

EXPOSURE TO HARMFUL ENERGIES

OBJECTIVE:

The objective is to prevent harm related to exposure to moving machine parts, failure of hydraulic equipment or systems, or other energy sources, such as compressed air, heat, electricity and gravity to ALARP, including consideration in design for foreseeable human error.

GENERAL OUTCOME:

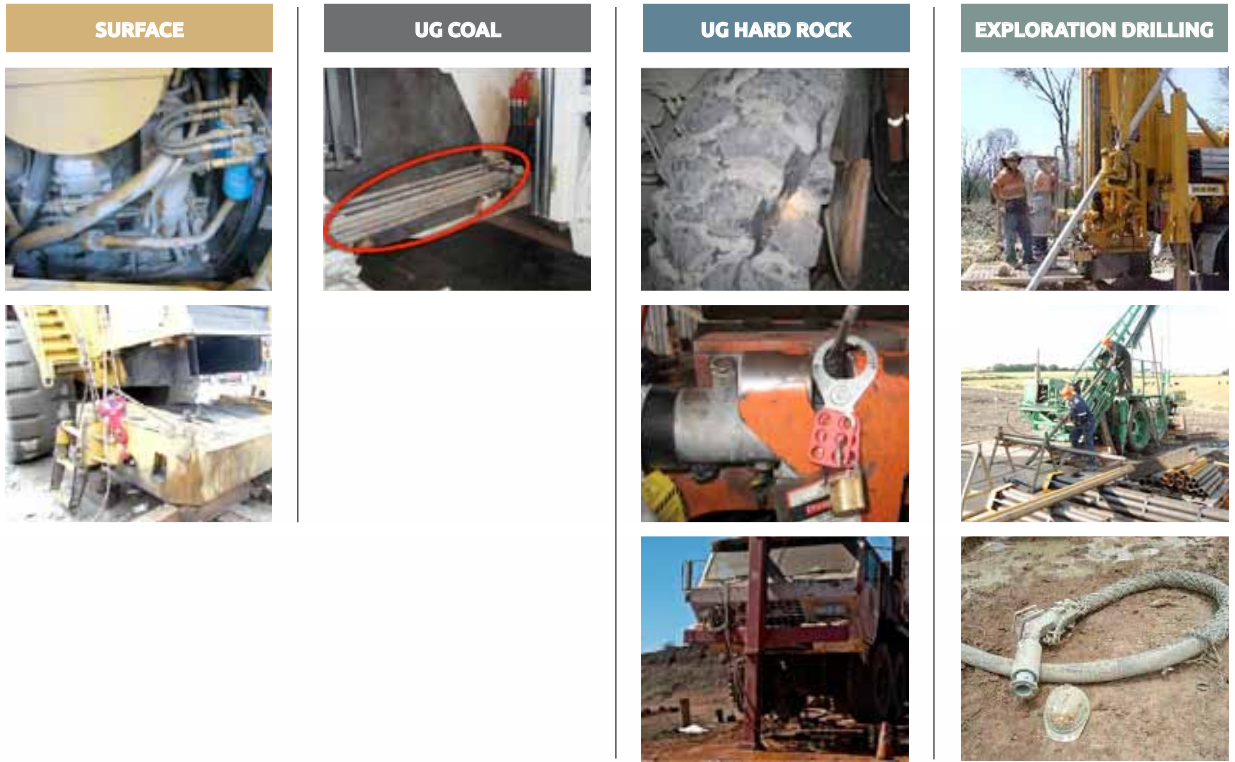
The intended design outcome should:

- Prevent intentional or unintentional contact with moving machine parts; hot components or fluids; electric currents; radiation; compressed air; and high pressure fluids including hydraulic fluids
- Minimise the likelihood of failure, during operation or maintenance, of equipment and equipment components that transmit harmful energies - including hydraulic hoses and fittings; compressed air lines; and electrical wires and components
- Enable isolation of equipment energy systems to be achieved at the primary, interrelated and stored energy source (ie not at the control circuit)
- Provide partial system isolation that facilitates maintenance activities
- Ensure that isolation devices are easy to use, of limited complexity, and can be locked in the isolated position
- Provide means to verify zero energy



Potential Unwanted Events (PUEs)

3.1 Harm from exposure to energies such as: heat; electricity; radiation; compressed air; high pressure fluids, including hydraulic fluids; and falling objects.









