

15. Health and Safety

15.1 Overview

This section examines the health and safety issues associated with the Project during the construction and operational phases. The health and safety of Project employees and the public are assessed, and mitigation strategies are outlined where appropriate. The hazards are analysed to identify any significant residual risks to either human health, safety or natural ecosystems.

15.1.1 Legislative Compliance

Table 15-1 identifies the relevant legislation and the regulatory requirements and describes how the Project will achieve compliance.

Table 15-1 Legislative Compliance

Relevant Legislation	Legislative Requirements	Compliance
<i>Explosives Act 1999</i> and AS 2187 'Explosives—Storage, transport and use'.	The Act sets out the requirements for the handling, storage, transport and manufacture of explosives. The Australian Standard is called up by the <i>Coal Mining Safety and Health Regulations 2001</i> .	The use and handling of explosive materials/ substances will be in compliance with the Explosives Act. There will be no storage or manufacture of explosives on the mining leases. However, detonators and boosters may be stored on site.
<i>Coal Mining Safety and Health Act 1999</i>	Sets obligations for the operator, designer, constructor, contractors and others on a coal mine.	Undertaking the requirements in the Act, Regulation and standards and by applying due diligence and taking reasonable precautions.
<i>Building Act 1975</i>	Permit required for the storage of flammable and combustible liquids from Belyando Shire Council.	A Permit to store flammable and combustible liquids will be obtained.
<i>Dangerous Goods Act 1985</i>	Sets standards for the transport and storage of substances and the systems to adopted based on these substances.	Comply with Australian Standards and implement management systems as defined for the storage and use of substances.
<i>Radiation Safety Act 1999</i>	Sets the requirements for handling radioactive substances and the monitoring of persons exposed to the hazard.	Undertake the requirements of the regulations as stated including radiation monitoring and screening as required.

15.1.2 Project Health and Safety Policy

The Proponent will implement the RTCA Safety Standards and Occupational Health Standards that are currently in use at all RTCA operations and provide the basis for effective management of employee and public health and safety.

The RTCA Health, Safety and Environmental Policy (**Appendix Q**) clearly demonstrates the commitment by RTCA to health, safety and environment.

15.1.3 Inventory of Dangerous Goods

The key hazards for the Project are associated with the substances being stored and used for mining. The Project will use a number of hazardous substances, which are regulated by the Australian Dangerous Goods Code. **Table 15-2** lists the principal dangerous goods, by name, classification, raw and storage concentration, UN number, packaging group and the maximum amount stored at the Project. Other substances, such as Floergerdw 533 flocculant and magnetite used in the CPP are not classified as 'dangerous'.

Table 15-2 Indicative List of Dangerous Goods and Hazardous Substances

Chemical Name/ Shipping Name	DG Class	Raw conc. (wt%)	Storage conc. (wt%)	UN Number	Packaging group	Purpose/ Use
Diesel Fuel Oil	3 (Class C1)*	N/A	N/A	1202	III	Fuel for mobile equipment
Lubrication Oils (hydraulic oil)	3 (Class C2)**	N/A	N/A	N/A	N/A	Lubricate plant and equipment
Lime (Calcium Oxide)	8	93	93	1910	III	Potable water treatment
Caustic soda (sodium hydroxide)	8	50	50	1823	II	Concrete degreasing agent
Solvents (eg acetone)	3	99.5	99.5	1090	II	Workshop degreasing agent
Hypochlorite solution (Chlorine)	8	10-15%	10-15%	1791	II or III	Potable water treatment, sewage effluent treatment
Paints	3	N/A	N/A	1263	III	Paint

* Class C1—a combustible liquid that has a flashpoint of 150°C or less.

** Class C2—a combustible liquid that has a flashpoint exceeding 150°C.

15.1.3.1 Construction

Table 15-3 provides an indicative list of dangerous goods and hazardous substances and materials, which may be used during construction. The table details the relevant rate of use and maximum amount of the substance/material stored at the site during construction.

Refer to **Table 15-2** for the physical properties of these materials. Material Safety Data Sheet (MSDS) information will be obtained and communicated to all site personnel involved in the storage, handling, use and disposal of dangerous and hazardous substances and materials.

Table 15-3 Indicative List of Dangerous Goods and Hazardous Substances – Construction

Chemical Name/ Shipping Name	Rate of Use	Indicative maximum inventory
Diesel Fuel Oil	3,300,000 L/a	200,000 L
Lubrication Oils (hydraulic oil)	10,000 L/a	10,000
Hypochlorite solution (liquid chlorine)	460 L/month	500 L

15.1.3.2 Operational Phase

The key hazards during the operational phase are associated with the substances being stored and used for mining activities. The Project makes use of several hazardous substances, whose transport is regulated by the Australian Dangerous Goods Code.

Table 15-4 lists the rate of use and the maximum amount stored on-site during operations. Refer to **Table 15-2** for the physical properties of these materials. MSDS information will be obtained and communicated to all site personnel involved in the storage, handling use and disposal of hazardous substances and materials.

