

PROJECT NAME:

GOLLANS BAY QUARRY CEMP

Lead Contractor: HC&R Joint Venture

Project Timeframe: Stage 1 – Duration of 2 years between December 2018 and December 2020



Environmental effect	Risk
Dust	MED
Erosion and sediment generations	HIGH
Noise	MED
Archaeology	HIGH
Hazardous substances	HIGH
Contaminated land	MED
Other	HIGH

Version #	Prepared By	Reviewed By	Approved By	Date
Rev C	John Hogan	Chris van Oosterom	Nick Ross	27/11/2018
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Role	Name	Signature	Date
Author	John Hogan		
Lead Contractors	Nick Ross		
LPC Project Environmental Adviser	Jared Pettersson		

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1.0 INTRODUCTION

1.1 PURPOSE OF THE QCEMP

This Quarry Construction Environmental Management Plan (QCEMP) has been prepared to fulfil the agreement between Lyttelton Port Company (LPC) and HC&R to carry out stage 1 of the Te Awaparahi Bay Dredging and Reclamation Project and develop the Gollans Bay Quarry to provide rock and reclamation materials for the Contract.

The purpose of the QCEMP is to put in place practices for the duration of the Project which will reduce the negative environmental impact of the works. Ongoing monitoring and review of environmental effects through out the works may require changes to these practices.

The QCEMP details practices required to mitigate the potential environmental effects of operating the Gollans Bay Quarry and using the access haul road to provide rock and reclamation materials specifically for construction of Stage 1 of the Te Awaparahi Bay Dredging and Reclamation Project (herein referred to as the Project).

This QCEMP is a working document and will be amended as required with any Contract requirements following the Principal's approval to commence quarry extraction and processing activities on the designated Gollans Bay site.

This QCEMP sets out the specific environmental risks for the quarry operations and truck haulage of quarry products to the reclamation area followed by placement in the construction zone to interface with the dredging operations.

The information provided by the LPC consultants for tender purposes and Appendix 28 in the LPC Port Recovery Plan forms the basis of the risk assessments, mitigation of risk, control measures and monitoring and HC&R will ensure that at whatever stage the Project is at, the environmental risks will be continuously re-evaluated in the monitoring, and all the necessary control measures are in place.

This QCEMP is for Stage One of the Project and the recommended mitigation measures for the rehabilitation which relate to the final stages of the Quarry with completed quarry faces and benches will only be partly completed.

In preparing this QCEMP, consideration has been given to the potential environmental risk each activity in the quarry development will present.

1.2 ROLES AND RESPONSIBILITIES

HC&R's environmental policy is detailed below as it is a key responsibility for all Contract personnel to follow:

STAGE ONE LAND RECLAMATION AND QUARRY MANAGEMENT

ENVIRONMENTAL POLICY

Our Commitment

HC&R Joint Venture is committed to undertaking its operations in an environmentally responsible manner, and proactively managing risk that may harm or affect the environment.

HC&R Joint Venture will:

- Establish and maintain an environmental management system in accordance with AS/NZ 14001.
- Comply with all contract conditions and relevant environmental legislation.
- Regularly review business operations, identify and implement opportunities for continuous improvement.
- Establish clearly defined environmental objectives and targets to measure performance and identify opportunities for continual improvement.
- Ensure that Senior Management are accountable and provide leadership and resources to manage environment performance.
- Ensure that Supervisors and Superintendents are held responsible for their work areas and proactively address environmental issues applicable to their work site.
- Ensure and that all personnel are aware of their responsibilities and have the relevant education and training, including Project-specific awareness training and incident reporting procedures.
- Strive to prevent pollution, reduce waste, and commit to recovery and recycling where feasible.
- Periodically review this policy for effectiveness, compliance and stakeholder participation.
- Ensure that subcontractors and consultants adopt all principles of HC&R Joint Venture's Environmental Policy and Construction Environmental Management Plan.

Greg Kroef
JV Leadership Team

Geert Mijers
JV Leadership Team

Nick Ross
JV Leadership Team

Tim Ross
JV Leadership Team

The following table details the responsible personnel and their assigned roles for the Project.

Table 1: Roles and responsibilities

Role	Company Name	Person Responsible	Contact Details
LPC Project Manager	LPC	Craig Monkman	021630560
LPC Project Environmental Adviser	Enviser Ltd	Jared Pettersson	021679838
Contractor – lead	HC&R	Mark Coleman	0274352627
Foreman	HC&R	Jason Shaw	0274884038
Subcontractor	Red Bull Powder Co	Matt Cowie	0276488636
Technical experts			
Contaminated land specialists	Envirowaste	Dean Burwell	0274784022
Archaeologist	Under Over Archaeology	Kirsa Webb	0212361126
Noise expert	Marshall Day	Jon Farren	033658455
Hazardous substances specialists	Envirowaste	Joe Wildy	0212771099
Approved handler (hazardous substance)	RedBull Powder Co	Matt Cowie	0276488636
Erosion and sediment control expert	PSES	Peter Stevens	021757081
Person responsible for monitoring and reporting and onsite referral of complaints			
Dust	HC&R	Mark Coleman	0274352627
Erosion and sediment generation	HC&R	Mark Coleman	0274352627
Noise	HC&R	Mark Coleman	0274352627
Archaeology	HC&R	Mark Coleman	0274352627
Contaminated land	HC&R	Mark Coleman	0274352627

1.2.1 Training

It is the responsibility of HC&R to ensure all staff involved in the construction project understand the environmental risk involved with developing the GB quarry and are trained and competent in implementing this QCEMP.

The training provided will ensure that all Contract and Sub Contract employees working on the site understand the requirements of the QCEMP and the related quarry consent conditions in particular for the dust control, erosion & sediment control and for handling any archaeological discoveries. The training will cover the actions required to implement the QCEMP such as:

- a) site inductions will include the key requirements of the QCEMP
- b) hazard boards and signage will be used for environmental matters as well as safety alerts
- c) toolbox discussions & meetings at which the topic will be rock slope stability & observations
- d) formal training sessions for dust control and the erosion & sediment control system
- e) special briefings for prestart and as required for archaeology finds

- f) special briefing for the handling of hazardous substances such as oils, fuel and greases
- g) briefing sessions by the drill & blast subcontractor to cover the requirements for the storage and handling of explosives on the site
- h) briefing sessions by the Contaminated Land specialist on their asbestos removal methodology and the Contaminated Soil Management Plan
- i) Mobile plant training for best industry practice is a continuing process for HC&R to ensure the operators work with due consideration for the environment and the neighbours around the quarry
- j) HC&R will provide ongoing instruction and education on the QCEMP, in particular to cover any changes that may need to be implemented during the term of the project works and for any new staff working on the project.

1.3 SITE DESCRIPTION

The GB Quarry is situated on the south facing shore of Lyttelton Harbour, at Gollans Bay a distance of 2.5 km from the LPC coal yard. Access to the site is along a section of Old Sumner Road from Lyttelton Port which links with the quarry access road. The quarry has provided rock to the Lyttelton port companies for several decades for port maintenance. A disused landfill is also located in the Gollans Bay area adjacent to (downslope of) the quarry site. Due to the safety concerns for the quarry benches after the 2011 Christchurch earthquake there has been no work in the quarry since that time.

The quarry benches have naturally re-vegetated with predominantly grass and other exotic plants, as well as some native species. The land surrounding the quarry is steep and is covered in grass and other exotic and native plants with many rock outcrop exposures.

Access along the quarry haul road to the LPC Coal Yard rail line is included as the site in the QCEMP. The provisions for the section of truck haulage west of the rail crossing to the Stage 1 reclamation contract site are included in the Reclamation CEMP.

Image of Stage 1 construction location and Gollans Bay location

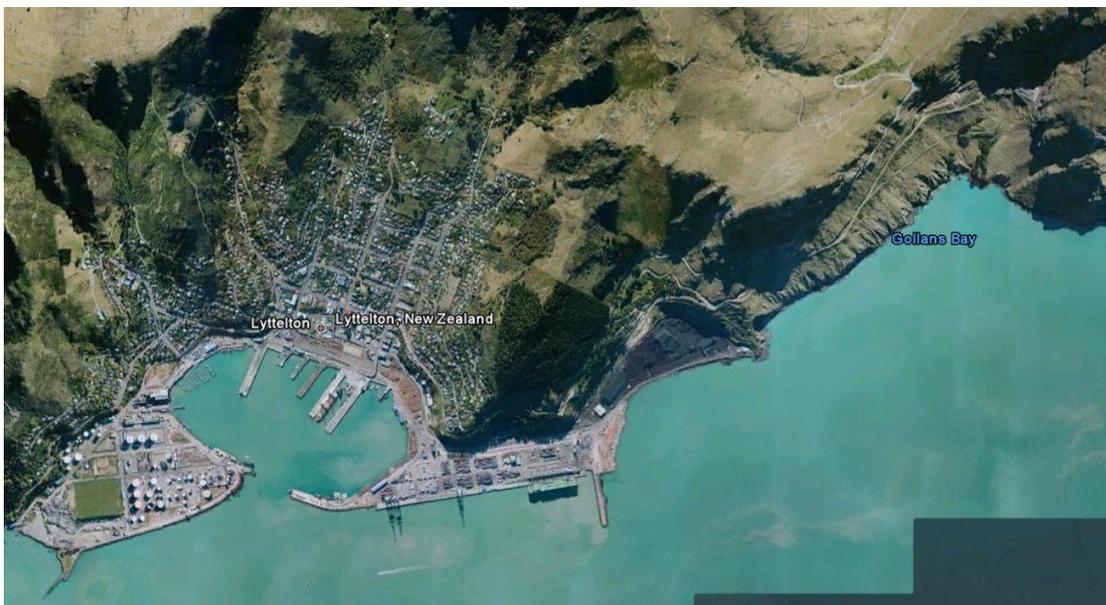


Image of Gollans Bay Quarry



1.4 PROJECT DESCRIPTION

The project is for constructing Stage 1 of the planned LPC wharf extension and the rock for the bund and the materials for the reclamation Works will be obtained from the Gollans Bay Quarry and transported to the Stage 1 site along a designated haul road alignment. This QCEMP covers the quarrying portion of that project.

Stage 1 includes 5 Ha of reclamation works which extends into Te Awaparahi Bay from an existing area of about 10 ha of reclamation that is nearing completion, extending south from the existing coal stockyard.

The Stage 1 Project involves the following items which form the Contract Works:

1. To construct an engineered bund which will retain the reclamation fill and provide a foundation for the future LPC wharf construction. The engineered bund interfaces with the existing breakwater at the reclamation site.
2. Removing soft sediment under the proposed bund footprint using dredging methods with disposal in the designated area offshore.
3. Preparing the GB Quarry for rock extraction by scaling and clearing the benches and the quarry floor, removing stockpiles of earthquake debris and setting up the processing and stockpiling which will be required to meet the construction programme. The key quarry product required is Select Fill for the core of the bund as well as armour rock for the outer bund slopes forming a seawall.
4. Constructing the engineered bund by initial placement of Select Fill with a bottom dumping barge, followed by end-tipping rock onto the leading face of the bund and pushing the Select Fill rock into the harbour along the partly filled dredged channel using a bulldozer or excavator.
5. Extending the new southern bund approximately 50 m beyond the proposed eastern end of the planned reclamation to enable the construction of a 350 m long Stage 1 wharf.
6. Reclaiming the land between the bund and the existing reclamation by end tipping material from the quarry into the area along the north side of the bund. This would commence when sufficient length of the southern bund has been constructed such that the bund can be formed concurrently and the reclamation is contained.

7. Construction material will be primarily from rock and fill material excavated from the LPC owned GB Quarry. Some earthquake rubble may also be utilised if it is available and suitable. The larger rocks for armouring which become available from the quarry operations will be used along the sea wall and in accordance with the bund construction specifications.
8. A surcharge stockpile is to be placed along the completed southern bund and across the northern reclamation area together with settlement monitoring stations.

The overall construction programme for this Stage 1 work is expected to take two years between December 2018 and December 2020.

