NSW Resources
Resources Regulator

Investigation report

Worker seriously injured while refuelling pressure cleaner

June 2025

Published by the Department of Primary Industries and Regional Development

Title: Investigation report: Worker seriously injured while refuelling pressure cleaner

First published: June 2025

Department reference number: D25/31661

Amendment schedule		
Date	Version	Amendment
June 2025	1	First published

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Introduction

A worker suffered burns to his hands, face and body when unleaded petrol came into contact with the hot engine components of a hot water pressure cleaner he was refuelling at the Rix's Creek mine on 22 June 2023.

During refuelling, unleaded petrol was released in an uncontrolled manner from a 10-litre plastic fuel container equipped with a plastic spout attachment. The worker was refuelling a pressure cleaner powered by a Honda petrol engine, which was housed within a purpose-built trailer. The worker was positioned inside the trailer, adjacent to the pressure cleaner, and was leaning over the equipment to direct the flow of fuel from the fuel container.

After the transfer of fuel had started, the worker opened the breather/airlock of the container, resulting in the uncontrolled release of petrol. The discharged fuel came into contact with hot engine components, causing ignition and a fire.

The worker was exposed to the risk of suffering more serious burns or even death, if he had not quickly exited the trailer, discarded the fuel container and removed his jacket which had caught fire.

The mine

The Rix's Creek Coal Mine is an open-cut coal mine about 5 kilometres northwest of Singleton in New South Wales (**the mine**). Bloomfield Collieries Pty Ltd is the mine operator.

The contractor

The worker involved was employed by Induspray Australia Pty Ltd (IAPL), a sub-contractor engaged by the mine to undertake high-pressure water cleaning, mechanical cleaning, hand tool surface preparation, abrasive sandblasting and spray painting.

The worker had undertaken appropriate training and was experienced in use of the plant involved in the incident.

The plant

The contractor supplied and operated their own pressure cleaner for the task. It was a Jetwave model HW200-15PH, comprising a Honda iGX390 petrol engine and a vertically mounted diesel-powered hot water burner system, purpose-built for high-temperature cleaning applications (**the pressure cleaner**). It was rated with an operational pressure of 3000 PSI (200 bar) and a flow rate of 15 litres per minute.

In accordance with *Australian/New Zealand Standard AS/NZS 4233.1:2013 High pressure water jetting systems Safe operation and maintenance*, the unit was classified as a class A high-pressure water jetting system, as its output did not exceed 5600 bar-litres per minute. Based on this classification, the operation of the pressure cleaner did not require the worker to hold a high-risk work licence, however, competency-based training in its safe use was required.

The incident

The worker was tasked with hot washing the blue belt in the mine's coal handling and preparation plant at Rix's Creek North on 22 June 2023. The mine allocated the task at the start of the shift, with

the expectation that it would be carried out for its duration under supervision by the mine.

The pressure cleaner was mounted inside a small box trailer fitted with a canopy. The trailer also contained additional items, including jerry cans of petrol and diesel. The box trailer was attached to the contractor's work utility vehicle, which was parked outside the washery building.

About 12:00 pm, the worker ceased pressure washing activities on the blue belt and left the platform within the washery where the task was conducted. The worker retrieved the fuel container filled with unleaded petrol and entered the box trailer via the rear access point.

The worker proceeded to refill the fuel tank of the pressure cleaner, which was positioned atop its Honda petrol engine and adjacent to the engine's exhaust. The worker detached the fuel container cap and fitted the integrated spout attachment. Refuelling commenced using the spout attachment.

After the transfer of fuel began, the worker noticed that the breather/airlock on the fuel container was closed. Upon opening it during the refuelling process, petrol unexpectedly released. Around the same time, the spout also became detached from the jerry can. Petrol splashed onto the hot engine and exhaust components.

The elevated temperatures of the surfaces caused the petrol to ignite, resulting in a fire that engulfed both the fuel container and the worker's clothing. The worker immediately left the trailer while still holding the fuel container, which he dropped at the back of the trailer.