Table 15-4 Indicative List of Dangerous Goods and Hazardous Substances - Operations Phase

Chemical Name/ Shipping Name	Rate of Use	Indicative maximum inventory
Diesel Fuel Oil	55,500,000 L/a	200,000 L
Lubrication Oils (hydraulic oil)	250,000 L/a	81,600 L
Lime (Calcium Oxide)	5 kg/month	16 kg
Caustic soda (sodium hydroxide)	100 kg/month	1 t
Solvents (eg acetone)	50 L/month	300 L
Hypochlorite solution (liquid chlorine)	<5,500 L/a	500 L

The major dangerous/hazardous substances shown in **Table 15-4** are fuel oils. It is vital that approved separation distances are maintained during the storage of these materials/substances as defined in Australian Standard AS 1940-1993: The storage and handling of flammable and combustible liquids. Also, the storage, handling and use of these materials/substances will be in accordance with current Australian Standards (AS), industry codes of practice and best environmental management practices (BEMP).

There will be no explosives stored on site. However, boosters and detonators may be stored on site. Detonators stored on site shall meet the requirements of AS 2187 'Explosives—Storage, transport and use' and the additional requirements of Part 4 - Explosives in the *Coal Mining Safety and Health Regulation 2001*.

Given the correct controls of these materials there is negligible risk to employees, adjacent land users, general public and the environment. All effects from potential incidents involving dangerous/hazardous substances are expected to be contained within the site.

15.1.3.3 Concentration of Raw Materials in Operation Phase Storage Tanks

Materials and substances required at the Project will be acquired from approved manufacturers/suppliers. The raw concentration of materials/substances acquired for the Project will comply with that stated in the relevant MSDS. The concentration of materials and substances stored on-site is unlikely to change during storage. Some materials/substances may be diluted prior to their use, to concentrations recommended by the manufacturer, in order to attain optimum efficiency. It is unlikely that the concentration of any material/substance will be increased during storage.

15.2 Project Risk Assessment

15.2.1 Method

This section presents the assessment method and results for the hazards and risks associated with the proposed Project identified through the use of a Preliminary Hazard Analysis (PHA).

The PHA was carried out in accordance with the appropriate "Guidelines for Hazard Analysis" and Australian Standard AS/NZS 4360:1999 Risk Management. This PHA was carried out by SKM, based on their experience with construction and operational Projects. The assessment outlines the implications for, and the impact on, the surrounding land uses, and refers to the Belyando Shire Disaster Plan where appropriate. The preliminary hazard analysis incorporates:

- all relevant hazards (minor and major);
- the possible frequency of the potential hazards, accidents, spillages and abnormal events occurring;
- indication of cumulative risk levels to surrounding land uses;
- life of any identified hazards;
- the effects and rate of usage of the hazardous substances to be used, stored, processed or produced contained in **Table 15-3** and **Table 15-4**; and
- the type of machinery and equipment used.

Potential incident scenarios from the operations at the mine were identified through consideration of:

- the range of activities carried out and facilities present during the construction and operation phase. These included construction activities, energy supply, coal excavation, preparation and handling and waste water management; and
- the range of potentially hazardous incidents that might be associated with each of the activities/facilities identified at the site.

The identification of hazards is aided through the application of a prompt list. The list is based upon the possibility of a damaging energy occurring as a result of a loss of control of that energy. Not all energies are relevant to this project as can be seen from the identified potential hazards in **Table 15-8** and **Table 15-9**.

- | | | |
|--------------------------|-------------------|----------------------|
| ■ Animal | ■ Manual handling | ■ UV |
| ■ Biological | ■ Mechanical | ■ Interface |
| ■ Chemical | ■ Noise | ■ Sharp |
| ■ Electrical | ■ Proximity | ■ Vacuum |
| ■ Falling objects | ■ Pressure | ■ Dust, fume, vapour |
| ■ Falls, slips and trips | ■ Radiation | ■ Stressors |
| ■ Fire & explosion | ■ Temperature | ■ Confined spaces |
| ■ Kinetic | ■ Vibration | |

Having identified the range of hazards likely to occur at the site, the following matters were considered for each hazard:

- appropriate controls and mitigation factors expected to be put in place for the management of each hazard. These may include prevention and response measures;
- the consequences of each of the hazardous incidents if they were to occur. Consequences might include direct impacts of incidents and the potential for propagation and secondary incident. Assessment of the severity of the consequences takes into consideration the proposed mitigation measures listed;
- possible causes and the probability of these causes occurring and leading to the hazardous incident identified. The probability of each hazardous incident occurring takes into consideration the proposed control measures. This information was then tabled to prioritise the risks and evaluate these levels against the concept of As Low As Reasonably Practical (ALARP); and
- where an extreme or high risk was identified, appropriate, controls and mitigation measures were identified and the hazardous incident reassessed with these controls in place.

These potential incident scenarios, including potential consequences and prevention, protection or mitigation measures are outlined in **Table 15-8** and **Table 15-9**.

15.2.2 Risk Analysis Criteria

The risk assessment matrix, which is shown in **Table 15-7**, is a tabular portrayal of risk as the combination of the probability of occurrence and consequence severity. Potentially hazardous incidents are identified for the facility or system under consideration and represent each potential incident having identifiable causes and consequences.

The consequences may vary from a safety or health consideration to an environmental outcome. Where applicable, risk scores for both consequences are recorded in the risk assessment. The consequence and probability are plotted on the risk assessment matrix in order to determine the risk level. The risk assessment matrix presented in **Table 15-7** is based on the model contained in Appendix E of AS/NZS 4360:1999 Risk Management.