The Quarry re-established under Stage 1 Contract may also be utilised for the bulk fill for the Stage Two commencing 8 – 10 years after Stage 1 is completed.

The quarry development requires the excavation of hard rock in benches using drill and blast techniques with explosives, and the subcontractor for the drill and blast work will be the RedBull Powder Company.

C&R own and operate the fleet of mobile plant which is to be used for the quarry operations, for the stockpiling and the truck haulage between the quarry and the reclamation works.

HC&R plan to have the following staff working in the quarry:

- a) Two supervisory staff who report to the Contract Manager
- b) 16 equipment operators
- c) 2 plant maintenance servicemen
- d) 2 men for the drill &blast subcontractor plus additional blast crew as required
- e) 5 survey, consultants and technical staff will visit the quarry to provide services

Subcontractors on the quarry site working for HC&R will include:

- a) RedBull Powder Company for drill &blast services
- b) Consultants as required for the specialist services such as slope stability analysis and noise measurements.

The mobile plant and machinery for the Stage One Contract work at the GB Quarry will be the typical equipment used for large quarry and earthworks projects specifically sized for the duty and to meet the programme and will include;

- a) Large sized excavators (100 tonne class)
- b) Medium size excavators (30 to 50 tonne)
- c) Medium sized excavator (HY 480) with hydraulic rock breaker
- d) Large wheeled loaders (WA 500, WA 600 & WA 900)
- e) Rear Dump Trucks 65 tonne capacity Komatsu 605EO)
- f) Bulldozers (40 – 60 tonne) in the quarry and at the reclamation
- g) Drill Rig for the quarry bench drilling
- h) Grizzly screen (40 tonne) for the large rock separation
- i) Rock scalping screen (Powerscreen 2400) to produce the Select Fill, Separation Layer and undersize products
- j) Grader (Komatsu 825) for the haul road and quarry tracks
- k) Water truck to be used for water application to the haul roads and stockpiles
- l) Explosives handling truck
- m) Franna mobile crane
- n) Other support machinery such as maintenance truck & fuel truck as required

The quarry operating hours are planned as the hours of daylight normally between 6 am and 7 pm for Monday to Saturday inclusive and excluding public holidays. It may be necessary to extend the hours of work to expedite the Contract. Where needed some machines maybe required to work past 7pm to continue with producing selected construction products.

1.5 REGULATORY REQUIREMENTS

The preparation and implementation of this QCEMP is required under the following rules (and related matters of control) inserted in the Regional Coastal Environmental Plan via the Lyttleton Port Recovery Plan.

Rule 10.1.1 - Elements of recovery

An expedited recovery of the Lyttleton Port is enabled by undertaking the following activities:

Item 3) Quarrying at Gollans Bay and the construction of a new haul road and works to widen and improve the existing haul road.

Rule 10.1.5 – Construction Environmental Management Plans

All recovery activities are undertaken in accordance with a CEMP that:

- 1) identifies the receiving environment and its state and contains an assessment of the effects of the construction activity on the receiving environment,
- 2) identifies appropriate mitigation measures
- 3) identifies monitoring and reporting processes and procedures, and
- 4) Ensures that management practices are adapted to address any adverse effects of an activity where practicable.

The Gollans Bay quarry has an approved Land Use Consent Application Number RMA/2017/869 to undertake quarrying operations within the identified area and the Report /Decision is included in this QCEMP as Appendix I.

Appendix J is CRC 111657, consent to discharge contaminants to air from the upgrade of the haul road and construction of the reclamation at Te Awaparahi Bay.

Appendix K is CRC 175552, consent to discharge contaminants to air from the Gollans Bay quarry

The following Consents have been replaced by Rules to cover them as Permitted Activities in the Canterbury Land & Water Regional Plan:

- CRC 111660, Land Use Consent to undertake earthworks to extend a quarry and associated haul road. CRC 111662, consent to discharge stormwater to land which may enter water for site construction works on quarry activities to the Gollans Bay quarry or upgrading the haul road between the quarry and Te Awaparahi Bay.

1.6 ENVIRONMENTAL RISK ASSESSMENT

The Environmental risk assessments have been carried out utilising the LPC CEMP Guideline manual and the Contract specification documents together with the experience of the Contractor working in quarry development projects.

The types of work in the quarry that may generate **Airborne Dust** will be:

- a) The movement and operation of the mobile equipment in the quarry
- b) The movement of dump trucks along the haul road
- c) Bulldozer use to remove overburden and develop the benches in the quarry by pushing material from upper benches to lower benches
- d) Unstabilised stockpiles of loess and topsoils may be affected by the prevailing SE and NW winds.
- e) The process of stockpiling and materials handling with wheeled loaders
- f) The process of sorting, breaking and screening rock
- g) Use of a drill rig for drilling blast holes on the quarry benches and blasting with explosives
- h) Dropping rock onto the Grizzly sizer

The risk of **Erosion & Sediment** generation in the quarry operations is from:

- a) Steep terrain which has loess that may be disturbed as the upper level quarry workings are extended
- b) Stormwater from the quarry is directed across benches and roads to the pit floor at RL 100 m from where it needs to be discharged
- c) Rain events on stockpiles of product and reclamation materials
- d) Haul road edge drainage channels which carry haul road surface water
- e) Run off from quarry benches and ramps that are traversed by mobile plant and tracked equipment

The risk of **Noise & Vibration** generation at the GB quarry will be from:

- a) The operation of the mobile plant in the quarry which includes excavators, wheeled loaders and trucks
- b) The rock handling by wheeled loaders and stockpiling work
- c) The use of bulldozers for bench development and stockpiling
- d) Truck haulage along the haul road
- e) Drilling blast holes on the rock benches
- f) The use of explosives to break the rock
- g) Rock movement down the stockpiles on the benches
- h) Dropping rock onto the Grizzly from the loader bucket
- i) The rock screening process

The **Archaeology** risk is attributed to the following:

- a) The quarry working zone is an area of special significance
- b) A midden has been identified near the ephemeral stream outfall into the harbour within the quarry boundary
- c) The top of the ridge on the north side of the quarry is also identified as a possible area of significance
- d) The quarry area has a historical past

The **Hazardous Substance** risk is from:

- a) The use of oil, grease, and large quantities of diesel fuel in the mobile plant for quarry and truck haulage
- b) The use of explosives which are necessary for quarry rock breakage on the benches

The **Contaminated Land** risk is associated with:

- a) The demolition waste stockpiled at the east end of the RL 100 quarry working area which is likely to contain asbestos and related hazardous substances within the building materials in the stockpile which is mainly brick and concrete.
- b) The unknown fill material in the base of the quarry. Which may have been used as a city rubbish disposal area.
- c) The unknown material used to form access and haul roads to and around the quarry
- d) The known mound of rubbish disposal area on the south boundary of the quarry limits.

The risk associated with the **Rehabilitation & Ecology** plans is due to:

- a) The difficult access on the existing quarry working benches and surrounding area for the carrying out the planned ecological & rehabilitation plans including the Lizard Recovery Programme and Plan
- b) the need to retain access along benches beyond the Stage 1 Contract effectively deferring the ability to progress the rehabilitation programme.

Table 2: Risk ratings for each type of work and the project as a whole

Environmental effect	Risk				
	Drill blast holes & blasting	Excavate & load rock & waste layers	Stockpiling, sorting & processing materials	Haul road operation	Quarry Project
Dust	MED	MED	MED	MED	MED
Erosion & sediment generations	LOW	HIGH	HIGH	HIGH	HIGH
Noise	MED	MED	MED	MED	MED
Archaeology	N/A	HIGH	HIGH	HIGH	HIGH
Hazardous substances	HIGH	HIGH	HIGH	HIGH	HIGH
Contaminated land	MED	MED	MED	MED	MED
Other Effects	LOW	HIGH	LOW	LOW	HIGH
Rehabilitation	LOW	HIGH	LOW	LOW	HIGH

1.6.1 Other effects (e.g. odour, light)

The other Environmental effects to be monitored will include an understanding of the effect of any lighting towers that may be utilised around the rock screening plant in the floor of the quarry and how the potential effect can be mitigated by adjusting the direction of the lights.



2.0 DUST

2.1 ENVIRONMENTAL RISK ASSESSMENT

The discharge to air of dust from the quarry operations and use of the haul road linking the quarry to the reclamation area is a potential environmental risk that requires continuous monitoring and routine control measures.

The dust contaminants discharged to air can be generated from:

- a) Drilling, blasting and the excavation of rock.
- b) The stockpiling, breakage, screening or handling of rock and aggregate.
- c) The loading and unloading of material associated with the handling of rock and aggregate.
- d) Transport of material within the quarry and along the 2.5 km length of haul road to the Reclamation.
- e) Movement of vehicles in and around the quarry working area
- f) Unconsolidated surfaces on stockpiles and quarry faces with wind generated fugitive dust
- g) The handling, stockpiling & transport of the quarry overburden such as soil / loess, tuff and clays.

Table 2-1 Environmental risk assessment, dust

	Type of work				
	Drill blast holes & blasting	Excavate & load rock & waste layers & loess	Stockpiling sorting & processing materials	Haul road operation	Quarry project
Dust risk	MED	MED	MED	MED	MED

2.2 PERFORMANCE STANDARDS

The Contractor will comply with the conditions of the Consents to discharge contaminants to air (CRC175552 and CRC 111657), to ensure that the discharge of dust shall not cause suspended or deposited contaminants which are offensive or objectionable beyond the boundary of the quarry & haul road LPC property on which these consents are exercised.

2.3 CONTROL MEASURES

HC&R will follow all practicable control measures to avoid or mitigate adverse effects on the environment resulting from the discharges of construction and quarry operations dust to ensure compliance.

The single most important control of airborne dust at the quarry and haul road is to have the water truck with sprays available and in use continuously in dry weather conditions. The water supply for the purpose of filling the water truck is the unlimited supply (150 mm pipe at mains pressure) at the coal yard filling station which will share the tank filling time with the LPC water truck.

The control measures will include but are not limited to:

- a) Spraying water on to all working haul roads and unconsolidated surfaces on a regular basis
- b) Minimising unstabilised areas of exposed soil / loess
- c) Control and managing vehicle speeds where water spraying volume proves inadequate
- d) Assess meteorological conditions daily to determine the additional dust control measures required. Windy conditions (above 5.5 m/sec) can aggravate airborne dust so assessing the weather conditions in advance to determine the appropriate dust control measures such as rearranging the work, will be applied

- e) Ensuring appropriate training for the Contract employees to ensure they meet the requirements of the QCEMP and the related quarry consent conditions.
- f) HC&R designating a specific person in the team to be responsible for carrying out all the actions needed in order to meet the requirements of this consent in particular the daily inspections, logbook records and reports.
- g) Maintaining the quarry to reclamation haul road surface in good condition with regular grading and fresh gravel material addition which is appropriate for heavy off-highway dump trucks.

The following table summarises the type of work, dust risk and control that is required.

Type of work	Dust Risk	Control
Clearing and developing benches in quarry	MED	Minimise disturbance if dry materials such as tuff & loess
Excavation & haulage on the quarry benches	MED	Water on rock if required, limit drop heights when loading
Sorting and screening rock on the quarry floor and stockpiling products	MED	Water spray & add shrouds if necessary, minimise stockpile height if needed, limit drop heights in windy weather
Haul road operations to the reclamation area	MED	Control speed & spray water on all haul roads with dry & windy weather use of the water truck

2.4 MONITORING AND REPORTING

2.4.1 Monitoring

2.4.1.1 Meteorological Forecasts

HC&R will check the weather forecasts daily for wind speed, direction and rainfall to assist in managing the site activities and implementing the dust controls. HC&R will request access to the LPC site weather station for this daily data which will be the most representative data available for the quarry operations.

It is noted that the prevailing wind directions at Lyttleton Port are north easterlies and south westerlies which will be considered for implementing the dust controls and determining the potential effects of dusty conditions.

2.4.1.2 Dust Monitoring

A daily dust log will be maintained by HC&R to record the conditions observed during a visual site inspection, the type of work and the potential for any airborne dust generation along with the control measures. In addition, the water truck use, location and quantity of water used will be recorded.

