Use of Vehicles/Fuel Burning Plant In Underground Facilities

Couple of takeaways

- Using vehicles and fuel burning plant in underground facilities can introduce risks associated with air pollution, oxygen depletion and explosions or fire.
- Work occurring in underground facilities needs to take these risks into consideration when planning the work and emergency scenarios and ensure adequate controls are in place.
- All diesel and petrol vehicles entering underground facilities at Hydro Tasmania must be modern and well maintained to reduce harmful emissions. Petrol light vehicles must be built after November 2016 and/or meet Australian Design Rule 79/04 and/or Euro 5 or a newer standard.

What is this procedure for?

The procedure describes the control measures that need to be in place at underground facilities (e.g., Power Stations, tunnels, etc.) when vehicles or fuel burning plant are to be used for work, to maintain a safe working environment for personnel at the location.

This procedure applies to all underground facilities at Hydro Tasmania and is to be adhered to whenever such locations are to be accessed using a vehicle or fuel burning plant is to be used at the location for work. Examples are Gordon, Tribute, Cethana, and Poatina power stations.

Policy

Hydro Tasmania group is committed to the provision of a safe working environment to its employees at the workplace and for prevention of fatalities, injuries, accidents, incidents, and the improvement of underground safety. In meeting this objective, Hydro Tasmania group will raise awareness of underground safety issues amongst its employees, promote underground safety and ensure its employees including contractors and visitors are safe while working at underground facilities.

Workplace Health and Safety legislation require employers to provide information, instruction, training, and supervision to their employees, to enable them to carry out their work safely. Hydro Tasmania group is committed to reducing the risks associated with underground work and meeting the duty of care requirements under the Workplace Health and Safety Act.

The primary objective of this policy is to ensure that all WHS risks associated with the use of vehicles to access, or plant used for work at an underground location are mitigated and managed to a reasonably acceptable level for safety of personnel at the location.

What are the responsibilities involved?

Hydro Tasmania group manager shall

The Hydro Tasmania group manager is accountable to provide the necessary resources to ensure safe systems of work that ensure this procedure is understood, applied and observed within their area of authority.

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Leader of Work Health and Safety shall

The Leader of Work Health and Safety is responsible for:

- Ensuring that training material is current and of an appropriate quality
- Ensuring safety systems are kept up to date in relation to this procedure
- Recording and analysing incident / investigation data
- Ensuring that this procedure is reviewed as stipulated.

Line managers shall

Have the responsibility for the management or control of a workplace, within their area of authority, and must ensure this procedure is implemented. They shall maintain a hazard and risk register and appropriate signage for their workplace and shall ensure that competent and accountable persons assigned for the management and execution of work within their area of authority, conduct appropriate risk assessments.

Accountable person shall

Has the responsibility for following this procedure and ensuring those working under their control follow this procedure. They have the responsibility for the safety of personnel following this procedure and for maintaining appropriate records relating to their activities. Line managers, asset owners and their delegates, job managers, site managers and project managers, authorised issuing officers and persons in charge are all examples of an accountable person.

Employee / contractor shall

Have the responsibility to act in a manner that does not adversely affect their own health and safety, or that of others. They may be instructed persons and shall comply with the terms of this procedure and must immediately report to the accountable person any matter that may affect their own or other's health and safety.

How is the procedure managed?

Hazards

The hazards introduced to the underground location by using fuel burning vehicles/plant are as follows:

- Exhaust emissions into the enclosed area (from vehicles/plant that use different types of fuel for burning such as diesel, petrol, LPG, natural gas, etc)
- Hydrocarbon fumes from petrol fuel tank vents and fuel leaks (these are heavier than air and under still air conditions will collect at the lowest point leading to an explosion risk).

The WHS risks to which the personnel are exposed at the location due to the above hazards are:

- Air pollution – The two common pollutants are carbon monoxide and carbon dioxide. The former has the highest risk as it is toxic to people and is produced by internal combustion engines. This risk can be reduced by installing appropriately designed ventilation systems at the location, which meet its specific requirements.

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- Explosion / fire – Petrol and petrol fumes are much more flammable than diesel and also are heavier than air which causes them to settle at low levels and not readily disperse. It is difficult to eliminate this risk altogether but to some extent this could be reduced by having a correctly designed ventilation system at the location
- Oxygen depletion – Heavy gaseous components of vehicle/plant emissions displacing oxygen at lower levels may lead to dangerously low levels of oxygen in breathable air.

The level of risk exposure for each of the above hazards varies according to many factors such as adequacy of the ventilation system, (if any exists), type of vehicle/plant, emission control installed in the vehicle/plant, condition of vehicle/plant, configuration of the enclosed area where the vehicles are parked or plant is used and other hazards present in the enclosed area (e.g. chemicals, hazardous material).

It must be recognised that the use of petrol vehicles carries a significantly greater risk than the use of diesel vehicles. Even if diesel vehicles are to be used in preference to petrol vehicles, other factors such as number of vehicles used, the number of visits made to the location, and number of persons present at the location need to be considered.

Risk Assessment / Safety Management Plan (SMP)

The risk assessment / SMP (for major/project works) developed for the work to be performed at the underground location shall identify 'use of vehicles/plant' as one of the hazards with control measures put in place to mitigate those risks. Some of the control measures recommended in this procedure shall be used where it is appropriate. The site Hazard Register for the location will carry reference to this procedure where the hazard specified is 'use of fuel burning vehicles/plant.