The highest risk incidents are judged to have the highest priority for consideration of additional risk reduction options. Low risk incidents are subject to the normal, ongoing improvement process and operational controls.

A likelihood of occurrence was assigned to each identified hazardous incident based on definitions shown in **Table 15-5**. The contribution of the preventative and protective features was taken into account when assessing the likelihood of occurrence and potential consequence from each hazardous incident. The likelihood of occurrence also assumes that any recommendations provided in this document are implemented. The probability of occurrence used for this risk assessment are based on Appendix E of AS/NZS 4360:1999 Risk Management. The risk levels denote the residual risk for the most likely scenarios.

The consequences assessed include both threats to the natural environment and to health and safety of the public based on definitions shown in **Table 15-6**. Where a hazardous incident may have several outcomes, each potential outcome was assessed in turn. The severity classes for health & safety type outcomes are based on the Australian Standard AS/NZS 4360:1999 Risk Management, while those for the threat to the natural environment are based on common environmental risk management consequence categories.

The shading and numerical coding in the risk matrix at **Table 15-7** refers the qualitative bands of risk level. Risk ranks from 1 to 8 are considered to be “extreme”, 9 to 16 are “high”, 17 to 20, “moderate” and 21 to 25 “low” (ASNZS 4360:1999 Risk Management Appendix E).

Table 15-5 Likelihood of Occurrence for Hazardous Incidents

Probability rank	Descriptor	Description
A	Almost certain	The event is expected to occur in most circumstances
B	Likely	The event will probably occur in most circumstances
C	Possible	The event could possibly occur at some time
D	Unlikely	The event could possibly occur at some time but is unlikely
E	Rare	The event may occur only in exceptional circumstances

Table 15-6 Consequence Classes for Public Safety and Environmental Losses

Consequence rank	Descriptor	Public health and safety	Environmental severity
1	Catastrophic	Fatality	Irreversible detrimental effect to off-site natural resource.
2	Major	Permanent disability	Prolonged but reversible detrimental effect to off-site natural resource.
3	Moderate	Hospital treatment	Short term detrimental effect to off-site natural resource with full recovery.
4	Minor	Medical treatment	Minor detrimental effect to on or off-site natural resource and promptly contained/cleaned.
5	Insignificant	First aid	On site release with no damage to natural resource.

Table 15-7 Risk Assessment Matrix

		Probability				
		A	B	C	D	E
Consequence	1	1	2	4	7	11
	2	3	5	8	12	16
	3	6	9	13	17	20
	4	10	14	18	21	23
	5	15	19	22	24	25

15.2.3 Hazard Identification and Assessment

In the following table, C is consequence, L is Likelihood and R is the level of Risk.

Table 15-8 Risk Assessment Table – Construction Phase

Hazards	Proposed controls	Environment			Health and Safety		
		C	L	R	C	L	R
1. Dust from road and earthworks	1. Water trucks.	5	C	22	5	C	22
	2. Speed limits.						
2. Traffic incidents on site	1. Traffic management plan.	4	D	21	3	D	17
	2. Safety inductions for workers.						
	3. Speed controls						
	4. Radio communications in vehicles.						
3. Traffic incidents during conveyor overpass construction	1. Traffic management plan.				3	D	17
	2. Road diversions as appropriate.						
	3. Speed limits.						
	4. Coordination with Department of Main Roads.						
4. Construction activity hazards	1. Fall from heights controls.				3	D	17
	2. Experienced supervision.						
	3. Safety management systems.						
	4. Equipment inspection and selection.						
	5. Formal design safety practices.						
	6. Welding safety practices.						
	7. Contractor and supplier selection.						
	8. Personal Protective Equipment (PPE)						
5. Slump of sloped ground	1. Rollover Protective Structures (ROPS) fitted to equipment.	5	D	24	3	D	17
	2. Geotechnical investigation and design.						
	3. Drainage Controls.						
6. Leaks of oil, fuel or chemicals from vehicles onto construction earthworks	1. Refuelling in designated areas fitted with spill containment.	4	C	18			
	2. Storage and handling in accordance with AS1940.						
	3. Material used in construction will be stored and used in an appropriate fashion to ensure containment.						
7. Pests (weeds) brought to site by earthmoving equipment	1. All vehicles must be washed down and inspected prior to arrival on site.	4	D	21			