The details of the monitoring activities are summarised as follows with the frequency of checks:

Monitoring Activities	Frequency
Check weather forecasts for strong winds and rainfall to plan Contract activities and dust management response	Daily
Observe weather conditions, wind via observations and data outputs from weather stations and the presence of rain.	Daily and as conditions change
Visual inspections shall be made of all the active quarry working areas	Daily and increased to at least three times daily during the dry

Monitoring Activities	Frequency
	months
Inspect all exposed soils and exposed surfaces for dampness and to ensure that surface exposure of loess and topsoil is minimised	Daily and as conditions change
Inspect stockpiles to ensure enclosure, covering, stabilisation or dampness. Ensure stockpiles of over 3 m in height are appropriately stabilised.	Daily and as conditions change
Inspect dusty activities including drilling, loadout and the rock screening and sorting to ensure dust emissions are effectively controlled.	At all times in particular when wind speed is over 5.5 m/s (20 km/h or 10 knots)
Inspect water cart and sprays to ensure equipment is maintained and functioning to effectively dampen the exposed areas in the quarry and along the haul road extending into the reclamation area along the perimeter road that bypasses the coal yard.	Continuous observation with weekly inspection logged

The key monitoring that requires reporting measures are as follows:

Monitoring & reporting measures	Risk Category
Check & log weather forecast daily. Assess wind speed and rainfall to decide on any actions	HIGH
Carry out visual inspection of daily site activities, dust controls and site conditions and record in daily dust log. Ensure the water truck is deployed to the key haul road sections that may cause airborne dust.	HIGH
Keep an accurate log of all dust complaints from the public and LPC. Record the nature/location/time of complaint, the cause identified, and measures taken to reduce emissions.	HIGH
Use real time dust monitoring (eg hand held monitor) at the quarry site boundary to supplement visual assessments for investigation of complaints	HIGH
Record any exceptional incidents that cause dust either on or off the quarry site & haul road and the action taken to resolve the situation	HIGH

The Contractor will also maintain a regular photographic record of site progress and conditions in particular a record of any airborne dust occurrences.

The Contractor will check any local airborne dust stations for monitoring information in particular at the Principal's LPC site.

2.4.2 Reporting

A copy of the QCEMP which covers the dust management plan will be retained at the HC&R site office and any amendments will be provided as required in the consents.

The daily dust logs will be provided to the LPC project manager on a weekly basis.

A record of complaints relating to the construction dust emissions from the quarry & haul road operations will be maintained.

A record of exceptional dust events shall also be kept.

Each record of a complaint shall include:

1. Date, time and location of the complaint

2. Description of the reported dust nuisance
3. A description of the wind speed and wind direction when the complaint occurred
4. Weather conditions at the time of the complaint
5. Any possible cause of the dust complaint, details of the site inspection, what was noted in terms of dusty activities and what controls were being used or what action was taken to reduce and eliminate the dust nuisance
6. Any corrective action taken to address the cause of the complaint, and
7. The name of the complainant, if available.

All complaints will be reported to the LPC Project Manager.

2.5 CONTINGENCY

HC&R will utilise the best practice equipment operation to minimise dust and, in the event, that further measures are required to control any site dust discharges these will be discussed with the Principal.

A contingency measure that may be required if the road watering application for dust control with one water truck proves to be inadequate is that the contractor can mobilise a second water spraying truck with both road spray boom and hose fittings to wet stockpiles.

In the event that real time monitoring of dust is required for additional control & monitoring an experienced consultant will be engaged to advise on the location, and type of real time particulate monitor.

In moderate windy conditions HC&R will consider additional controls such as further water applications, carry out additional site inspections and limit activities that may be causing airborne dust conditions.

In extreme conditions of wind with strong winds over 10 m/sec combined with dry weather causing high airborne dust risk it may be necessary to relocate, scale down or consider a temporary suspension of equipment operations which are causing the airborne dust nuisance, until the wind eases.

If the haul road condition is contributing to the risk of airborne dust it may be necessary to upgrade the haul road running surface by a combination of adding fresh quarry aggregate and grading the road in addition to the normal application of water by the Contractor's water truck tanker.

The use of haul roads in wet weather can generate fine sludge on the road surface that subsequently changes to dry fine material which potentially can generate dust if not kept wet.

Additives to the water truck tank may be considered if the potential dust causing areas require these wetting agents.

The following table summarises the contingency actions which may be required during adverse wind conditions

Weather Forecast	Action to consider
Winds of 5.5 m/s (20 km/h or 11 knots) or more	Limit the activities that may cause dust affecting the nearest neighbours Additional visual inspections of exposed areas and quarry and haulage operations Assess the need for additional controls in particular an increased water application with the water truck(s)
Strong winds over 10 m/s (36 km/h or 20 knots)	A site shut down and cover up policy to be implemented to minimise / eliminate dust emissions until the wind speed eases
Dry weather (particularly between September and February)	Additional water suppression may be required to minimise any dust generation.



3.0 CONTAMINATED LAND

3.1 ENVIRONMENTAL RISK ASSESSMENT

The Gollans Bay quarry site includes a stockpile of demolition material from the earthquake damaged buildings which includes concrete, brick and related materials which will have to be removed to access the underlying rock for the LPC projects. The stockpile requires testing to ascertain any content for materials such as asbestos and related hazardous building materials which could require removal from the LPC site for disposal to the nearest landfill.

The base of the quarry floor is known to contain fill of an unknown depth and quality.

Consequently, and in accordance with the LPC CEMP guidelines and global NES (soil) consent, the site is classed as Category 2 and the Category 2 Site Management Plan (SMP) will be applied to the site works. A copy of the Category 2 SMP is attached as Appendix A.

Any material which is deemed suitable for the reclamation project would be loaded out and taken by truck to the Stage 1 reclamation site by a specialist subcontractor or HC&R if the material is clear of contaminants and safe to handle.

There is an older Council Landfill located to the south of the designated quarry working boundary and covered with grass and shrub vegetation at about RL 60 m which will remain undisturbed for this Stage 1 Contract.

Table 3-1 Environmental risk assessment, contaminated land.

	Type of work				
	Drill blast holes & blasting	Excavate & load rock & waste layers & loess	Stockpiling sorting & processing materials	Haul road operation	Quarry project
Contaminated land risk	MED	MED	MED	MED	MED

3.2 ASBESTOS MANAGEMENT PLANS

An Asbestos Management Plan (MP) may need to be prepared (in addition to the Category 2 SMP) if the testing of the stockpile of earthquake debris located at the east end of the quarry floor proves that the material is contaminated with asbestos and has to be removed from the quarry and from the LPC site to an approved landfill.

The main target for the quarry management of an AMP will be to assess and remove the stockpile of earthquake demolition debris from the quarry floor and to direct the material to a facility licensed to receive the material.

For the Stage 1 Contract the initial quarry plan has the preferred option to leave the stockpile of earthquake material undisturbed and to build the working stockpiles of reclamation rubble across the top and around the remnant stockpile of demolition debris.

The verification and reporting would be on forms which are appended to the SMP. These must be filled out and provided to LPC on a monthly basis.



4.0 ARCHAEOLOGY

4.1 ENVIRONMENTAL RISK ASSESSMENT

The Gollans Bay quarry is in a Contract work area where it is possible that archaeological remains may be discovered and requires an Accidental Discovery Protocol (ADP)

There is a designated midden (N36/57) located near the outfall of the ephemeral stream into Lyttleton harbour but it is outside the defined quarry limits.

The quarry development will be mainly on the existing benches, however, the highest level quarry bench may be excavated back to the quarry boundary as a new surface disturbance with the associated risk of an archaeological find, requiring the Accidental Discovery Protocol.

Table 4-1 Environmental risk assessment, archaeology

	Type of work				
	Drill blast holes & blasting	Excavate & load rock & waste layers & loess soils	Stockpiling sorting & processing materials	Haul road operation	Quarry project
Archaeology risk	N/A	HIGH	HIGH	HIGH	HIGH

4.2 PERFORMANCE STANDARDS

The contractor's role and responsibility is clearly defined;

- The contractor is required to contact the archaeologist at least three weeks prior to any works that may damage or destroy a known or unknown archaeological site.
- The contractor will work with the archaeologist to assess the risk of the works and the associated control procedures.
- The control measures will be implemented at all times and HC&R understands the legal obligation to stop work and inform the project archaeologist of the discovery of any suspected archaeological sites.

All work will be undertaken in a manner that ensures compliance with all the authority requirements under the Heritage New Zealand Pouhere Taonga Act 2014. All construction and quarry works and equipment will be operated, maintained, supervised, monitored and controlled at all times, so that any impact on archaeological sites is minimised and any archaeological information is not lost.

All Contract staff will be briefed on the archaeological work required by the authority approving the LPC works and the possibility of encountering archaeological evidence. The contractor will arrange for a briefing to be provided by an archaeologist approved by Heritage New Zealand prior to the quarry works commencing.

The authority dated April 2016 for the haul road earthworks, issued by Heritage New Zealand was specifically for the haul road work near the Battery Point structures, however the awareness of the requirements for due consideration of any archaeological finds on the quarry site will be a component of the staff training programme.

The Heritage NZ approved archaeologist is Kirsia Webb (Underground Overground Archaeology).

HC&R understands that any archaeological work must be undertaken in conformity with any tikanga Maori protocols as per the statement provided by Te Hapu o Ngati Wheke.

4.3 CONTROL MEASURES

Type of work	Archaeology Risk	Control
Quarry bench formation and development with tracked excavators including removal of surface soil & loess	HIGH	Briefing on archaeological finds and accidental discovery protocol with archaeologist on site at site start up meeting
Haul road widening with tracked excavator and /or wheeled loader	HIGH	Staff briefed on observation, accidental discovery protocols and Battery Point features by archaeologist

4.4 MONITORING AND REPORTING

The Contractor will arrange on-site briefing by the project archaeologist for the quarry staff about the archaeological work required and how to identify archaeological sites during the works.

Any archaeological evidence encountered by the Contractor during the term of the Contract works will be reported immediately to the LPC Project Manager and then arrangements put in place for the archaeologist to investigate. Works will cease in the area of any finds.

Any required archaeological work will be carried out by the archaeologist approved by Heritage New Zealand and the emergency contact details will be contained in the site operating procedures.

4.5 CONTINGENCY

In the event that archaeological evidence is encountered during the quarry & haul road development stage it may become necessary for HC&R to temporarily rearrange their Contract works to provide time for the evidence encountered to be investigated.

The accidental discovery protocol (ADP) applies across the Port in areas with high risk activities. In the event of any discovery of a suspected archaeological site, the worker / contractor shall take the following actions:

- a) cease all works immediately within a 20 m radius
- b) advise the contract supervisor of a find
- c) The quarry site supervisor shall contact the Principle's Project Manager and the appointed archaeologist, who will advise on the significance of the find and outline what steps are to be taken. In all instances, the appointed archaeologist will advise Heritage New Zealand Pouhere Taonga of the discovery.
- d) The archaeological site will be recorded and excavated in accordance with standard archaeological practice.
- e) In the event of a Maori archaeological site being found, Te Hapu o Ngati wheke will be advised of the find and will be consulted with regard to ny matters of tikanga in relation to the discovery.
- f) In the case of uncovering koiwi (human remains), Te Hapu o Ngati Wheke, Heritage New Zealand and the New Zealand Police must be contacted. Te Hapu o Ngati Wheke will be consulted with regard to any matters of tikanga in relation to the discovery.
- g) In the event of the discovery of koiwi tangata (human remains), discussions about the future of the site shall be entered into by Te Hapu o Ngati wheke and LPC (or their nominated representative). All parties shall work towards operations recommencing in the shortest possible timeframes.

The Contractor understands that the current archaeological procedures may include but is not limited to, the production of plans of site location and extent, excavation, section and artefact drawings, photographs and sampling, identification and analysis of faunal and floral remains and modified soils and radiocarbon dating of samples.