Potential Unwanted Events (PUEs)

3.2 Friction burns, injection or other harm due to working in close proximity to hydraulic equipment or systems.









Potential Unwanted Events (PUEs)

3.3 Entanglement in rotating parts including engine fans, pulleys, drive belts, gears, drive drums, rollers and rotating shafts, including drill rods and steels.

SURFACE	UG HARD ROCK	EXPLORATION DRILLING
		
		
		

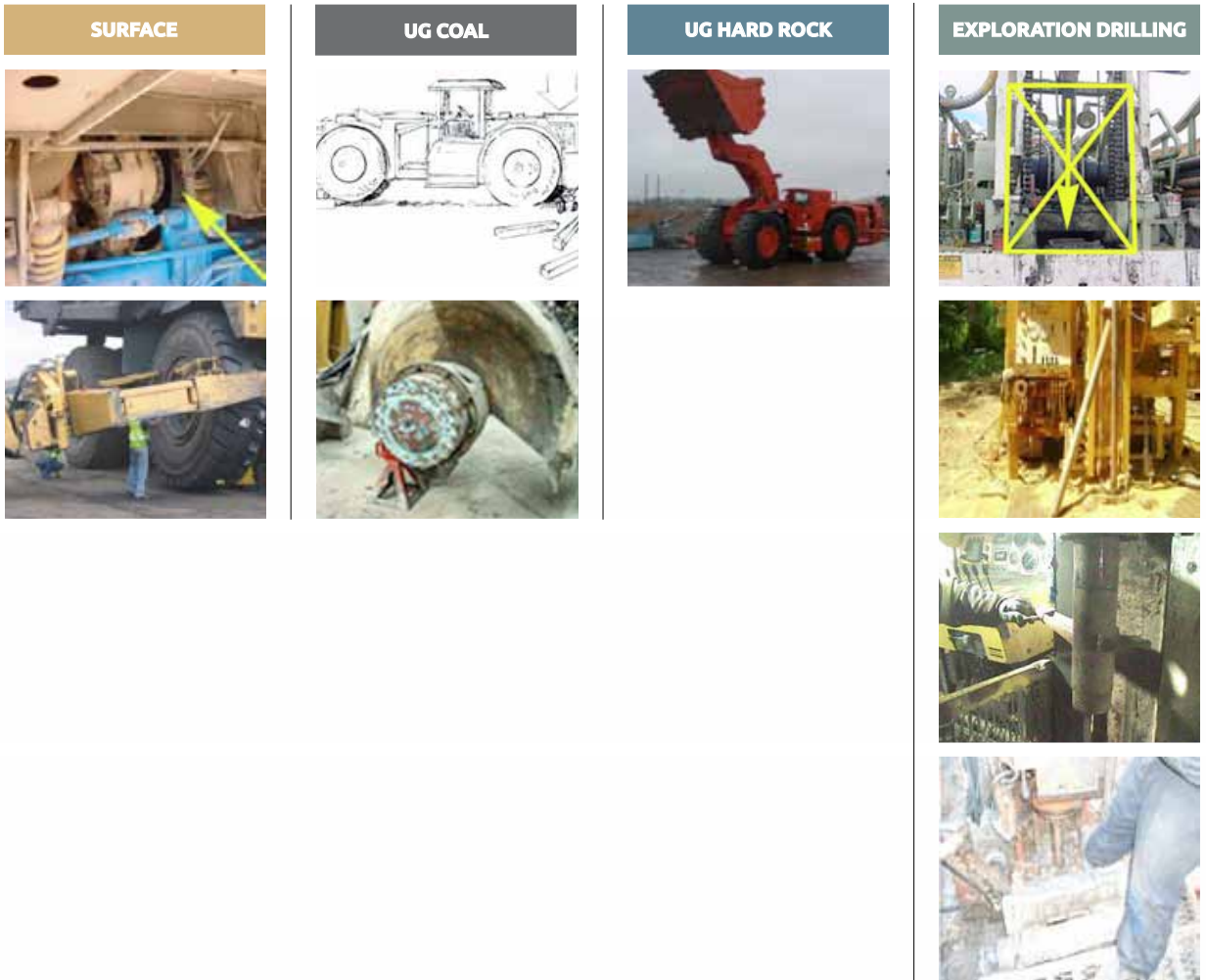
Potential Unwanted Events (PUEs)