Table 15-9 Risk Assessment Table – Operations Phase

Hazards	Proposed controls	Environment			Health and Safety		
		C	P	R	C	P	R
1. Dust from road and earthworks	1. Water trucks.	5	C	22	5	C	22
	2. Speed limits.						
2. Dust release - from the conveyors	1. Dust control on conveyor transfer points will be by the use of water.	5	C	22	5	D	24
	2. Conveyor will be fully enclosed over road ways.						
	3. Conveyor will have wind shield						
3. Traffic incidents on site	1. Traffic management plan.	4	D	21	3	D	17
	2. Safety inductions for workers.						
	3. Speed controls.						
	4. Radio communications in vehicles.						
4. Slump of sloped ground	1. ROPS fitted to equipment.	5	D	24	3	D	17
	2. Geotechnical investigation and design.						
	3. Drainage control.						
	4. Clearance from site boundary or protective berm or bund.						
5. Highwall rock falls	1. Separation of pedestrians from the face.				1	E	11
	2. Protective cabins – Falling Object Protective Structure (FOPS).						
6. Leaks of oil, fuel or chemicals from vehicles during site operations	1. Major equipment maintenance to be conducted in dedicated facilities.	4	C	18			
	2. Refuelling in designated areas fitted with spill containment.						
	3. Storage and handling in accordance with AS1940.						
	4. Material used in construction will be stored and used in an appropriate fashion to ensure containment.						
7. Blasting	1. Explosive materials handled and used in compliance with current Australian Standards (AS2187)/best environmental management practice.	4	D	21	1	E	11
	2. Explosive materials (ANFO) will only be made by licensed contract personnel as and when required.						
	3. Explosives will only be handled and used by competent Contractor personnel.						
	4. Sources of ignition will be strictly controlled.						
	5. Blasting procedures including separation from the blast zone.						
	6. Storage of detonators shall be in accordance with the Explosives Act, Part 4 Division 6.						

Hazards	Proposed controls	Environment			Health and Safety		
		C	P	R	C	P	R
8. Bush Fire	1. Mine operation facilities and equipment will be inspected and tested for fire safety on a regular basis.	3	D	17	4	D	21
	2. Relevant site staff will complete fire safety training during induction and thereafter on an annual basis.						
	3. The site will have an approved fire alarm, detection, suppression and fighting system designed and installed in consultation with the relevant fire control authorities.						
9. Fire in coal storage and handling facilities	1. Water trucks.	4	D	21	5	D	24
	2. Protective cabin on earth moving machinery.						
	3. Suppression systems to be designed to Australian Standards.						
	4. Maintenance of systems to be included in the Project requirements.						
	5. Plant designed to limit ignition sources including non-smoking requirements.						
	6. Emergency Response Plan						
10. Chemical release – liquid from leaks, ruptures, overflows, spillages or pooling. Release to atmosphere or ground systems	1. All storage and handling facilities designed and operated to relevant Australian Standards	4	D	21	4	D	21
	2. Clean storm water is directed away from potentially contaminated areas.						
	3. Site drainage system designed to allow retention of spills on site.						
	4. Hazard and Operability (HAZOP) reviews conducted during detailed design.						
	5. Personnel trained in appropriate storage and handling and incident response.						
	6. Monitoring of wastewater/ Sewage Treatment Plant (STP) plant to detect leaks or spills.						
	7. Material safety data sheets available on site						
	8. Procedure for introduction of new chemicals						
	9. Appropriate personal protective equipment and spill response/incident response equipment.						
	10. Chemical incidents included in Emergency Response Plan.						
	11. Preventative maintenance program.						
11. Excessive noise (blasting/ coal preparation plant)	1. Design and operate all equipment to comply with the <i>Environmental Protection (Noise) Policy 1997</i> .	5	C	22	5	C	22
	2. Noise emission requirements included in vendor information for the evaluation process.						
	3. Personal Protective Equipment provided.						
	4. Silencers fitted to dust collection fan outlets.						
12. Failure to provide emergency treatment and response	1. Communication system for operators working alone.				4	E	23

Hazards	Proposed controls	Environment			Health and Safety		
		C	P	R	C	P	R
13. Release of treated effluent from STP	1. Re-use in process water circuit or treatment in sewage treatment ponds.	4	E	23			
14. Contact with high voltage electricity	1. Secured access				1	E	11
	2. Qualified electricians.						
	3. Control of Energy (isolations) procedure						

15.2.4 Risk Assessment - Conclusion

The information contained in **Table 15-8** and **Table 15-9** shows that the risk profile for the proposed facility is generally “Low” or “Moderate” with the exception of safety risks from highwall rock fall and blasting, which have been assessed as “High” risk. It should be noted that these are assessed as high since there is significant energy involved and the controls can only address the probability of the event. These risks are common to all open cut mining operations and are subject to the controls contained in the *Coal Mining Safety and Health Regulations 2001*. Blasting is covered specifically in Part 4 which also refers to AS 2187 ‘Explosives—Storage, transport and use’.

There are no “Extreme” risk scenarios identified. There are no identified extreme or high risks to off site facilities, persons or the environment.

15.3 Construction and Operations Impacts and Controls

15.3.1 Emergency Response

Designated first aid and emergency rescue facilities and equipment will be available during the construction and operation phases. Appropriately trained personnel will be on-site throughout the life of the Project to provide first aid and respond to on site emergencies. First aid response and provision will be included in the site induction training that will be provided to all staff members.

The site will have a fire brigade approved fire response/fighting system. All fire fighting facilities and equipment will be installed, serviced, maintained and inspected by a certified body.

Stores, workshops and offices will be fitted with approved and certified fire detection (smoke detectors) and sprinkler systems. First aid fire fighting equipment (hand held extinguishers and fire hoses) will be installed at strategic points within the each building. Fire fighting equipment and exit locations will be suitably signed. All work areas will be within the required distance to reach emergency exits.

Induction training will include fire response techniques. The site will have a fire truck or suitably equipped water truck or trailer that can support fire response requirements. Site fire fighting capabilities also will be addressed in the Emergency Response Plan.

