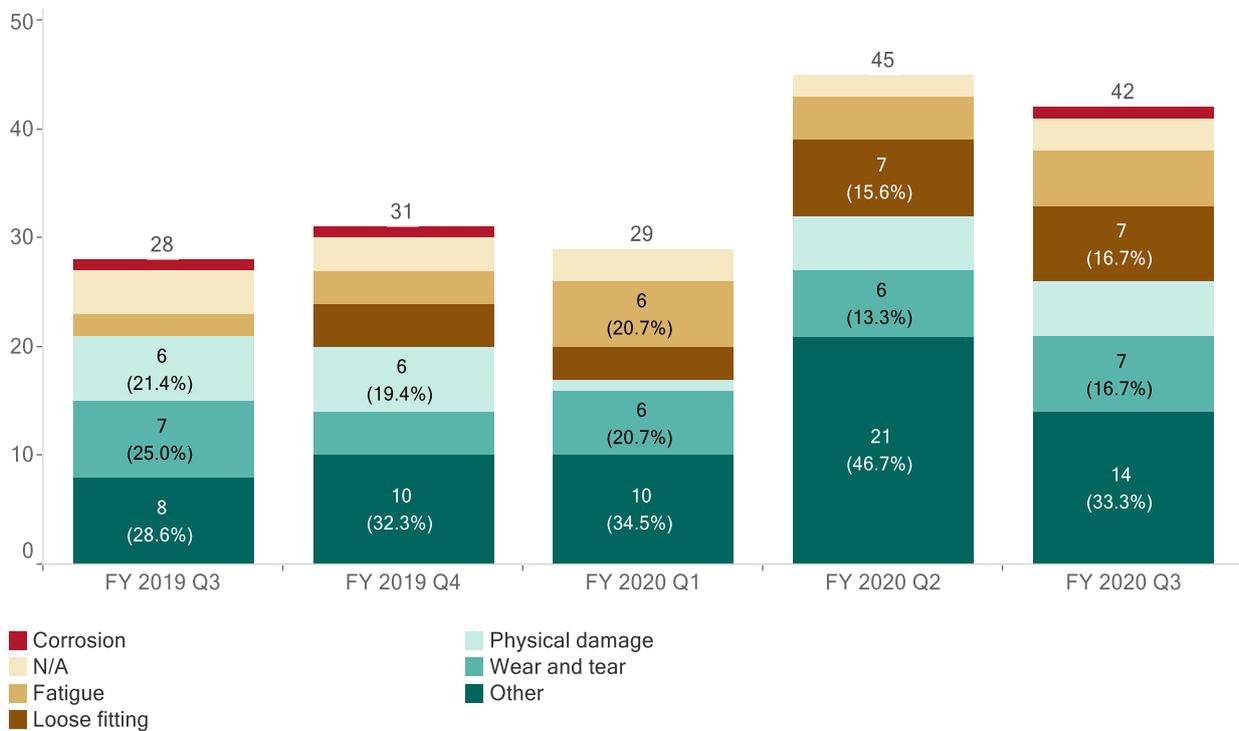


FIGURE 18. ANCILLARY REPORTS – CAUSE OF COMPONENT FAILURE– JANUARY 2019 TO MARCH 2020



Incidents of note

January 2020 - Peak Gold Mine (IncNot0036461)

A fire occurred on a loaded Caterpillar 730D concrete agitator at an underground metalliferous mine. The operator had set up to spray cement in the decline when he saw a fire at the front of the agitator. The cause of the fire was determined to be water ingress into the starter motor. Previous modifications allowed water (which is regularly used to clean the machine) to get into the engine bay and subsequently the starter motor. The fire was extinguished by the onboard fire suppression system and a hand-held extinguisher.

January 2020 – Tritton Copper Mine (IncNot0036464)

At a metalliferous mine, a Sandvik haul truck caught fire while travelling up a decline. The cause of the fire was an internal failure in a recently rebuilt engine. A mine investigation identified the tappet cover breather caps were modified from a metal cap that was held in place with a circlip, to a plastic cap held with silastic. A component failure has allowed coolant into the sump. The over-pressured engine oil escaped from the breather and contacted the hot engine. The original equipment manufacturer (OEM) is investigating the engine failure.

FIGURE 20. TRITTON COPPER MINE



January 2020 – Cadia East Project (IncNot0036500)

A Caterpillar R3000H underground loader at a metalliferous mine was in a draw point of an extraction drive. The operator saw smoke coming from the engine area. The operator shut down the loader. He inspected the engine bay and saw flames coming from the belly plate area. He activated the fire suppression system, which extinguished the fire. A mine investigation identified that the mine had made a modification to all its loaders to facilitate taking engine oil samples. The failed hose had been clamped in place and was not part of any scheduled service inspection. The OEM was not involved with the modification.

January 2020 – Holcim - Albion Park Quarry (IncNot0036553)

A dump truck operator smelled fuel during mining operations. The operator drove the Caterpillar 775E dump truck to where a maintenance fitter was located, before parking the machine. The fitter saw smoke and attempted to put the fire out with an extinguisher. A water cart attended and extinguished the fire. A mine investigation identified there was a fuel line damaged near the turbo. It was also identified that there was no fire suppression system fitted to the truck.