The quarry work for the Stage 1 contract is unlikely to extend to the Midden (pre 1769) (N36/57). The quarry work to form the upper benches in the proposed plan may require archaeological supervision and this would be determined during the first site inspection by the appointed archaeologist.



5.0 EROSION & SEDIMENT CONTROL

5.1 ENVIRONMENTAL RISK ASSESSMENT

The quarry area is in an area of steep terrain with a number of ephemeral water courses in incised valleys that flow into the Harbour and have the potential to transport large amounts of sediment during heavy rainfall events.

The quarry development for the Stage 1 contract will be mostly enlargement of the existing quarry benches to operate the equipment on but will require extensions that will influence the potential for sediment generation. In addition, the layers of tuff, weathered agglomerate and soils in between the basalt and breccia layers have the ability to generate sediments.

It is noted that the loess cover on the steep slopes can be up to 7 m deep in places. The loess is easily mobilised when disturbed or exposed and there is potential for large scale erosion, including slope failure.

It is noted that the removal of loess from stormwater is difficult and hard to achieve high removal with out the use of flocculants.

The activities in the GB quarry development work introduce the risk of the damaging effects of large or ongoing sediment discharges into the watercourses that flow into the Lyttelton harbour which is a sensitive receiving environment.

The following points are listed to enable the assessment of the adverse effects of the quarry development for the construction Contract to be analysed;

- a) The existing GB quarry workings in the form of a series of benches is surrounded by steep terrain with the presence of loess topsoils. The benches and access roads are generally covered in secondary vegetation and grasses which will need to be moved.
- b) To form and develop the quarry into a series of benches or steps it requires the removal of vegetation, and the removal of topsoils including the loess layer to extend the benches. The methodology used for extending quarry benches along the terrain is to use the excavator to pull the materials into the working area on solid level ground.
- c) The quarry planning requires the construction of inclined roads (ramps) for equipment access and rock haulage between benches with edge drains which form watercourses that have the potential to shed water rapidly during a rain event.
- d) Stormwater will accumulate in the quarry on the benches and pit floor and will run off the rock surfaces in the quarry relatively rapidly into the sediment control system. The developed quarry forms a significant catchment area that contains the stormwater runoff.
- e) The quarry benches will interface with the natural ground around the perimeter of the excavation where cut off drains may be suitable to divert surface water run off
- f) Mobile plant including rear dump trucks and wheeled loaders will move along the benches and roads which will be surfaced with fine rock. The large quarrying equipment operates best on rock or aggregate covered surfaces on the roads, ramps and benches.
- g) The quarry has minimal groundwater flow at present so the erosion and sediment control requirements are directed at the effect of rain events and the resultant stormwater flows

The risk assessment is based on consideration of these potential adverse effects and ranked in the following Table 5-1.

Table 5-1 Environmental risk assessment, erosion and sediment generation.

	Type of work				
	Drill blast holes & blasting	Excavate & load rock & waste layers	Stockpiling sorting & processing materials	Haul road operation	Quarry project
Erosion & sediment generations	LOW	HIGH	HIGH	HIGH	HIGH

5.2 PERFORMANCE STANDARDS

Stormwater associated with upgrading of the haul road is to be discharged onto land via ephemeral waterways at intervals between Gollans Bay and Te Awaparahi Bay from where it may enter coastal waters.

The stormwater associated with the quarry activities is to be discharged onto land via the existing ephemeral waterway to the south side and below the Gollans Bay quarry.

The water quality requirements for discharges from LPC to land are set out in the Land and Water Regional Plan.;The discharge shall not result in any of the following:

- a) The production of conspicuous oil or grease films, scums or foams, or floatable or suspended materials
- b) Any conspicuous change in colour or visual clarity
- c) Any emission of objectionable odour; or
- d) Significant adverse effects on aquatic life

5.3 CONTROL MEASURES

This QCEMP section details the Erosion & Sediment Control measures that will be put in place during the works. However these measures may require alterations and refinements once the quarrying work commences.

The proposed Erosion & Sediment Control Plan as shown in Appendix L, is to utilise perimeter contour drains to channel the quarry surface water to a series of rock filter bunds in the upper part of the ephemeral stream that is consented as the discharge channel to the coastal waters, being the Lyttelton Harbour.

The proposed sediment control plan is based on retaining the surface water flow paths inside the quarry working area using a network of contour and cut off drains along the perimeter of the quarry working level which for the Stage 1 contract will be about RL 100, beside the existing quarry road surface. The drainage flow path will be directed to the head of the centrally located ephemeral stream which drains down to the sea level outfall into the Lyttelton harbour. Refer to the map included as Appendix L the GB Quarry Sediment Control Plan R2.

The main ephemeral stream will be retained as the existing vegetated valley and closely monitored to identify any adverse effects that may be caused such as stream valley erosion and removal of vegetation.

There will be a number of exit points for water from the main perimeter cut off drain at RL 100 m to the smaller ephemeral stream channels that also flow to the harbour which will spread and dissipate the run off from the drain. In addition, there will be flow control rock features along the cut off drain channel to assist dissipate the flow energy.

A series of rock filtration bunds are proposed to be positioned in the main valley of the ephemeral stream which is the current outfall from the existing quarry floor sediment control pond which is centrally located on the quarry working floor and this pond will need to be de-commissioned when it is replaced by the proposed system. A flow spreader will be constructed on the last rock filter bund.

The filtration bunds will be formed with clean quarry rock. The size of the filter rock is to be confirmed but is envisaged as small to medium sized rock with upper layers of finer rock and geotechnical filter textile added as required.

The existing quarry floor sediment control pond which was primarily the sediment control for the Evans Pass road works debris will be retained until the filtration bunds have been constructed and are operational.

The existing pond at the east end of the quarry floor will be retained as a stormwater surge pond and this will be a permanent feature of the quarry floor. When the pit floor is lowered below RL 100 m the south wall of the future pit will be retained but there may be a requirement to pump stormwater from a pit floor collection pond to the discharge stream.

The slopes below the quarry working level and south of the main cut off bund will be retained as vegetated cover until there is a need for using part of this area as a rock stockpile working within the designated quarry limit. The rock stockpile would effectively form a stabilised surface.

The demolition rubble in the east end of the quarry is to remain as a stockpile base until such time as the stockpile is completely removed to reclamation. An evaluation of the existing demolition waste is planned and if the testing finds it to be contaminated the removal at some future date would be controlled and monitored under a Contaminated Site Management Plan. By retaining the demolition stockpile as the base of a quarry stockpile any adverse effects on the sediment control plan will be minimised.

As the successive quarry benches are formed following the development plan of the top down benching sequence there will be increasingly rapid runoff during significant rain events and there will be a number of cut off drains, bench drains and small check bunds to control and direct the flow to the exit channel. These will be carried out by the quarry staff in accordance with good practice to control and direct the surface water in the quarry workings which is necessary for safe and efficient mobile plant operation. It is not good practice to operate heavy trucks through pools of surface water.

The erosion and sediment control monitoring programme will identify if additional controls are required as the quarry working area expands as the multiple benches and longer benches are developed.

The additional surface water run off controls may include adjusting the bench gradients to direct flow paths, adding more rock filter bunds, the use of filter fabric and if necessary, consider the use of more extensive sediment control ponding and flocculants. A common gradient to keep water moving off quarry benches is between 1 in 50 and 1 in 100.

The best practice experience will be utilised for the quarry planning to consider the drainage flow along bench channels, access ramps and around the stockpile areas on the quarry working floor.

From the site visit observations, the quarry has minimal groundwater seepages which would be directed into the surface water system.

The purpose of the erosion and sediment control is to protect Lyttelton Harbour from the damaging effects of large or ongoing sediment discharges. The control measures are based around;

- a) Avoidance – preventing erosion and sediment generation
- b) Treatment – removing sediment from water
- c) Stabilisation – completing the works and removing the potential to generate sediment.

The following table summarises the erosion and sediment control measures organised by avoidance, treatment and stabilisation:

AVOIDANCE	TREATMENT	STABILISATION
Minimise the disturbance area in loess & soils Clean water cut off drains around the perimeter of the quarry Flumes and pipes under roads to eliminate driving through water Check dams in drains as required Armouring channels Tip outs to exit water from the haul road edge drain Removal of any erodible material into	Sediment fences, filter socks, straw barriers as required Soakage systems in the quarry floor Filter bunds built from rock with or without geotextile fibres filtering Decanting earth bunds (DEB's) Impoundment within the quarry floor pond and controlled release of water Sumps as required Sump protection measures Flocculation if required	Sealing with aggregate cover from the quarry Soil mulching and hydroseed applications Soil binders and chemical treatment for stockpiles Rehabilitation nodes on completed benches will slow the stormwater run off

AVOIDANCE	TREATMENT	STABILISATION
a stabilised stockpile	Rock filter bunds in the ephemeral water courses as required	

The erosion and sediment control measures in the quarry and along the haul road will be utilising the following avoidance, treatment and stabilisation measures:

- a) Rock covering on operating surfaces for the haul roads, ramps and benches to minimise sediment in surface water runoff. All roads and benches will be formed with consideration of drainage and the use of edge drains to direct the surface water flows to the surge pond and discharge points from the quarry.
- b) Rock check dams along the drains forming the quarry drainage system
- c) Quarry design will give due consideration to the drainage of water with benches at suitable gradients to shed water along and not over the edge of the benches.
- d) cut off drains which are clean and stabilised and contain check dams as required
- e) Silt fences where necessary in particular around the lower side of any rock stockpiles
- f) Rock filtration bunds, with filter cloth as necessary in the ephemeral stream channelStabilising any soil/loess stockpiles or non-rock surfaces with planting or hydro seeding for vegetation.
- g) Additional inspections of the erosion & sediment control measures after rainfall events of greater than five millimetres per hour.
- h) Repair of any scouring or erosion as soon as practicable after rain events
- i) Removal of any accumulated sediments from drains, ponds and filter bunds.

5.3.1 Controls

Controls are required to treat a two-year storm event but survive a 20 year event. As the quarry is re-opened and benches cleared the catchment area will be monitored and checks carried out on the ability of the proposed plan to perform. These calculations will be carried out by a suitably qualified person.

The control measures to be implemented are as follows and will be in accordance with the Canterbury Erosion and Sediment Control Guidelines (CEMP Guidelines section 10.7.2.1 specifically for Minimising disturbed area, clean water cut off drains, flumes & pipes, check dams, channel armoring, decanting earth bunds (DEBs), vegetative strips and impoundment within workings (quarry):

- a) a main south perimeter cut off drain along the edge of the quarry workings at RL 100 m and along the edge of the haul road. The water flow will be directed to the main ephemeral water course into which the existing SRP drains.
- b) Along the haul road there will be pipes or flumes at the tip outs into the numerous coastal ephemeral streams.
- c) Controlling the progressive removal of loess where benches are extended, or new benches developed to minimise the area of disturbance at any one time.
- d) Two or more rock filter bunds in the main discharge water course below the quarry working level with upstream slope sheeted with filter cloth and a fine rock layer.

The following Table summarises the planned Controls:

Table 5-2 Summary of controls

Type of work	Sediment & Erosion Risk	Control
Excavate soils and loess to remove overburden from the volcanic rock layers	Run off carrying loess into the quarry stormwater drainage system	Minimise the exposed area Work out from stabilised bench Apply mulch or hydro seed as required
Stockpiling, sorting reclamation materials	Run off from stockpiles direct to the discharge water course	Stabilise the stockpile surface by compaction or sheeting with rock fines Perimeter drain at nominal RL 100 m to direct the flow and prevent uncontrolled discharge to the loess covered slopes on the south side of the quarry
Sorting & processing rock across grizzly and screens	Run off carrying rock fines direct to the discharge water course	Drainage slopes to the surge ponds and additional surge sumps which can be cleaned out Sheet working areas with rock fines Perimeter drain at nominal RL 100 m to direct the flow and prevent uncontrolled discharge to the loess covered slopes on the south side of the quarry
Haul road truck haulage	Surface water runoff into perimeter drain may carry fine sediments and loess	Rock lined drain where required Check dams to dissipate energy Tip outs at intervals to reduce the flow Flumes or pipes at discharges Maintain road surface in sound condition with grading and water application for dust suppression and to bind the surface aggregates.
Quarry benching by drill, blast then load out with excavator on to rear dump trucks	Stormwater runoff may carry fines	Bench slopes to drainage system to inclined roads and using flumes and pipes where required
Bulldozer use to clean benches and roads	Stormwater runoff may carry fines	Sheet benches along agglomerate and soft materials with rock fines to stabilise the surface. Maintain drainage slopes and water courses
Quarry planning	No drainage considerations	Ensure that the bench and interbench ramp system considers the drainage paths and allows width for edge drains, rock check dams and surge sumps where required with flow directed as in the E&S Plan

The contractor will provide regular inspections of the erosion and sediment control rock filter bunds, ponds, cut off drains and outflow to the designated discharge water courses and maintain any observed adverse condition that may affect the system performance such as a fines accumulation, wash outs, seepages and outfall changes such as choked filter cloth.