Fire drills will be undertaken on a regular basis. Permanent facilities, such as fuel storage areas, will have a dedicated fire alarm, suppression and fire fighting systems.

The Proponent will liase with local State Emergency Services and local ambulance and hospital services with respect to planning for Emergency Response.

If there is a need for a helicopter evacuation, then it is likely that the evacuation would occur from the Clermont Airport to the south of the Clermont MLs.

15.3.2 Health Controls

15.3.2.1 Food Hygiene

Areas involved the provision and supply of food, such as the construction mess or meal rooms, will operate in compliance with current food and hygiene legislation. The catering contractor will hold the relevant licence under the *Food Act 1981*.

15.3.2.2 Odour

The Project is not expected to produce any odour which may be detrimental to the health and safety of employees, visitors or the general public.

15.3.2.3 Dust

The Project will implement particulate and gas/vapour exposure standards and procedures that will apply to dust, fibres, mist and fume (ie. particulates), and gas and vapour exposures in the workplace, (with emphasis on inhalation as the prime route of exposure). The standards and procedures will cover, amongst other things, evaluation of particulate and gas/vapour hazards, and development of a control program to ensure that employees and contractors will not suffer adverse health effects from particulates or gas/vapours, either used or generated by the Project. Where required, the dust control program will include engineering controls and use of respiratory protection devices.

The health risks are expected to be low. Dust from earthmoving machinery will be controlled by water trucks. The nearest residences are several kilometres from the site and are not expected to be adversely affected by dust during construction (see **Section 6 – Air Quality**).

15.3.2.4 Noise

All equipment (both fixed and mobile) will comply with the relevant Australian Standard in regard to design and operating noise levels.

The Rio Tinto Occupational Health Standard for Hearing Conservation will apply to all phases of the Project. The Project will implement hearing conservation standards and procedures during construction and operation to ensure that employees and contractors will not suffer adverse health effects from noise generated in the workplace. These standards and procedures will cover, amongst other things, the identification and evaluation of occupational noise hazards and development of noise control programs to minimise noise levels and protect employees and contractors from adverse exposure. Where required the noise control programs will include use of hearing protection devices.

15.3.2.5 Pests

The Project is not expected to lead to an increase in the number of pests during construction or as a result of site operations.

15.3.2.6 Waste

Waste will be managed to avoid adverse impacts on the health of the mine workforce and minimise risk of impact on land, air and water.

There will be small amounts of wastes generated during the construction of the mine site infrastructure. This waste will consist of scrap steel, timber, concrete, general waste, recyclable waste and some hazardous waste from the operation and service of equipment.

During the construction phase, food wastes, paper and recyclables will be generated in communal areas. Colour-coded, signed bins will be used to segregate and collect these wastes. The bins will be located throughout offices and canteen areas to achieve maximum economic waste recovery. Waste materials that are known to attract vermin will be stored and handled in a hygienic manner. General wastes will be transported for disposal to the Clermont landfill.

Standard procedures will be in place during construction to contain and limit damage from accidental release of waste materials, such as oil spillages.

Operational activities are also expected to produce small quantities of hazardous (regulated) wastes such as hydrocarbons and hydrocarbon contaminated products (oily wastes and oil filters). Waste materials which are known to attract vermin will be stored, handled in a responsible manner and removed from site by a licensed waste management firm.

Standard procedures for the storage, containment, disposal and spill response for potentially hazardous waste materials will minimise potential impacts associated with these materials/substances. The health risks presented by operational wastes are low.

15.3.2.7 Chemicals

The chemicals used during the construction and operation phases will be relatively benign. Fuel (predominantly diesel), lubricants, oils, minor quantities of solvents, degreasers and domestic cleaning agents will form the majority of chemicals on site (**Table 15-3**). All hydrocarbons will be stored and handled in accordance with Australian Standard 1940:1993 *The Storage and handling of combustible and flammable liquids*. In the event of leaks or spills chemical storage areas will be suitably bunded and constructed to minimise the potential for leaks to cause environmental harm. All chemicals will be stored, handled and used according to provisions in their Material Safety Data Sheet (MSDS). The health risk presented by these chemicals is relatively low.

The chemicals used at the mine site will be relatively benign. The coal preparation plant will involve the use of an industry standard flocculent. Fuel (predominantly diesel), lubricants, oils, minor quantities of solvents, degreasers and domestic cleaning agents will form the majority of chemicals on site (refer **Table 15-4**). Standard procedures for the storage, containment, disposal and spill response for potentially hazardous materials will be developed.

15.3.3 Construction and Operation Safety Issues

The key hazards identified with the construction and operation phase are discussed below, along with appropriate prevention, detection and protection measures. The traffic predicted to occur during the construction and operational phases will pose negligible risk to any nearby bridge structures.

15.3.3.1 Equipment

Construction vehicles and equipment will be operated within the manufacture's specifications. All vehicles and equipment will be maintained and serviced on a regular basis. Records of maintenance and servicing will be retained on-site for the duration of the construction phase.

During operations, mining equipment, such as industrial gauges or soil/ moisture density gauges, which contain radionuclide material, will be held under licence (issued under the *Radiation Safety Act 1999*). Machinery and equipment operators will be trained and carry the current licenses, where necessary. The health risk presented by equipment/machinery operation is considered low. The key hazards identified with the mining operations are also shown below, along with appropriate prevention, detection and protection measures.