The worker removed his burning clothing following ignition and 4 nearby workers responded to assist. These workers used portable fire extinguishers to put out the fire. Once the fire was fully extinguished, they noticed the pressure cleaner engine was still running. Upon becoming aware of this, the injured worker approached the trailer and activated the emergency stop button on the exterior of the trailer, which immediately shut down the engine.

Figure 1: Incident site with IAPL work ute and trailer containing pressure cleaner

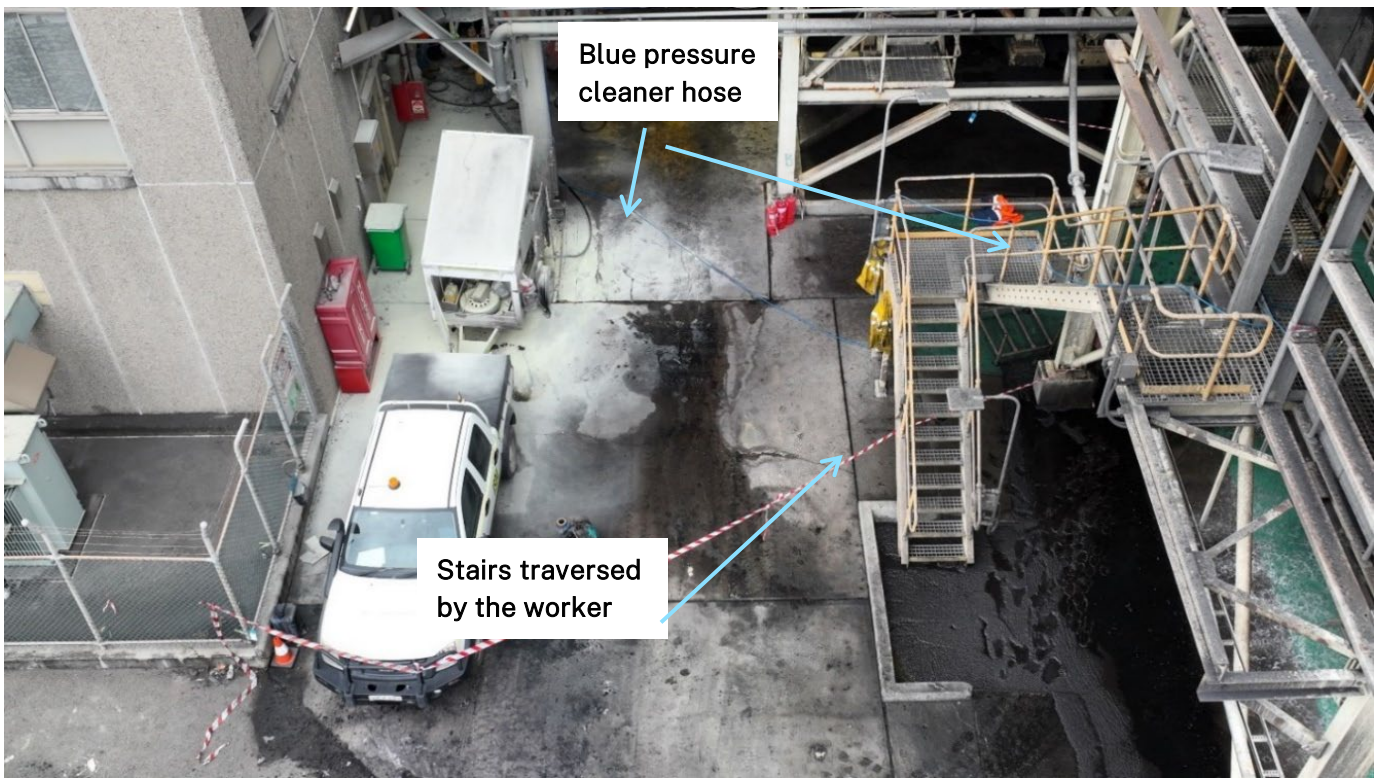

Figure 2: Rear of trailer and damaged fuel container on ground

Figure 3: Rear of trailer, pressure cleaner and equipment

Investigation

The Resource Regulator's Major Safety Investigation Unit investigated the incident to determine its cause and circumstances.