FIGURE 21. ALBION PARK QUARRY



January 2020 – Northparkes Mines (IncNot0036558)

During mining operations at an underground metalliferous mine, a haul truck operator saw smoke, and then flames. He parked the Atlas Copco MT6020 haul truck and activated the fire suppression system. With the help of another two workers, they extinguished the fire with hand-held extinguishers. The fire was in the engine bay and articulation point of the truck. The mine investigation identified the cause of the fire as a failure of a driveline bearing. The truck had recently returned from a transmission rebuild.

FIGURE 22. NORTHPARKES MINES



January 2020 – New Cobar & Chesney (IncNot0036585)

At an underground metalliferous mine, a Volvo L120 integrated tool carrier (IT) was being used by a charge-up crew when they noticed a flame on the right-hand side of the engine. The onboard fire suppression system was activated manually, which extinguished the fire. The IT was hosed down to extinguish smoldering cladding that was surrounding the exhaust system.

The mine's initial investigation identified an overflow or leak in the coolant system that doused the exhaust lagging with coolant. The coolant containing glycol, or similar chemical, can be flammable when dried.

FIGURE 23. NEW COBAR & CHESNEY



January 2020 – Bengalla Mine (IncNot0036586)

A Caterpillar D11T dozer at a surface (open cut) coal mine was working next to the dragline when the driver smelled fumes. The operator pulled the dozer back and saw smoke coming from the engine compartment. The fire was extinguished using a hand-held fire extinguisher. The mine's initial observation identified that the hydraulic pilot filter came loose, which allowed oil mist to be drawn into the engine compartment and make contact with hot surfaces.

FIGURE 24. BENGALLA MINE



February 2020 – Bengalla Mine (IncNot0036718)

At a surface (open cut) coal mine a technician operating a Manitou MT1040 telehandler in the CHPP area saw smoke in the cab. The technician looked down to the left-hand side and witnessed flames in the cab near the two-way radio. He parked the machinery, lowered the implements and turned the machine off. The technician put the flames out with the fire extinguisher and turned the battery isolator off.

FIGURE 25. BENGALLA MINE



February 2020 – Peak Gold Mine (IncNot0036737)

At an underground metalliferous mine, a small fire occurred on the park brake of a Volvo L70F Integrated Tool Carrier underground. The fire was immediately extinguished by the operator. The investigation identified the oil supply to the brake calliper was leaking. The leak was dripping onto the calliper. The leak resulted in a decay of oil pressure which caused the brakes to drag, generating heat.

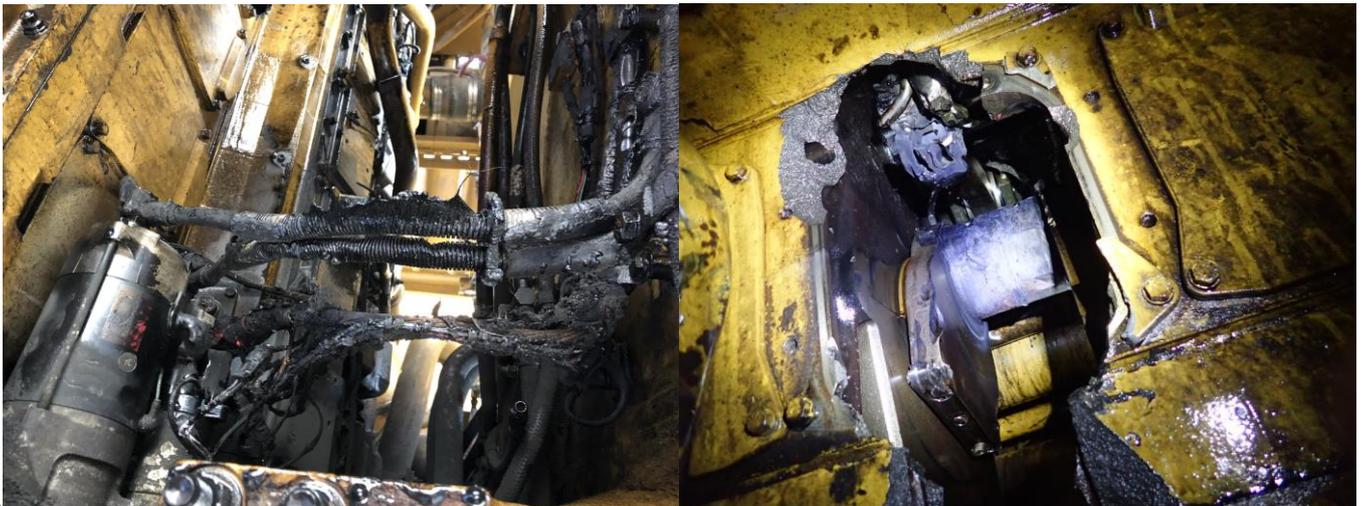
FIGURE 26. PEAK GOLD MINE



February 2020 Wambo open cut coal mine (IncNot0036748)

At an open coal mine, a Caterpillar 793 haul truck suffered a catastrophic engine failure whilst travelling on the main haul road on the way back to the workshop. The operator brought the truck to a stop and activated the fire suppression system. This extinguished the fire in the engine bay area, and the operator was able to safely exit the vehicle. A water cart extinguished a residual oil fire in the Pos 4 tyre area.