General

All diesel and petrol vehicles entering underground facilities at Hydro Tasmania must be modern and well maintained to reduce harmful emissions. Petrol light vehicles must be built after November 2016 and/or meet Australian Design Rule 79/04 and/or Euro 5 or a newer standard.

As a minimum the following requirements shall be met if fuel burning vehicles/plant are to be used at underground facilities:

1. Vehicle numbers used for accessing underground facilities are limited for each location to suit local ventilation capacity and operators shall stop their engines as soon as they are parked, facing the exit direction (NEVER keep engines running after parking at the designated point at the location).
2. The vehicles used for accessing underground facilities shall:

- Be regularly serviced (properly tuned and the oil is clean).
- Have no modifications which affect Vehicle Emission Controls
- Be In good condition.
- Equipped with appropriate fire extinguishers (i.e. foam or dry chemical).

3. Ventilation system installed (permanent or temporary) and working.
4. All underground facilities are strictly smoke-free zones.

Outage/project/major work

Where many personnel are involved in the work to be performed at the underground location, the risk assessment / SMP shall consider the following control measures which need to be actioned prior to start of

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work at the location and checked for functionality daily for the whole duration of the work at the location:

- If there is no ventilation system or the existing one does not meet the additional requirements for the duration of the planned work, then a dedicated local ventilation system shall be installed for the duration of work.
- PPE (self-rescuer, portable fire extinguisher) must be made available at the location in adequate quantities to meet any emergency (selection of type of PPE and quantity to be decided through the SMP).
- Pre-use on vehicle checks is to be carried out prior to commencement of work.
- Gas monitors provided for monitoring quality of air (mainly carbon monoxide) at the work location.
- Signage on warning against leaving engines running to be installed at the site (if not existing already as a permanent signage at site).

The safety management plan is an outcome from the high-level risk assessment carried out for the planned job to be done at the underground location based on the information given in the workplace hazard register for the site but not limited to same.

Risk mitigation measures

If vehicles are to be used to access underground facilities, or plant is to be used for a lengthy period of time (e.g. major works, station tours etc), then the risk mitigation measures detailed below must be implemented at locations.

Ventilation

All areas where vehicles are to be used or plant operated must be ventilated by mechanical means, with a direct outside air source. Where a ventilation system exists but is not adequate to meet the requirements, additional ventilation must be provided. In the long-term action is to be taken to install new or upgrade existing systems to meet the necessary requirements for the site.

Air quality monitoring

Where the identified risks are assessed to be high, carbon monoxide levels shall be monitored (research has shown that carbon monoxide levels exceed the exposure standard before nitrogen dioxide levels). Some of the major components found in diesel/petrol vehicle or plant emissions are carbon monoxide, carbon dioxide and nitrogen dioxide (many other gaseous components in much smaller quantities are also present). In addition to these, diesel emissions contain solid carbon particles small enough to be inhaled to the lowest reaches of the lung.

Alarms should be set below 35 ppm for carbon monoxide (i.e. time weighted average exposure level expressed in parts of gas per million parts of contaminated air by volume) which is the major gaseous component of diesel/petrol vehicle/plant emissions. Alternatively, air quality shall be tested for each location with the ventilation in its normal operation in order to arrive at a reference point for the location concerned. The results are to be documented and recorded in the Workplace Hazard Register for future reference purposes. When a major work is performed at the location involving number of vehicles or plant then results of any gas monitoring done at the location can be compared against this recorded reference reading to ensure the new levels remain

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within the recommended exposure limits to always maintain a safe working environment at all times.

These are the maximum Time Weighted Average (TWA) maximum exposure levels for underground facilities:

- Carbon monoxide – 50 ppm
- Carbon dioxide – 5000 ppm
- Nitrogen dioxide – 3 ppm
- Nitrogen oxide – 25 ppm
- Hydrogen sulphide – 10 ppm
- Sulphur dioxide – 2 ppm
- Aldehydes – 1pmm
- Respirable combustible dust – 2.0 mg/m3

In addition to the above, air at the location must contain 20% or more oxygen.

Maintenance of vehicles/plant

All vehicles/plant both petrol and diesel shall be serviced at the correct time and always kept in good working condition.

Monitoring equipment

For locations where it is expected that many vehicles will be accessing the location at frequent intervals (e.g. heavy or high traffic situation, multiple trips of large numbers of people etc.) or plant will be used for work purposes, gas monitoring equipment shall be used to measure the quality of air at the location. Initial monitoring will be to obtain a base level for the location, ongoing monitoring of quality of air at the location need to be done only if the results obtained at the initial measurement are higher than the reading taken for the same location under normal conditions (no vehicles or plant operating).

What training is required?

Employees and contractors should be made aware of the danger of carbon monoxide poisoning by inhaling exhaust emissions from vehicles/plant. They must be educated enough to recognise the warning signs of carbon monoxide exposure such as headache, faintness, dizziness, confusion, nausea and irregular heartbeat.

How do we manage emergencies or incidents?

Personnel responding to emergency situations must use supplied air or self-contained breathing apparatus to enter areas where carbon monoxide may be present. Employees who have been exposed to carbon monoxide need immediate medical attention. Job managers should consider the need to increase the availability of WHS equipment required for rescue, in line with the number of personnel on site.

How are records managed?

Records to be maintained for the location are as follows:

- Workplace Hazard Register
- SMP (where applicable) for the work being performed
- Pre-use checklist for vehicles/plant used for the work
- Gas monitoring results where applicable