15.3.3.2 Vehicle Collision and Driving Conditions

Vehicles on the construction site are likely to include front-end loaders, graders, rollers, water trucks, dump trucks and light vehicles (four-wheel drives) that operate on roads and access roads around the site. Collisions between these have the potential to cause serious injury to operators and passengers.

The traffic projected to occur during the construction and operational phases will pose negligible risk to any nearby bridge structures.

Construction workers operating vehicles on-site will be trained and licensed, so that these vehicles are driven in a safe and appropriate manner. Speed control (signage), driving to conditions, and prescribed driving etiquette on the mine site will be used to control the risk. All vehicles will be fitted with radios for two-way communication.

Watering of roads and access areas will be undertaken regularly to suppress dust and improve visibility. Adequate night lighting through the provision of lighting towers and vehicle headlights will be provided to ensure night operating and driving conditions are safe.

The potential for injury from vehicles on the construction site is confined to construction personnel and animals, and the risk is considered moderate.

During operations, vehicles on the proposed mine include haul trucks, loaders, scrapers, graders, water trucks and light vehicles (four-wheel drives) that operate on haul roads and access roads around the mine site. Collisions between these have the potential to cause serious injury to operators. Mine traffic will occur 24 hours per day, with a significant amount of night driving likely to occur.

Training for drivers will be provided, so that these vehicles are driven in a safe and appropriate manner. Speed control, driving to conditions, and prescribed driving etiquette on the mine site will be used to control the risk.

Haul roads will be designed to comply with *Coal Mining Safety and Health Act* requirements and roads will be graded to an adequate and safe level of operation for these vehicles. Areas within the mine will have restricted access to ensure the separation of these vehicles from other mine vehicles. Watering of roads and access areas will be undertaken regularly to suppress dust and improve visibility. Adequate night lighting will be provided around the industrial area to ensure night driving conditions are safe. The risk of injury is confined to mine personnel, and the hazard is considered moderate.

15.3.3.3 Personnel Interaction with Machinery

Personnel may be at risk of interacting with construction machinery, parts from vehicles and earth moving equipment, resulting in the potential for serious injury. The hazards from interaction with machinery may occur during the construction of infrastructure and movement of heavy equipment.

Although the potential for injury is moderate, strict adherence to the site's work place health and safety rules and established safety systems will reduce the likelihood of occurrence.

During operations, although the potential for injury is high, road traffic rules and maintenance lock-out/tag-out safety systems reduce the likelihood of occurrence and therefore the risk to low levels.

15.3.3.4 Fuel Storage (Mobile and Static)

A permit, under the *Building Act 1975*, to store flammable and combustible liquids will be obtained from the Belyando Shire Council. Fuel storage on-site will be predominantly diesel, which presents a relatively low combustion risk and a moderate environmental risk. Ignition sources will be controlled to avoid fire involving bulk fuel oil. Fire fighting facilities will be provided at fuel storage facilities.

All hydrocarbons will be stored and handled in accordance with Australian Standard 1940:1993 *The Storage and handling of combustible and flammable liquids*. Chemical storage areas will be suitably bunded and constructed to minimise the potential for leaks to cause environmental harm. Standard operating procedures for the storage, containment, disposal and spill response for potentially hazardous materials will be developed. The use of Australian Standards (AS 1940) for the management of fuel storage (bunding and containment) will reduce this risk to a low level.

During operations, the hazard associated with the storage of fuel oil arises from leaks/ failures in the system. To minimise the hazards associated with fuel oil leaking during tanker unloading, the following measures will be in place:

- a program of regular equipment inspection and testing will be implemented to ensure reliable performance;
- operators will be trained in the safe operation of the system and emergency procedures in the event of fuel oil leakage;
- spill containment equipment will be available at the unloading pad for use in the event of spillage;
- a sump will be provided to collect any spillage and allow recovery;
- ignition sources will be strictly controlled and limited to avoid a fire;
- appropriate fire fighting materials and equipment will be available to suppress fires; and
- an approved fire protection system will be installed around hydrocarbon storage areas.

The following measures will be taken to minimise the potential for the leakage of fuel oil from storage tanks:

- adequate bunding will be constructed to contain spill, in accordance with AS 1940;
- tank level indicators will be installed on fuel oil tanks for monitoring of fuel oil levels;
- maintenance of fuel oil tanks will be undertaken, to ensure safe and effective operation of all components; and
- the tank will be designed in accordance with AS 1692: 1989 Tanks for flammable and combustible liquids to minimise the potential for failure of the diesel storage vessel.

15.3.3.5 Blasting and Misfires

Blasting creates a number of potential risks such as dust, noise, vibration and flyrock and airblast effects. Flyrock and airblast effects can cause serious personal injury if not properly controlled and therefore create a high risk to the workers. Mitigation measures include the use of blasting experts to undertake safe blast design, control of access (including temporary mine site road closure) and evacuation warnings before blasting. Personnel in the vicinity of a blast will wear Personal Protective Equipment (PPE) and all personnel will observe safe distances during blasting activities.