In the event that any site Sediment Retention Pond requires dosing with flocculants, details of how the optimal dosing rates for varying discharge rates will be provided to the Principal and obtained from an experienced subcontractor in accordance with the Canterbury Erosion and Sediment Control Guidelines.

The Contractor will take all practical measures to prevent spills of hazardous substances such as fuel, oil & grease being discharged into the receiving environment via the quarry surface water runoff system including:

- a) Provision of materials used to clean up spills at each area used to store fuel or hazardous substances.
- b) Ensuring that all operators of vehicles used to transport or store fuel or hazardous substances have access to materials for cleaning up spillages.
- c) Servicing mobile plant in an area away from the surface water channels and ensuring that any spills can be cleaned up promptly. Empty grease cartridges & oil containers will be disposed of offsite.

5.3.2 Decommissioning of controls

The existing sediment control pond will be utilised for the initial quarry development until the proposed series of drains and filter bunds in the Erosion & Sediment Control plan is commissioned after which time it will be decommissioned. In the pond decommissioning process, the removal and disposal of any accumulated fines & sludge (loess) will be controlled to avoid any waterway contamination. The small volume of sludge should be able to be mixed into the large quantity of reclamation fill as a disposal means, subject to LPC approval.

The removal of the existing pond may be deferred and it may be filled to quarry floor level then excavated at such time in the future as the floor is lowered with pit development.

The east end of the current quarry pit floor will be utilised as surge capacity for the stormwater discharge system and will remain for the duration of the quarry activities. At a future stage when the quarry is a complete pit enclosed on all sides it will become necessary to dewater the quarry by pumping water to the prevailing site discharge system

Any quarry working land subject to earthworks shall be stabilised as soon as practicable following completion of the earthworks which may be by placement of rock cover, by hydro seed application or by plantings as part of the quarry rehabilitation programme.

5.4 MONITORING AND REPORTING

5.4.1 Monitoring compliance with performance standards

The Rule 10.5.12 in the Canterbury Land and Water Regional Plan makes activity within the GB quarry area a permitted activity with conditions as follows.

An activity within the area shown on Map 10.1 as Area A (GBQ) or Area B (Reclamation) which involves any one or more of

- (a) the use of land for:
 - (i) the excavation of materials
 - (ii) the deposition of material onto or into land or into groundwater, and any associated discharge into groundwater
 - (iii) vegetation clearance or earthworks within the riparian margin (defined for the purposes of this rule as any land within 10 metres of the bed of a river, lake or wetland boundary);
 - (iv) the installation and use of building foundations
- (b) the discharge of sediment laden water generated from earthworks into a surface waterbody, or onto or into land where it may enter a surface waterbody; and
- (c) the taking of water for the purposes of dewatering or land drainage, and the associated discharge of that water into a surface waterbody, or onto or into land where it may enter a surface waterbody is a permitted activity, providing the following conditions as applicable are met:

Earthworks, deposition and excavation of material

1. Erosion and sediment control measures are implemented and maintained throughout the duration of the works to minimise erosion and the discharge of sediment laden water to surface water, or onto or into land where it may enter surface water.
2. Any material deposited into groundwater or onto or into land within 1 metre of groundwater shall only be previous insitu material from the same location, uncontaminated fill (soil, rocks, gravel, sand silt, clay), concrete. Cement. Grout, steel or timber foundation piles, or inert building materials.
3. Earthworks involving below ground soil disturbance do not occur on any area which is identified as landfill.
4. There is no discharge of any cement, concrete, grout, or water containing cement, grout or concrete, into any surface waterbody, or beyond the property boundary.

Geotechnical investigations

5. The bore is used only for the purposes of geotechnical investigations and is decommissioned by filling with clean material and compacted or sealed at the surface to prevent contaminants entering the bore.
6. Information on location, borelogs and intended uses is submitted to the Canterbury Regional Council within 20 working days of drilling the bore.

Dewatering, sediment laden water and land drainage

7. For Area A (GBQ) the discharge is only sediment and water.
8. The taking and discharge of land drainage water and the site dewatering water onto or into land or into surface water does not result in river bed or river bank erosion.
9. The discharge shall not result in any of the following:
 - a. The production of conspicuous oil or grease films, scums or foams, or floatable or suspended materials
 - b. Any conspicuous change in colour or visual clarity
 - c. Any emission of objectionable odour; or
 - d. Significant adverse effects on aquatic life.

5.4.2 Maintenance, inspections and monitoring

The inspection of the erosion and sediment control measures and monitoring of discharge points will be carried out on a weekly basis and also during and after rainfall events to ensure they continue to work and that performance standards are not breached.

Check sheet for the inspections is included in Appendix B.

Table 5-3 Inspection and monitoring requirements

Work Phase	Frequency	Monitoring actions
Surface is exposed and site is changing frequently	<ul style="list-style-type: none"> • Daily • Before expected rainfall event • After rainfall event greater than 20 mm per 24 hr 	<ul style="list-style-type: none"> • Inspect all structures (culverts clear of debris, structural integrity of control measures is sound, all weather access to measures is maintained) • Check discharge points meet performance standards • Once a week – fill in inspection sheet
Surface is exposed but not changing	<ul style="list-style-type: none"> • Weekly • Before expected rainfall event 	<ul style="list-style-type: none"> • Inspect all structures and fill in inspection sheet (culverts clear of debris, structural integrity of control

Work Phase	Frequency	Monitoring actions
	<ul style="list-style-type: none"> After rainfall event greater than 5 mm per hr 	<p>measures is sound, all weather access to measures is maintained)</p> <ul style="list-style-type: none"> Check discharge points meet performance standards
After stabilisation if vegetation has been used	<ul style="list-style-type: none"> Weekly After rainfall event greater than 5 mm per hr After vegetation has been established, 3 monthly 	<ul style="list-style-type: none"> Inspect whether surface remains stabilised (80 % coverage is maintained if vegetated)

5.4.3 Reporting

The Contractor will provide the LPC Project Manager their completed inspection & monitoring checklists on a weekly basis.

Once a month the LPC Project Manager or his representative will accompany the Contractor during the site inspection to ensure compliance and identify areas where improvements can be made, or remedial work and maintenance are needed.

A fortnightly meeting will be held at the quarry to discuss the results of the weekly inspections and the monthly audit.

5.5 CONTINGENCY

The most likely reason for any discharge of sediment into the ephemeral stream and eventually the harbour will be due to the failure of the clean water diversion drains or silt fences and the filter bunds to operate correctly due to an extreme rainfall event or due to a lack of regular monitoring and maintenance.

In the first instance, if the discharge is considered to breach the regulatory requirements, the incident will be reported to the Project Manager.

Should there be a discharge all practical steps will be taken to improve the quality of the discharge or to stop the discharge.

This may include any or all of the following activities;

- a) If required a sediment retention pond (SRP) would be designed by an experienced engineer and constructed in accordance with the methods described in TP 227 and flocculent addition considered.
- b) Unblocking floating decants if an SRP is in use
- c) Use of flocculants if an SRP is in use
- d) Reduce the discharges from SRP or channels
- e) Halting any discharge by diverting water to the pit floor surge pond
- f) Identifying possible mitigation measures such as removal of debris, clearing channels
- g) Reviewing any failed structure to determine repairs or re-design needs
- h) Use of a water truck to clear surge ponds to provide capacity
- i) Improve diversion of clean water away from disturbed land
- j) Increase the size of internal ponds at the quarry or reclamation
- k) Placement of mulch on disturbed land.
- l) Forming additional tip outs from the surface drainage system



6.0 NOISE & VIBRATION

6.1 ENVIRONMENTAL RISK ASSESSMENT

The operation of the GB Quarry will generate noise & vibration from activities which include;

- a) Operation of a drill rig to drill blast holes in the quarry benches
- b) Quarry blasts at intervals normally only one event per day
- c) Excavator on quarry benches to load the rear dump trucks
- d) Truck operations within the quarry on benches, ramps and roads
- e) Secondary rock breaker mounted on excavator
- f) Wheeled loader for stockpiling materials and providing rock into the processing plant
- g) Rock falling across the grizzly sorting frame
- h) Rock traversing the sizing screen and the operation of the conveyors and other screens
- i) Truck operations taking products along the haul road to the bund construction and reclamation areas
- j) Water truck and support vehicles including service trucks and light vehicles

The specialist blasting activity for rock breakage will be carried out by RedBull Powder Co as a subcontractor to HC&R and the blasting operations including storage, handling, control and monitoring are detailed in their documentation included as Appendices M and N.

The GB quarry is located about 2.5 km from the LPC reclamation area and there are no residents located in close proximity to the quarry. The distance to the residents at Diamond Harbour is 3.35 km across the Harbour. The noise from the quarry operations including intermittent rock blasting is likely to carry across Lyttelton harbour but should not have any significant effect on the residents in that area because of the distance from the quarry.

Table 6-1 Environmental risk assessment, noise and vibration

	Type of work				
	Drill blast holes & blasting	Excavate & load rock & waste layers	Stockpiling sorting & processing materials	Haul road operation	Quarry project
Noise & vibration risk	MED	MED	MED	MED	MED

Noise levels of equipment and quarry operations are not included in this report but may be measured and recorded on the site and at the nearest receivers when the quarry operations commence.

6.2 PERFORMANCE STANDARDS

The noise criteria for the project is based on the New Zealand standard for construction noise NZS 6803:1999.

Where the noise criteria in the following Table cannot be achieved, the contractor will implement controls to manage the noise.

Table 6-3 Guideline construction noise limits

Building type	Days	Times	Noise limit	
			L _{Aeq(t)}	L _{AFmax}
Residential	Weekdays	0630-0730	55 dB	75 dB
		0730-1800	70 dB	85 dB
		1800-2000	65 dB	80 dB
		2000-0630	45 dB	75 dB
	Saturdays	0630-0730	45 dB	75 dB
		0730-1800	70 dB	85 dB
		1800-2000	45 dB	75 dB
		2000-0630	45 dB	75 dB
	Sundays & public holidays	0630-0730	45 dB	75 dB
		0730-1800	55 dB	85 dB
		1800-2000	45 dB	75 dB
		2000-0630	45 dB	75 dB
Industrial & commercial	All days	0730-1800	70 dB	-
		1800-0730	75 dB	-

6.3 CONTROL MEASURES

The quarry operating hours are planned as the hours of daylight normally between 6 am and 7 pm for Monday to Saturday inclusive and excluding public holidays. It may be necessary to extend the hours of work to expedite the Contract. Where needed some machines may be required to work past 7pm to continue with producing selected construction products.

The HC&R JV will follow best practice using the sound suppressed mobile plant and techniques based on experience at other quarry operations for operating in a noise compliant manner. The fleet of equipment will be maintained in sound operating condition with corrective maintenance for any defective engine exhaust and other noise generating components of the diesel-powered machines.

The quarry machinery such as trucks and wheeled loaders have reversing alarms for operator safety which can be clearly audible and may require modification. The reversing alarms on mobile plant will be low frequency beepers and will be replaced with no noise proxy sensors if the beepers do not meet the required noise levels.