The investigation found the following:

- The mine operator attempted to eliminate petrol operated equipment, including generators, side-by-sides and drilling-related equipment, from site in 2020. However, some petrol-powered plant was approved for use on site. This equipment was generally operated and maintained by specialist contractors including the contractor in the incident.
- To manage the risks associated with using petrol-powered equipment on site, the mine operator required the completion of a suitable risk assessment. This applied to equipment such as small petrol pumps, generators, lawn mowers, brush cutters, chainsaws and the pressure cleaner.
- Only permitted petrol containers with a maximum capacity of 20 litres were allowed on site.
- To minimise the amount of petrol on site, only small tanks were allowed to be refuelled.
- The mine operator required the contractor to have an external competent person inspect and risk assess the plant to ensure it was safe for use at the mine.
- The pressure cleaner was put through the mine operator's introduction to site process before it was permitted to be used at the mine.

- An established safe system of work that was in place, documented within the contractor's safe work procedure approved for use by the mine operator, required workers to allow the machine to cool down before refuelling.
- The requirement to allow the machine to cool down before refuelling was in accordance with manufacturer guidance provided by Honda, the manufacturer of the engine fitted to the pressure cleaner.
- The worker:
  - was inducted, experienced, qualified and was aware of the hazards and risks of fire and explosion associated with refuelling petrol-powered plant, including the pressure cleaner
  - had received appropriate training and instruction in hazard identification, risk assessment, the pressure cleaner's safe work procedure and general operation, including the requirement to stop the machine and allow it to cool down before refuelling
  - was not operating under any imposed or perceived time constraints
  - deviated from the established safe system of work by:
    - failing to stop the pressure cleaner before commencing refuelling.
    - refuelling the pressure cleaner without allowing it to cool down to a safe temperature.

Recommendations

Mine operators and contractors must:

- conduct an appropriate risk assessment to identify potential hazards associated with refuelling plant and equipment. This includes evaluating ignition sources, equipment temperature, fuel type, fuel storage and spill risks
- develop and implement safe work procedures that detail the step-by-step refuelling processes, including shutdown and cool-down times, the use of approved fuel containers and immediate spill response actions
- ensure suitable refuelling equipment designed for the safe transfer of fuel including sealed nozzles, anti-static devices and proper personal protective equipment (PPE) such as gloves and safety glasses.
- ensure all personnel involved in refuelling tasks are trained, assessed as competent and familiar with the specific procedures for the equipment they are working with including awareness of manufacturer guidelines
- maintain accessible firefighting equipment (e.g. fire extinguishers rated for flammable liquids) and ensure all workers are trained in its use
- periodically review refuelling procedures and update risk assessments based on incidents, near misses, or equipment changes. Engage workers in reviews to ensure practical and effective controls
- provide adequate supervision during refuelling tasks, especially for high-risk equipment or new workers. Supervisors should verify that cooling times are observed, and refuelling steps are followed as required.

Suppliers of plant must:

- carry out, arrange the carrying out of or ensure the carrying out of calculations, analysis, testing or examination to determine minimum cool-down times of engines before refuelling
- provide adequate information to persons to whom plant is supplied concerning the results of any calculations, analysis, testing or examination referred to above and environmental or other conditions that may impact upon cool down temperatures of engines.

Workers must:

- comply with the approved safe work procedure (SWP) for refuelling plant and equipment, including shutting down the equipment and allowing sufficient cooling time before refuelling
- never attempt to refuel petrol-powered equipment while the engine is running or still hot and follow manufacturer guidelines
- use approved fuel containers and follow site protocols for fuel handling, transfer, and storage
- conduct a visual inspection prior to refuelling to ensure no ignition sources are present, ventilation is sufficient, and all required PPE is worn.

For further recommendations, refer to information published by the Regulator:

- SafeWork NSW - code of practice - Managing the risks of plant in the workplace
- SafeWork NSW - code of practice - How to manage work health and safety risks
- SafeWork NSW - code of practice – Managing risks of hazardous chemicals in the workplace
- Safe Work Australia – Guidance material – Storage of flammable liquids
- Safe Work Australia - Guide for managing risks from high pressure water jetting
- Resources Regulator – Safety Bulletin SB21-01– Fires occur while refuelling plant