Proper stemming will be used in the preparation of charges and appropriate charge ratios will be used to limit the amount of fly rock produced by a blast. Blasting operations will be carried out by an explosive contractor, which has an established record of operation in the mining industry and adherence to the Australian Explosives Manufacturer Safety Committee (AEMSC) Code of Practice.

Blasting misfires include incomplete detonation of the blast. This may reduce or confine the blast impact, and may pose safety issues to personnel re-entering the area of blast misfires. The requirements of the *Coal Mining Safety and Health Regulations 2001* and *AS 2187 – 1988 Explosives - Storage, transport and use* will be applied to reduce the incidence of misfires. The training and management of the blast crew will be required to ensure appropriate knowledge and skill by personnel involved in blasting activities. Safety procedures will be strictly adhered to on site to limit the probability of the hazard occurring.

15.3.3.6 High Voltage Exposure

Specialist electrical engineers will undertake the construction of the 66 kV power line and mine site reticulation systems, using approved codes of practice and procedures.

Power supply to the Project will be via a 66 kV overhead power line originating at the Copperfield substation located to the west of the Clermont township. A substation near the Project will provide power distribution for infrastructure facilities and the electric equipment.

Electricity use from mine lighting and the electrical operation of infrastructure will require the use of potentially lethal levels of voltage and amperage.

There will be specific and detailed standard operating procedures implemented that deal with high voltage. The residual high risk can be managed by ensuring the preventative controls are well implemented and monitored.

15.3.3.7 Working at Height and Falling Objects

There will be instances where workers are required to work at height during the construction phase (e.g mine site buildings and conveyor construction). The Proponent will plan activities to eliminate the requirement to work at heights where practical. However, where working at heights is unavoidable, Safe Operating Procedures for working at height will be used to control this risk. Mandatory PPE on a construction site that protects against objects falling from height includes steel capped boots and hard hats (both are worn at all times). Fall of persons will be controlled through appropriate elevated work platforms and the proper use of harnesses.

The residual risk is moderate with these controls, as safety statistics during construction activities indicate that injuries caused from falls do contribute significantly to work related injuries.

During operations, there will also be instances where mine operators are required to work at height during maintenance or repair duties (e.g. for crushers or conveyors) and where rocks could fall from the highwall near worker locations. Safe Operating Procedures for working at height will be used to control this risk. Mandatory PPE on a mine site that protects against objects falling from normal heights includes steel capped boots and hard hats. Objects falling from significant height shall be controlled through exclusion zones.

The residual hazard is still high, as safety statistics at mine sites indicate that injuries caused from falling objects and falls do contribute significantly to work related injuries. Hence the preventative controls must be strictly enforced.

15.3.3.8 Spontaneous Combustion at Coal Stockpile

Coal stockpiles may combust spontaneously, which may result in fires, smoke and environmental nuisance effects. The issue of spontaneous combustion at the Project will be assessed during the construction phase. Spontaneous combustion hazards are believed to be low and relatively easily controlled.

Management systems at the BAM have been developed to minimise the risk of spontaneous combustion of the coal. These systems will be adopted at the Project.

15.3.3.9 Transportation

Licensed transporters operating in compliance with the Australian Dangerous Goods Code will undertake the transport of dangerous goods to the construction site.

During operations, licensed transporters will undertake the transport of dangerous goods (ammonium nitrate) to site. The transport of ammonium nitrate will be undertaken in compliance with the requirements of AS 1678.5.1.002-1998: *Emergency procedure guide - Transport - Ammonium nitrate*.

15.3.3.10 Conveyor

During operations, the overland conveyor will convey around 3000 t/hr, with the belt travelling at around 5.5 m/s. The overland conveyor corridor will be fenced with 1.8 m high chain wire fence to control public access.

15.3.4 Security

The project will be enclosed with suitable fencing. All areas with high risk of a security breach or unauthorised public access will be protected by a 1.8 m high chain wire fence topped with barbed wire. Prior to being given access to the site, visitors will complete mandatory registration and an environmental, health and safety induction. The scope of induction will reflect those areas of the site that the visitor will be permitted access.

Access to the site will be denied to any site staff/visitor not wearing the following mandatory personal protective equipment (PPE):

- safety helmet;
- steel cap boots;
- safety glasses; and
- high visibility vest.

15.3.5 Explosives

A specialist explosives company will provide the ammonium nitrate, emulsion, detonators and boosters to be used during blasting operations. The Contractor's personnel will be licensed and trained in the transport, handling, mixing and use of explosive materials. ANFO will be mixed on-site by the explosives company in a dedicated area.

There will be no explosives stored on site – only detonators. The magazine for the storage of the detonators is in the south-west area of ML 1904, suitably distant from any activities on the mine and the highway (see **Figure 2-1**). The storage location for the detonators will be approved under the

Explosives Regulation 2003 section 44 and Part 3 of *Explosive Act 1999* prior to construction. Blasting operations will comply with the *Explosive Act 1999* and the *Coal Mining Safety and Health Act 2001*.

Note that the location of the magazine will take into consideration:

- 1) public risk;
- 2) enhancing physical protection to the public by the use of natural ground features;
- 3) vehicular access routes and junctions with public roads;
- 4) security;
- 5) other activities within the proximity of the site; and
- 6) protection from flood, fire, landslide, lightning or other natural incidents.