3.4 Injury from being struck by a release of poorly secured moving or rotating equipment or components.

SURFACE	UG COAL	EXPLORATION DRILLING
		
		
		

Potential Unwanted Events (PUEs)

3.5 Entrapment, entanglement, and/or crushing from moving equipment such as: arms, jaws, gates, doors, pull down ropes/chains, winches and foot clamps.



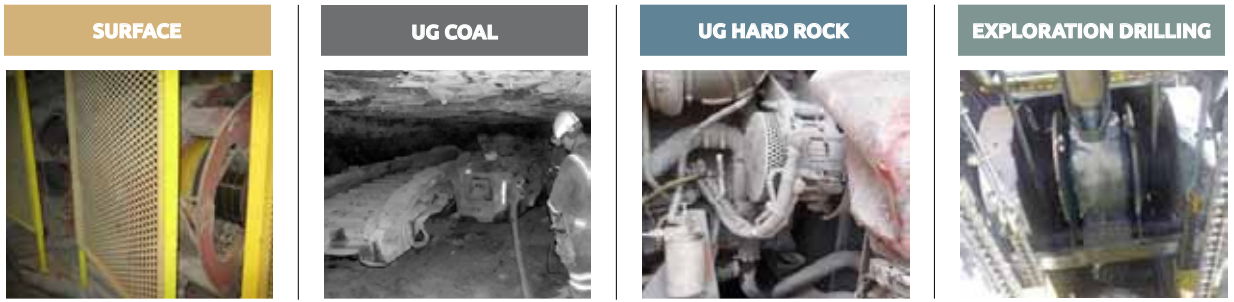
Potential Unwanted Events (PUEs)

3.6 Scalding or burning from exposure to accessible hot surfaces including but not limited to, engines, hot exhaust, engine components, cooling systems and hydraulic components.



Potential Unwanted Events (PUEs)

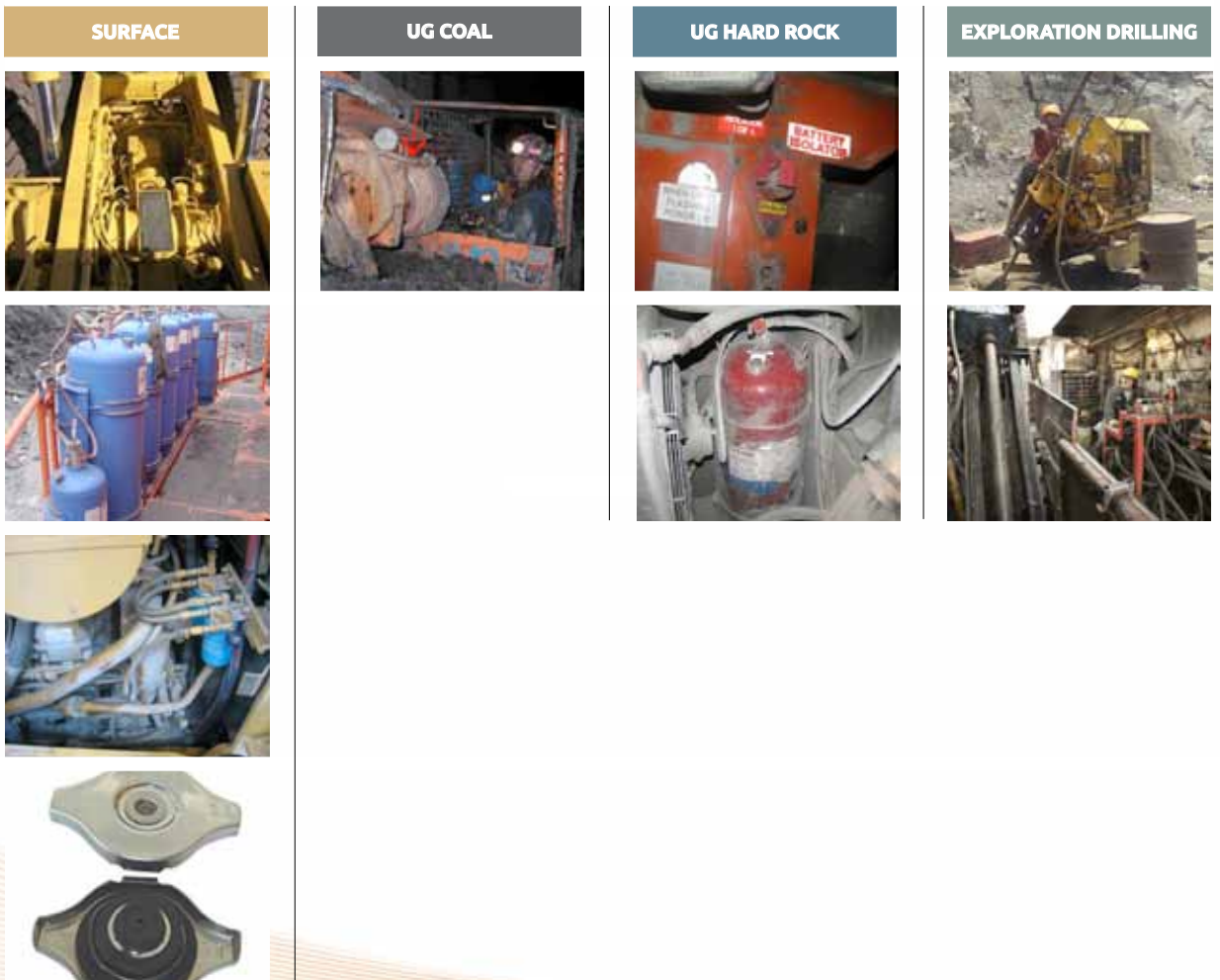
3.7 Electrocution or burning from contact with electrical switches, wires or devices.