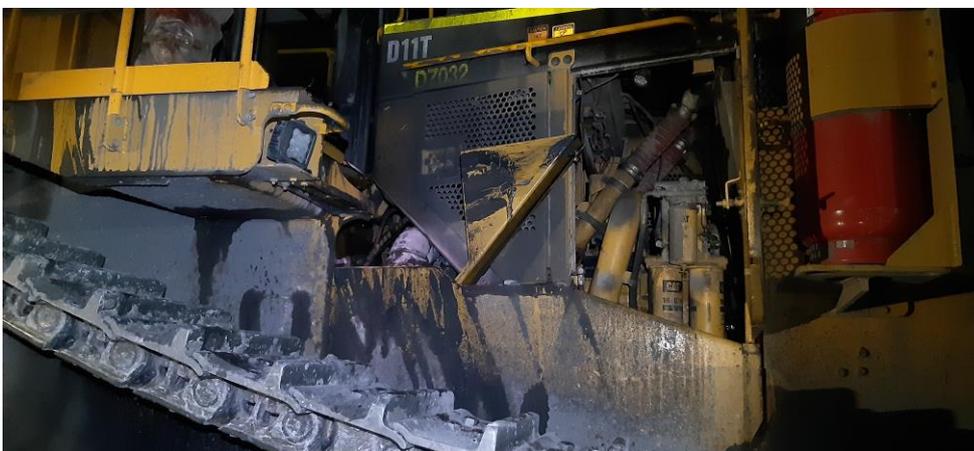
FIGURE 27 & 28. WAMBO OPEN CUT COAL MINE



February 2020 – Bengalla mine (IncNot00367840)

An operator of a Caterpillar D11T noticed an oil leak and smoke coming from the front of the machine. Flames were then observed coming from the engine bay. The fire suppression system was manually activated. This did not fully extinguish the fire so the operator used a handheld fire extinguisher to fully extinguish the fire. The investigation found that the fan pump signal hose has failed which allowed pressurised oil to spray into the engine bay.

FIGURE 29. BENGALLA MINE



March 2020 – Bengalla Mine (IncNot0036843)

An operator of a Caterpillar D11T was pushing material when a glow was noticed at the front of the machine. At the same time, a truck called emergency. The operator immediately reversed from the wall and saw flames.

The operator manually activated the fire suppression system. The operator inspected the engine bay and there was no evidence of fire, however he used an extinguisher as a precaution. A water cart was sent to the scene and was used to cool the area. A blade hose tilt failed, which sprayed hydraulic oil over the machine and into the engine bay.

FIGURE 30. BENGALLA MINE



March 2020 – CSA Mine (IncNot0036988)

A Caterpillar R2900G underground loader was idling when the operator saw smoke and flames at the back of the machine. The operator activated the fire suppression system and extinguished the fire. The investigation identified a failure of the fuel tank. It was leaking diesel onto hot components which caused the fire. The stress induced into the loader frame during recovery of the loader when stuck in stopes was identified as a contributing factor.

FIGURE 31. CSA MINE



Summary of recommendations to industry

Recommendation

When equipment modifications occur, mine operators must confirm that adequate change management processes are followed. This will ensure that any new risks are identified, and additional controls are implemented to reduce the risk to plant, equipment and workers. An example of this occurred when a modification was made to the engine covers (to address another risk) which allowed excessive water into the engine bay, causing an electrical fire.

Equipment modification

When modifications take place, mine operators should challenge if the modifications are the best option. Consultation with the OEM is suggested when the modification is identified as a life of asset modification. Any modifications to plant must be added to service schedules so that they are maintained throughout the life of the asset.

Equipment modification

Mine operators must remind machine operators that they are to stop and call for assistance when they identify any abnormal conditions such as smelling fuel or smoke. AS5062 Fire Prevention and Protection for mobile and transportable equipment and MDG 15 Guideline for mobile and transportable plant for use at mines (other than underground coal mines) 2017 recommend that designers, manufacturers, importers and suppliers should undertake an assessment of all fire risks.

Maintenance procedures

Following maintenance and repairs to mobile plant, the plant should be inspected, tested and verified as fit-for-purpose. Mobile plant should have suitable maintenance schedules that take into consideration condition and hours of operation.

Maintenance procedures

Mine operators must ensure safe maintenance systems of plant. Pre-use inspections should be reviewed to ensure any leaking fluids are identified before the machines are operated.

Review maintenance system controls

Mine operators must ensure that stringent monitoring and quality control of maintenance and repair activities are undertaken to prevent fires on mobile plant. Enough time and resourcing must also be allocated for maintenance and repair tasks

Review maintenance system controls