In the event that the quarry operation meets the criteria but still causes disturbance to residential and commercial neighbours of the Port it may be necessary to consider further control measures such as strategic shielding with bunds or changing the stockpile locations or re-arranging the equipment orientation and location.

If required, an initial identification & measurement of the noise levels can be carried out by a qualified noise consultant when the quarry equipment commences operation.

6.3.1 Administrative controls

HC&R will work with the LPC Project Manager for any stakeholder involvement which may be required to explain the quarry operations.

If required a site Noise Control Plan will provide for further baseline measuring, recording, and analysing the equipment noise levels.

6.3.2 Engineering controls

A key item for engineering controls is to maintain the equipment to a good standard to minimise the diesel engine exhaust and transmission noise from the excavators, rear dump trucks and wheeled loaders.

Table 6-4 Summary of controls

Type of work	Noise and Vibration risk	Control
Drilling blast holes	Drill rig noise	Best practice to be used as per RedBull SOPs
Blasting	Blast vibration risk	Design of blasts with delays
Excavator & truck operations	Machinery operating noise	Equipment in good condition
Rock screening & stockpiling	Rock on screen noise and wheeled loader use with alarms	Best practice to be used and minimise dropping loads. Grizzly has a set of suspended chains to slow the flow of large rocks
Haul road operations	Off highway truck noise	Speed limits apply along the route
Rock breaking	Hydraulic breaker	Best practise to be used which includes: rock breaking in an open space and or behind a stockpile area

6.3.3 Ongoing assessment

A complete record will be maintained of any testing carried out on site by a noise consultant to assess noise levels and the results will be reported to the Principal.

6.4 MONITORING AND REPORTING

The quarry operation may require noise monitoring at the start of the work and when changes occur and a noise control specialist will be engaged for this work. The time to carry out such monitoring is when the full Contract fleet has been mobilised and is in operation with rock extraction, truck haulage, rock screening and stockpiling.

6.4.1 Monitoring

Any monitoring that may be required will be carried out by a noise monitoring specialist with equipment as follows:

Table 6-5 Noise monitoring equipment

Equipment	Make	Model	Serial number	Verification date
Sound level meter and microphone	Bruel & Kjaer	Type 2250 analyser	2488377	02/08/2020
	Bruel & Kjaer	Type4231 calibrator	1882775	08/02/2020

6.4.2 Reporting

The results of any noise monitoring carried out by the Contractor will be reported to the LPC Project Manager.

Table 6-6 Information reporting requirements

Information	Timeframe
Noise survey reports	Within one week of monitoring
Noise complaint initial report	Within twenty-four hours
Noise complaint closed	Within one week of closing complaint

6.5 CONTINGENCY

Complaints about noise from the quarry operations will be managed using the project complaints process.

The Quarry Manager or Site Foreman will be available as required by the LPC Project manager to discuss noise issues and take immediate action as directed.

The quarry machinery such as trucks and wheeled loaders have reversing alarms for operator safety which can be clearly audible and may require modification. The reversing alarms on mobile plant will be low frequency beepers and will be replaced with no noise proxy sensors if the beepers do not meet the required noise levels.

In the event of marginal or non-compliant noise level, HC&R will assess the methodology, equipment condition and best practice to reduce noise levels generated in the quarry operations by their fleet of heavy earthmoving machinery and by the screening and stockpiling of rock and other materials.



7.0 HAZARDOUS SUBSTANCES MANAGEMENT

7.1 ENVIRONMENTAL RISK ASSESSMENT

The environmental risk of hazardous substances associated with the quarry operations is potentially from servicing and operating machinery which uses diesel, petrol, lubricating greases and oils, de-greasers and compressed gases.

The bulk oil will be stored in a service container on the reclamation area. Inside the container will be three 1,000 litre pods which are all labelled with the type of oil. The container is fully self bunded and contains all the relevant MSDS sheets.

The diesel fuel tank will be stored on the designated reclamation area. The tank will be fully self bunded and have a capacity of 15,000 litres.

The potential risk while using these substances in the equipment at the quarry site is during:

- a) Re-fueling machinery with diesel
- b) While lubricating and servicing the machinery on the quarry site
- c) Carrying out maintenance which requires the use of de-greasers
- d) Welding to repair damage on structures such as the grizzly and mobile machinery components.
- e) During normal operations if a fault occurs (i.e. hydraulic hose breakage)

The environmental risk associated with the use of explosives while transporting, storage and handling at the site is detailed in the RedBull Powder Blasting Management Plans in Appendix OM and their Emergency Response Plan in Appendix N.

Table 7-1 Environmental risk assessment, hazardous substances

	Type of work				
	Drill blast holes & blasting	Excavate & load rock & waste layers	Stockpiling sorting & processing materials	Haul road operation	Quarry project
Fuels, oils, lubricants	HIGH	HIGH	HIGH	HIGH	HIGH
Explosives	HIGH	NA	NA	NA	HIGH

7.2 PERFORMANCE STANDARDS

For the quarry and haul road operation the equipment used is excavators, wheeled loaders, rear dump trucks, bulldozers, drill rigs and screening plant, each having a high level of risk for a fuel or hydraulic oil spillage which will be controlled to eliminate any adverse effects associated with their use. The performance standard of operation is to have no spillages of fuel or hydraulic oil leakages from any machinery. If there are accidental spills, they shall be cleaned up quickly and completely using on site spill kits for that purpose.

The performance standard for explosives use at the quarry is zero incidents, with safe handling following the procedures in the RedBull Powder Blasting Management Plan in Appendix M and their Emergency Response Plan in Appendix N.

The management and control of hazardous substances at the Port shall be undertaken in accordance with the performance standards as in Section 12 of the CEMP Guidelines and as follows:

- a) As a minimum comply with the statutory requirements for storage, use and disposal of hazardous substances under the RMA and the HSNO Act, HSNO regulations and gazette notices,

- b) Hazardous substances are transported to and from site in accordance with the requirements of the Land Transport Management Act, 2003
- c) Storage facilities and equipment that hold significant quantities of hazardous substances are appropriately designed and operated to prevent & reduce the potential for any accidental spillage or leak of hazardous substance from the facility,
- d) Containers, facilities and equipment containing or storing hazardous substances are appropriately labelled and signed to identify the potential hazards.
- e) Emergency Response plans are in place which in the event of an incident/accident involving hazardous substances will be used to minimise the effect of the event on the environment;
- f) Staff and subcontractors at the site are trained how to handle, use and store hazardous substances in a safe manner and how to respond in the event of an emergency incident.
- g) No spills or leaks to soil or water will occur from the storage or use of hazardous substances.
- h) No spills and leaks to soil or water will occur from the maintenance of any on site equipment.
- i) No storage of hazardous substances will occur within 20 metres of the Harbour.
- j) All refueling of equipment on land or over water will be supervised throughout the whole activity and spill containment equipment must be immediately available.
- k) All refueling equipment will have cut off valves.
- l) If working in or near water, then appropriate spill containment equipment must be available.
- m) A monitoring regime will be in place for weekly inspections of all equipment, storage facilities, spill containment equipment.

Prior to commencing work the Contractor will identify the requirements of the hazardous substances likely to be used or stored at the LPC site.

7.3 CONTROL MEASURES

Spillage kits will be available on the quarry site as part of HC&R's site management and all site staff will be trained in the use of the kits. Early detection with pre-start inspections by the experienced machinery operators is also a control measure such that any signs of oil leakage can be identified quickly and eliminated.

Refer to the attached RedBull Powder Blasting Management Plan in Appendix M and their Emergency Response Plan in Appendix N for information on the controls around the use and storage of explosives.

Vehicles used for transport of fuel or hazardous oil & grease substances will have access to spill kits for clean-up of any spillage. Spill kits will be in the fuel tank, service truck, reclamation area and in the quarry. Also, the maintenance mechanics site vehicle will have a small mobile spill kit.

In the event of a spill of fuel or any other hazardous substance during the site works the Contractor will;

- a) Clean up the spill as soon as practicable and take measures to prevent a reoccurrence,
- b) Inform the Principal to the Contract and provide the date, time, location and estimated volume of the spill together with the cause of the spill, the type of hazardous substance spilled, and the clean-up procedures undertaken.
- c) Provide details of the steps to control and remediate the effects of the spill on the receiving environment
- d) Provide an assessment of any potential effects of the spill, and
- e) Provide measures to be undertaken to prevent a recurrence.

Table 7-2 Summary of controls

Type of work	Hazardous Substance risk	Control
Re fuelling equipment and maintaining mobile plant	Fuel, oil & grease spillage	Trained operators & procedures for spill kit use then clean up any spillage residues
Excavators (hydraulic) and wheeled loaders and drill rigs	Hydraulic oil release from burst hose	Immediate shut down of equipment and implement use of spill kits then clean up any spillage residues
Storage of hazardous substances	In correct use, leakage, fire,	Correct storage with fire extinguisher available Labelling & SDS available Approved handlers used
Maintenance welding with oxy acetylene	Fire, release of gas causing hazardous atmosphere zone	HSNO controls for use and storage
Transport of hazardous substances	Fire, spillage risks	Follow Land Transport Rules
Transport, storage, handling and use of explosives for quarry rock breakage. Magazine storage facility to be licenced.	Fire, uncontrolled explosion	RedBull procedures and ERP and only experienced subcontractor handles and uses explosives

The following controls to be adopted are from the CEMP Guidelines as follows:

- **Controls prior to bringing hazardous substances on site.**
 - a) Provision of a hazardous Substance Store that meets the requirements for fire resistance rating, adequate bunding, sufficient size to segregate products, provide fire extinguishers in each store, and provide a cage for oxygen & acetylene gas cylinders.
 - b) Preparation of an Emergency Response Plan. The environmental risk associated with the use of explosives while transporting, storage and handling at the site is detailed in the RedBull Powder Blasting Management Plans in Appendix M and their Emergency Response Plan in Appendix N.
 - c) Contractor and subcontractors will have an Approved Handler who is responsible for the Hazardous Substances store and compliance with the CEMP and the requirements of HSNO.
 - d) A process to review the requirements of new hazardous substances to be brought onto site during the works is to be developed. In particular the need to ensure a copy of the safety data sheet is provided.
 - e) A process of inspections and recording to monitor compliance.
- **Controls during the Works**
 - a) All hazardous substances shall be stored in the appropriate storage location.
 - b) The “Person in Charge” shall maintain a Hazardous Substance Inventory and ensure it is kept up to date and available on request to LPC, ECAN and Worksafe staff.
 - c) Copies of safety data sheets shall be held on site and available for staff to review.
 - d) Controlled zones shall be established around all Hazardous Substance stores and shall be included on a site map and should be clearly marked on site.

- e) Requirements for hazardous atmosphere zones and location test certificates shall be identified and met.
- f) Appropriate signage shall be in place
- g) All vehicles and works area must have as a minimum a spill kit appropriate to the hazardous substances and volumes being used.
- h) All refueling of equipment on land or over water will be supervised throughout the whole activity and spill containment equipment must be immediately available.
- i) All refueling equipment will have cut off valves.
- j) If working in or near water then appropriate spill containment equipment must be available.
- **Controls for portable refuelling containers**
A portable container can be fixed to a vehicle or towed by a vehicle.
 - a) The containers are not located within 20 m of a surface water body.
 - b) The aggregate quantity of specified substances stored on site in a portable container shall not exceed 2,000 litres.
 - c) A container shall be located in an area or structure that will contain a leak or spill of the substance and allow the spilled substance to be collected.
 - d) A spill kit shall be located with the container at all times with instructions on how to use the kit.
- **HSNO Controls**
 - a) maintain a register of hazardous substances used and stored maintain a record of SDS for every hazardous substance present
 - b) maintain a location plan showing the hazardous substance storage areas, location of the fire fighting equipment and spill kits
 - c) Ensure all hazardous substances are correctly labelled
 - d) Ensure that hazardous substances are transported safely
 - e) Demonstrate how you will ensure hazardous substances are safely stored and secured.
 - f) Ensure that containment (bunding) is provided for all liquid hazardous substances, and
 - g) Ensure that hazardous substances and their containers are appropriately disposed of.
- A hazardous substance register will be provided to LPC
- Safety Data sheets will be provided and available on site to the Contractor's staff.
- Location plan will be prepared and available for staff to access it.
- All containers of hazardous substance will be labelled.
- It is the responsibility of the supplier to follow the Land Transport Rules for delivery and collection of hazardous substances including portable toilet effluent.
- The storage, positioning, secondary containment, signage, location test certificates, segregation and security will be in accordance with the CEMP guidelines.