Potential Unwanted Events (PUEs)

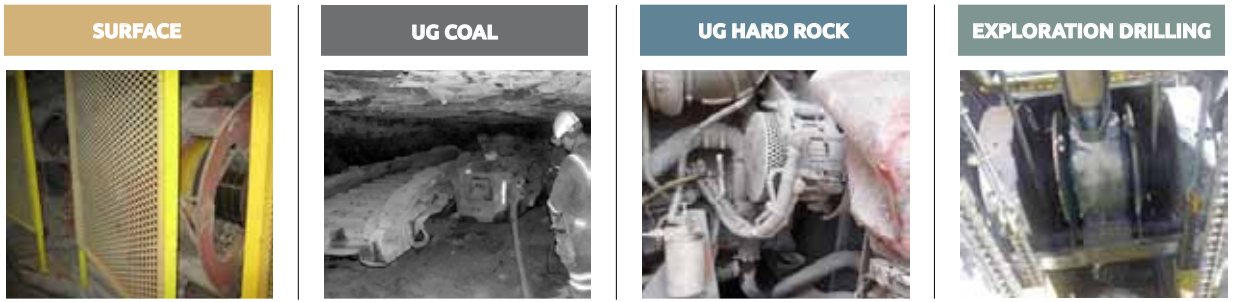
3.8 Harm from exposure to:

- a. Energy induced in hydraulic systems from cylinders.
- b. Energy inadvertently released by secondary systems e.g. fire systems, air bags.
- c. Residual energy retained after isolation and apparent de-energisation e.g. in springs, ropes, conveyor systems, accumulators, receiver tanks and fire systems
- d. Energy released from pressure vessels that have not been safely depressurised, including premature removal of radiator caps



Potential Unwanted Events (PUEs)

3.7 Electrocution or burning from contact with electrical switches, wires or devices.



Potential Unwanted Events (PUEs)

3.8 Harm from exposure to:

- a. Energy induced in hydraulic systems from cylinders.
- b. Energy inadvertently released by secondary systems e.g. fire systems, air bags.
- c. Residual energy retained after isolation and apparent de-energisation e.g. in springs, ropes, conveyor systems, accumulators, receiver tanks and fire systems
- d. Energy released from pressure vessels that have not been safely depressurised, including premature removal of radiator caps