Refer AS2187.1- 1998 Explosives—Storage, transport and use Part 1: Storage, Section 2 Design Requirements.

The mine will have, amongst other requirements, standard operating procedures as required under the *Coal Mining Health and Safety Regulation 2002* for the following—

- (a) transporting explosives on the mine site;
- (b) inspecting and reporting on the safety of equipment used at the mine for transporting and delivering explosives (as required);
- (c) taking appropriate action to make equipment mentioned in paragraph (b) safe;
- (d) accounting for explosives brought onto the mine;
- (e) checking for, and isolating, explosives that have deteriorated (unlikely, as none will be stored);
- (f) minimising the risk of theft or misuse of explosives (unlikely, as none will be stored);
- (g) identifying and controlling hazards—
 - (i) during the charging and firing of explosives; and
 - (ii) in particular places, including, for example in a storage bin feeder in which an explosive is to be used to clear a blockage;
- (h) finding, recovering and detonating misfired explosives; and
- (i) keeping a record about misfired explosives.

Additional requirements are included in AS2187.2- 1998 Explosives—Storage, transport and use Part 2: Use of Explosives.

15.3.6 Health and Safety Management Systems

The Project will adopt a health and safety management system similar to those presently implemented throughout RTCA's other operations. The system will adopt an integrated approach to risk management of the operations, recognising the hazards at all points in the operations and how these are controlled. The safety management system will comprise many of the 'defence in depth' layers but should include the following:

- strict review of modification and design procedures;
- policies for managing change (new technology, new procedures);
- assessment of human factors in the design and operation;
- training programs for operators;
- internal standards and codes of practice;

- process and equipment integrity including preventative maintenance and procedures;
- documentation and propagation of process knowledge to operators and engineers;
- accident investigation procedures;
- enhancement of process safety knowledge and its dissemination to staff;
- high quality risk and compliance auditing; and
- clear statements of risk management objectives and goals.

15.3.7 Future Risk Assessment

A hazard and operability (HAZOP) study will be carried out on the process areas of the Project, such as the coal preparation plant. Operations risk assessment such as Failure Mode Effect Analysis and Job Safety Analysis shall be carried out on mechanical and task based exposures.

15.3.8 Monitoring

Monitoring will be undertaken to assess whether project health and safety measures are being implemented and effective. Monitoring will involve of the compilation and assessment of data relating to health and safety issues, such as reported near misses, accident reports and any health surveillance data (sickness data).

Accident and near miss data will be monitored to identify where:

- common themes occur;
- PPE is being incorrectly used/abused;
- corrective actions have not been strictly implemented
- corrective actions are ineffective;
- procedures/practices need to be reviewed; and
- retraining may be required.

Health surveillance data will be monitored to identify common themes.

15.3.9 Emergency Planning

An Emergency Response Plan will be prepared for operations. Emergency planning will be based on the following components:

- an analysis of the key incidents likely to take place for each operational area;
- an assessment of the degree of impact likely to occur;
- an assessment of what constitutes an emergency for the particular operation;
- an on-site plan to handle incidents;
- an off-site plan with reference to emergency services needed;
- communication, emergency responsibilities, control centre establishment;
- post emergency procedures, including recovery, debriefing and review of plan; and
- testing of plan under emergency-like conditions.

General guidance for preparing emergency plans can be obtained from the Queensland Government, Department of Emergency Services. **Table 15-10** contains suggested or generic elements and response procedures.

The Belyando Shire Council Counter Disaster Plan will be considered when preparing the Emergency Response Plan. The Belyando Shire Council will also be advised of changes as a result of the Project that could affect the Shire and Mackay District Plans. These include changes resulting from creek and road diversions that could affect evacuation routes and response times.

Table 15-10 Emergency Plan Elements for Mine-Site Related Emergencies

Event	Level of emergency	Emergency services required	Resources needed	Organisational aspects	Damage control actions
Fire on mine site	Local/site	Local fire brigade Police and ambulance on alert	Fire fighting trucks and water tankers Plans and maps Site fire fighting team	Evacuation of affected mine workers Communications	Fire containment
	Potential external alert	Local fire brigade		Roll call	Shutdown of affected operations
				Evacuation notice Communications to fire brigades	Evacuation from around fire sensitive areas such as the fuel oil tanks.
Vehicle collision	Local/site	Ambulance, Police, Fire Crew	Rescue, Fire fighting capability, Fuel containment materials	People control, Evacuation of immediate area	Damage control actions, stabilise situation, contain fuel spillages, Control ignition sources
Falls and impact incidents	Local	Ambulance, Rescue	Site rescue equipment	Communication, Evacuation of immediate area	Stabilise, Isolate source of incident
Spontaneous combustion	Site	Site fire fighting team	Dozer, fire truck and/or water truck	Communication, Evacuation from area	Extinguish/cool heat source
Coal fire in conveyor system	Local and site	Local fire crew Maintenance staff	Fire fighting equipment Fire snuffing facilities	Production personnel shutdown	Shutdown procedures Containment of fire spread and extinguish
Mechanical and electrical failure	Local Site External	Local maintenance Production staff	Replacement or standby equipment	Major failure requires external communication Internal communication to maintenance groups from production	Isolation and possible shutdown