7.3.1 Waste management

The waste generated from the site will be recycled where practicable and will be from;

- a) Food including containers and waste paper which will be disposed of offsite in bins and recycled where applicable
- b) The ablutions facility will be serviced as a Portaloo system with effluent removed from the site.
- c) Containers for maintenance items delivered to the site including empty grease containers will be disposed of in

a waste disposal bin.

- d) Any residue from an oil or fuel spillage will be collected, isolated and transported off site to the relevant approved disposal site at HC&R's cost.

7.4 MONITORING AND REPORTING

The requirements of the Controls required for Hazardous substances include:

- a) documenting the location, quantity of any hazardous substances and providing SDS for each substance
- b) Monitoring the use and quantity of hazardous substances in storage in accordance with the HSNO controls

The event of any hazardous substance spillage will normally require the immediate shutdown or isolation of the specific item of equipment for remedial action to minimise and clean up the spillage and to repair any damage such as a burst hydraulic fitting with all incidents to be recorded and reported.

The site manager is required to notify the ECAN 24-hour emergency response service in the event of a spill that results in contamination to a stormwater system, water body or on to land.

7.5 CONTINGENCY

The Contractor will ensure that:

- a) Spill kits are clearly labelled and located in easily accessible position for all staff
- b) All staff are aware of and can access the chemical spill management and chemical spill guidelines and know how to use the spill kit in case of emergency
- c) Spill kits are restocked following use and the contents checked on a monthly basis.

The RedBull Powder Emergency Response Plan is in place to cover any emergency situation which may be created by the transport, storage & handling of explosives at the quarry and while traversing the LPC property.



8.0 OTHER EFFECTS

8.1 ENVIRONMENTAL RISK ASSESSMENT

There is an environmental risk associated with removal of any of the significant vegetation outside the boundary of the quarry which is also part of the lizard habitat. The Contractor will assist the work required under the Lizard Management Plan operated by LPC and their Ecologist to clear the designated lizard habitat areas.

The Contract component of the Quarry Rehabilitation Plan is to work with the Principal to ensure the applicable rehabilitation plans can be implemented as outlined in the Quarry Performance Specification.

Vegetation removed to expose the rock and for bench development will be used to form bunds around the site and along the haul road.

There is an environmental risk of air pollutants from the large diesel engines on the mobile plant which includes excavators, wheeled loaders, bulldozers and dump trucks.

Table 8-1 Environmental risk assessment, other effects

	Type of work				
	Drill, blast & Excavate & load rock	Excavate & load rock & waste layers & loess	Stockpiling, sorting & processing materials	Haul road operation	Quarry project
Ecology and Rehabilitation Risks	LOW	HIGH	LOW	LOW	HIGH
Waste management	N/A	MED	HIGH	NA	HIGH
Damage to existing vegetation and wildlife	LOW	HIGH	LOW	MED	HIGH
Diesel air pollution	LOW	LOW	LOW	LOW	LOW

8.2 PERFORMANCE STANDARDS

The Quarry Management Plan for Stage 1 will incorporate the Quarry Rehabilitation section of the Quarry Performance Specification in Appendix H which sets out the proposed rehabilitation nodes on the completed benches.

Because this Contract for Stage 1 is an initial stage of a longer-term project the rehabilitation and enhancement will be an on-going programme. Planting in the recommended habitat nodes can be commenced as soon as an area is available, and the plants are available from a suitable nursery.

Following completion of a bench or area of the Quarry, the contractor shall undertake works to rehabilitate that stage or area of the quarry to ensure compliance with the relevant Resource Consent Conditions.

In summary the proposed quarry rehabilitation work shall comprise of creation of up to 20 planting nodes by:

- Ripping a portion of the flat bench not less than 8 m long and 4 m wide
- Placement of weed free topsoil or overburden to a depth of 500 mm
- Hydroseeding the topsoil to prevent erosion, maintain until strike has been achieved
- Planting of 25 plants per node spaced closer than 1 m apart

- e) Plants shall be locally genetically sourced species selected from Table 1 – D2.1 in the Performance Specification.
- f) Plants shall be root trainer or PB2/3 grades of approximately 25 – 50 cm in height at the time of planting.

Adjacent to the habitat nodes, the Contractor shall collapse the vertical batter slope using quarrying methods in order to create rock piles for lizard habitat and providing the end result does not cause batter instability. The bench shall be collapsed over a length of between 10-30 m and at least half the vertical height. The Contractor shall collapse the benches in 30 locations as directed by the Engineer with due consideration for any rock face stability and safety concerns that the proposed collapse of bench faces may create.

Any reduction in final bench width associated with collapsing bench faces may prevent future access to the nodes.

8.3 CONTROL MEASURES

The rehabilitation work will be monitored with progress reports to the Principal as required.

Other control measures for stabilisation to assist rehabilitation may include the use of hydroseed for stabilising exposed surfaces such as road edge bunds.

Table 8-2 Summary of controls

Type of work	Other risk	Control
Weed Control if directed by LPC	Weed infestation can spread	Spraying programme
Planting haul Road Batter slopes	Erosion of the batter slopes and source of wind-blown dust	Planting or hydroseed programme & monitoring
Planting of quarry bench nodes	Collapsed bench may prevent safe access	Planting programme for the nodes & monitoring when safe access.
Gully Enhancement Plantings if required	Erosion of gully at quarry drainage outfall	Planting programme & monitoring add rock bunds
Short term stabilisation of excavated areas	Erosion of ground in particular loess & clays	Use hydroseed applications to stabilise as necessary

8.4 MONITORING AND REPORTING

The Contractor shall allow to monitor and maintain the planting of the nodes, monthly during the summer months and bi-monthly during winter months for a period of one-year post planting. Any dead or dying plants shall be replaced and weed species cleared using mechanical means. If the contractor notes that the same type of plant is regularly dying, the Contractor shall cease replanting that type of plant.

Experienced and skilled consultants and Sub-contractors are to be utilised for the planning programmes under the Stage 1 Contract, where directed by the Principal.

8.5 CONTINGENCY

Hydroseed and or short-term planting may be used to stabilise slopes and areas that may be at risk of slope and ground erosion from surface water run-off.

The work as outlined in the LMP will be reliant upon advice from a geotechnical engineer regarding site specific access and safe working conditions to salvage lizards.

Specialised small sized excavators and trucks may need to be used for difficult access along narrow benches for the node planting as part of the rehabilitation works.



9.0 COMMUNICATION

9.1 WITHIN THE PROJECT TEAM

Table 9.-1: Reporting requirements to the LPC Project Manager

Frequency	Requirements
Weekly	Site conditions, observations and photograph records
As required	Report any Environmental incidents

9.2 COMPLAINTS PROCEDURE

The following procedure shall be followed for all complaints:

- All complaints should be immediately directed to the person listed in the Section 2 or the LPC Project Manager. Their contact details are listed in Section 2.
- It is important that any interaction with the complainant is polite and does not belittle their concern
- As soon as the complaint is received it will be recorded on the project complaints register (Appendix C). Note there are specific requirements for what is to be recorded for any airborne dust complaint.
- An initial response will be made and recorded. Depending on the nature of the complaint the initial response could be to immediately cease the type of work pending investigation, replace an item of equipment, apply additional control (e.g. water sprayer for dust), or reinstate a damaged control device. However, in some cases it might not be practicable to provide immediate relief. The LPC Project Manager and the complainant will be informed of actions taken.
- Where the initial response does not address the complaint, the LPC Project Manager will be informed and will undertake (either themselves or delegated to the Contractor) further investigation, corrective action and follow-up monitoring as appropriate. The complainant will be advised of the outcome of this process.
- All actions will be recorded on the project complaints register and the complaint will then be closed.

9.3 DOCUMENTATION

All paper/electronic files relating to the QCEMP will be kept in HC&R's Site Office. This will include:

- The QCEMP and associated documentation (e.g. Safety Data Sheets for hazardous substances; type of work-specific noise schedules etc.)
- Consultation, reporting, monitoring and complaints registers
- Monitoring data
- Signed induction records which show that people inducted onto site understand what is required of them under the QCEMP.

The HC&R Project Manager is responsible for the distribution of this QCEMP. This Plan will be introduced to all Project staff and the workforce through general introductions to the management systems during the project inductions.

A controlled copy of the QCEMP will be maintained in the project Dropbox folder, the web-based document control system used by HC&R. Once copies are downloaded, these copies will be deemed as uncontrolled.

A controlled copy of the QCEMP, as well as future updates, will be provided to the Principal as contractually required.



10.0 UPDATING THE QCEMP

To maintain relevance, the QCEMP will be reviewed for the Principal's requirements, for technical and operational content when any changes to the methodology are made and the QCEMP will be updated accordingly.

This QCEMP will be amended if:

- The scope of the HC&R works or methodology is going to change;
- The mitigation measures are not working sufficiently;
- Responsible parties to the Contract change;
- The season or time of day in which the works need to take place changes;
- The area of works increases or changes;
- HC&R has identified improvements to the process or mitigation measures;
- The duration of the Contract works changes;
- Anything else changes that alters the effectiveness of your CEMP to manage the negative environmental effects of the Contract works

Reference attachments to the CEMP include:

- a) Process Flow Diagram (Appendix F)
- b) Initial Quarry Plan (Appendix G)
- c) Sediment Control Plan R2 (Appendix L)
- d) Quarry Performance Specification (Appendix H)
- e) Available Consent Condition documents (Appendices I through K)
- f) The RedBull Blast Management Plan and Emergency Response Plan (Appendices M & N)

Further reference documents which were supplied with the Request for Tender are listed in the Quarry Management Plan (QMP).

11.0 APPROVAL CHECKLIST

EMP Component	Contractor	LPC Project Manager
Purpose of the environmental management plan (EMP)		
Contractual obligation the EMP fulfils are listed		
Responsibilities are assigned in front table and signatures of assignees are present for the following:		
Controls actions		
Monitoring actions		
Reporting actions		
Site description contains:		
Location map showing the location of the site within the Port and the extent of the area where works will be undertaken, a north arrow, a scale bar and a title		
A description of the site condition and current use		
A description of the surrounding land use		
Project description contains:		
Description of what works are being done and why		
Method and equipment to do the works		
Project duration - including hours and days of operation		
Regulatory requirements contain:		
Whether resource consent is needed		
If it is needed, whether a resource consent has been obtained		
Resource consent reference and a description of what it is for		
Relevant consent conditions, how they will be achieved and who is responsible (in Table 1 of CEMP template)		
The contractor has discussed the regulatory requirements with the LPC PM before EMP is submitted		

Environmental effects and mitigation:														
For each environmental effect tick whether the following is provided (all except 'Other' must be completed):	Dust	Contaminated land	Archeology	Erosion and sediment	Noise and Vibration	Hazard Substances	Other (specify)	Dust	Contaminated land	Archeology	Erosion and sediment	Noise and Vibration	Hazard Substances	Other (specify)
	Description of the effect and risk category													
Environmental risk assessment undertaken														
Who/what will be impacted by the effect														
Performance criteria (e.g. noise level limits)														
Mitigation:														
Describe the mitigation measures for the effect described above														
Monitoring requirements:														
The monitoring method (e.g. measuring total suspended solids 10 m downstream of the site)														
How often monitoring will be done														
Monitoring actions are assigned to specific people														
Reporting requirements:														
States how regularly reporting is required														
States what is going to be reported														
States who the report must be submitted to														
Reporting actions are assigned to specific people														
Contingency:														
Describes actions to be taken in the event of non-compliance or if non-compliance is likely														
Information sharing:														
Describes adequate processes to share information with Contractor's staff and sub-contractors to enable the EMP to be implemented														
Approval:														
EMP is signed by the Contractor														

APPENDIX A

CONTAMINATED SITE MANAGEMENT PLAN CATEGORY 2 SMP

Appendix 8B: Site Management Plan for Category 2 Areas

Category 2 Contaminated Soil Management Plan

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Appendix A:	Category 2 Map
Appendix B:	Contractor Checklist
Appendix C:	Works Verification Form
Appendix D:	Incident and Monitoring Form

1 Introduction

This report has been prepared in general accordance with national guidance and standards for conducting ground contamination-related desk study investigations in New Zealand. This includes compliance with the general format described in the Ministry for the Environment (MfE) Contaminated Land Management Guideline No. 1 "*Reporting on Contaminated Sites in New Zealand*".

1.1 Basis for the procedures

Category 2 areas are those within general port operational or transport depot areas, with one or more additional HAIL activities such as minor fuel storage or substations. Category 2 covers many individual areas around the port sites, including a buffer around some sites depending on the nature of potential contamination (see Risk Category Zoning map in Appendix A). Some of these areas have recorded contamination, but records do not exist for many of them.

Further detail about the basis for the procedures is provided in the main section of the Contaminated Land Technical Chapter.

Excavation shall proceed in accordance with the procedures in Section 3 to ensure the early identification and management of any contaminated soil present. Where possible, the excavation shall also be undertaken in a manner which allows soils of different type/composition/contaminant levels to be kept separate. For instance, excavated material containing hydrocarbons shall, where possible, be kept separate from soils which do not. If this is carried out the cleaner material may be able to be disposed at a lower landfill cost, following sampling and testing, reducing the overall project costs.

The excavation method should allow for regular inspections and monitoring of the subsurface conditions to allow identification of any areas of unforeseen contamination. Inspection requirements are covered in Section 3.1.1, with soil sampling procedures in Section 3.1.9.

1.2 Site management

The following are key aspects of site management during all earthworks on Category 2 areas:

- Advise LPC's Environmental Manager at least one day prior to works commencing;
- The site Hazard Board shall include information pertaining to the contamination likely to be identified (as identified in Table 1). The Contractor's details shall be provided on the Hazard Board;
- Personal protective equipment (PPE) relevant to the expected contamination shall be available on site (Section 5);
- The site shall remain secured during non-working hours to prevent access by the public or unauthorised personnel; and
- Appropriate earthworks controls (Section 3) shall be emplaced prior to works commencing.

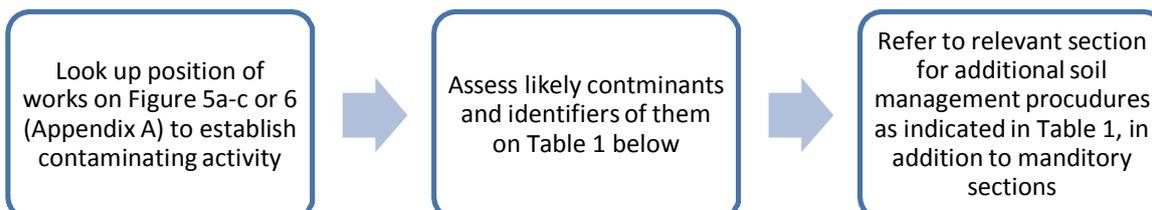
A Contractor's Checklist is included in Appendix B and outlines key requirements for site management and reporting for works in Category 2 areas.

1.3 Identification of contamination

A range of contaminants may be present within Category 2 areas, depending on the nature of the HAIL activity. Standard indicators of contamination for general port and transport depot areas include the following:

- A hydrocarbon odour (typically smells like petrol, diesel, kerosene etc.);
- Other abnormal odours not normally associated with soil;
- Discoloured soil (i.e. areas of soil with dark staining, abnormal or unnatural colouring);
- Soil with waste material or building debris (i.e. plastics, metal, bricks, timber etc.) indicating the ground has been filled;
- An oily substance or sheen on the surface of soil, or on the surface of water in the excavation.

In order to identify indicators that contamination may be present relating to specific HAIL activities, the following procedure should be followed:



There may be situations where specific site management procedures are required to be developed in addition to this Contaminated Soil Management Plan (CSMP), depending on the nature of the excavations and the potentially contaminating activity. For example, excavations in areas of military emplacements require specialist advice that is not within the scope of this CSMP. These situations are commented on in Table 1 and earthworks may not proceed without specialist advice.

Table 1: Specific contaminating activities and their key contaminants

Type of contaminating activity	Potential Contaminants	Identification of Contamination	Additional Management Sections
Gasworks or gasworks waste	PAH, BTEX, metals, cyanide	Fine black gravels, ash, hydrocarbon odours	3.2.1, 5.2.2
Fuel storage (above or below ground), petroleum depots and fuelling stations	Hydrocarbons including BTEX, PAHs, solvents, metals including lead	Hydrocarbon odours, oily sheen on the surface of soil or water, black stained soil.	3.2.1 to 3.2.4, 5.2.1, 5.2.2
Transformers and substations	PCBs, hydrocarbons, copper, tin, lead and mercury. Asbestos in substations	Stained ground, likely to be localised. Asbestos sheeting, insulation or cladding.	3.2.5
Military emplacements and dumping	PCP, nitroglycerine, metals, fuel oils and solvents	Visible shot or shells,	Specific site management procedures required – contact contaminated land specialist
Quarry blasting	Metals, chlorides, coke and fuel oils.	Coal, hydrocarbons	N/A

Type of contaminating activity	Potential Contaminants	Identification of Contamination	Additional Management Sections
Asbestos pipes, buildings, fragments or free fibres in soil	Asbestos	Visual identification including super six and honeycomb texture, fibrous board. Asbestos fibres in soil may not be visible.	3.2.5, 5.2.3
Cement silos	Lime, calcium hydroxide, boron and arsenic		N/A
Coal yard	Hydrocarbons (PAH), boron and arsenic	Visible coal, odours	3.2.1, 3.2.3
Railway yards	Hydrocarbons including PAHs, solvents, creosote/phenols, and heavy metals	Hydrocarbon odours, black staining	3.2.1, 3.2.3
Landfill, waste ponds and recycling centres.	Dependant on waste composition; wide range of hydrocarbons, metals, organic acids and landfill gas	Strong odours (H ₂ S, 'rotten' odours), visible refuse	Specific site management procedures required—contact contaminated land specialist
Wood storage or processing	PCP, copper, arsenic, chromium, boron, PAHs, creosote, antisapstain, OCP, TBT	Stained ground (especially green staining), unusual odours	3.2.1
Foundry activities	Metals, acids, cyanide, BTEX, solvents	Ash, slag or odours	3.2.1, 3.2.3

1.4 Post works verification

Works verification procedures are outlined in Section 6 and are centred on the use of a Works Verification Form by the Contractor and contaminated land specialist. A copy of the Works Verification Form is included in Appendix C.

2 Plan management and control

2.1 Roles and responsibilities

LPC is responsible for:

- Ensuring that the site works are undertaken in accordance with the category-specific CSMPs.
- Ensuring that all site staff and subcontractors understand and comply with the procedures and the health and safety requirements.
- Making the relevant CSMP available to site contractors carrying out works and ensure the most recent updated copy is kept on site.
- Compile annual report.

The Contractor is responsible for:

- Identifying the appropriate category-specific CSMP and implementing the required management procedures and health and safety controls.
- Notifying the Contaminated Land Specialist prior to commencing works which require observation.
- Communicating contaminated-land related incidents to LPC in a timely manner.

A Contractor's Checklist is included in **Appendix B** and includes the key management and reporting requirements for works in Category 2 sites.

Contaminated land specialist:

This document refers to a Contaminated Land Specialist as a role which provides technical expertise to oversee the identification and disposal of contaminated soil. For the purposes of this CSMP the Contaminated Land Specialist shall meet the following criteria:

The Contaminated Land Specialist shall be a person who is qualified to undertake a detailed site investigation (supervised) and who should have at least tertiary education in environmental science or engineering or a related field and 2 or more years of professional experience in environmental investigations and risk assessment.

Personnel with decision making roles in relation to contamination management procedures and their training requirements are set out below:

	Site Crew (e.g., excavator operators, site construction staff)	Trained Staff (e.g., Project Manager, Site Engineer, Environmental Managers)	Contaminated Land Specialist
Training Requirement	15 min tool box	2 Hour Training from Contaminated Land Specialist	Degree qualified + 2 or more years professional experience
Decision authority	Day to day site inspections during works	Regular inspections on Category 2 sites, daily inspections on Category 1 sites	Disposal of soil from works, additional mitigation measures

2.2 Distribution

The following parties have been provided with this CSMP and the three category-specific CSMPs:

- LPC;

- CCC;
- Environment Canterbury (ECan).

A copy of the CSMP shall be kept onsite at all times.

2.3 Review and update of CSMP

Any variations to this CSMP must be approved by LPC and Christchurch City Council (CCC). If the Contractor would like to change any aspect of the CSMPs please contact LPC in the first instance. Any changes made to the CSMPs shall not reduce the level of control of the works without good evidence that this is acceptable. The Contaminated Land Specialist should be consulted in the event of any CSMP changes.

It is the responsibility of Contractor to distribute updated versions of the CSMP and to ensure the correct copy of the report is onsite at all times.

2.4 Implementation

Contractors undertaking the works must implement the CSMP.

2.5 Reporting for consent compliance

LPC is obliged to submit an annual report to CCC. In order to prepare the report, LPC requires the following information from all Contractors:

- Records of all contaminated land inspections completed in the preceding annual period (LPC will advise the dates);
- Any contaminated land reports or testing undertaken to comply with this CSMP;
- Details of any incidents related to contamination, such as fuel spills, encountering asbestos, health and safety incidents as a result of contamination, etc; and
- Details of any variations to the procedures in the CSMP, including why variations occurred and who approved them.

A full list of all requirements is included in Section 6. Templates for reporting of incidents and monitoring can be found in **Appendix D**.

2.5.1 Annual reporting

Annually, a report shall be compiled and provided to the CCC¹. The report shall be compiled by LPC. The report shall set out:

- The records of all contaminated land inspections completed in the preceding annual period where contaminated material has been positively identified;
- Any contaminated land reports or testing results undertaken to comply with this CSMP.

Contractors undertaking the works will provide LPC² copies of all reports produced by the Contaminated Land Specialist produced in relation to the sampling, analysis and assessment of all contaminated materials encountered. These reports will include information relating to the

¹ Marked for the attention of Team Leader Environmental Compliance Team (I&EEnvComplianceINBOX@ccc.govt.govt.nz)

² Attn Kim Kelleher, Environmental Manager, LPC

location, type and depths of contamination observed (if any), photographs, surrounding land uses and any monitoring/validation (if any).

3 Soil Management Procedures

Due to the range of contamination that may be identified in Category 2 areas, a range of soil management procedures may be applicable. These procedures focus on the early identification of contaminants and implementation of appropriate handling and disposal procedures.

All earthworks in Category 2 areas must follow the soil handling procedures in Section 3.1, regardless of the contaminating activities identified.

3.1 General site management procedures

3.1.1 Inspection procedures

The Contaminated Land Specialist will attend a tool box meeting prior to excavations commencing to discuss potential soil and groundwater contamination issues that may arise during excavations. The Contaminated Land Specialist will then be on call as required and may inspect the excavations at any time during earthworks. In addition, all excavations in Category 2 areas shall be inspected regularly by the Trained Staff member, at an interval determined by the Contaminated Land Specialist.

If unforeseen contamination is encountered, the Contaminated Land Specialist will be contacted to inspect the excavation and advise on the appropriate soil handling and health and safety procedures.

Training requirements are discussed in Section 2.1.

3.1.2 General soil handling procedures

The following general handling procedures should be followed where contamination is identified/suspected in any Category 2 area, except where testing of soils has proven soils to be not impacted by the contaminating activity (see Section 4.3):

- Material excavated shall be loaded by the Contractor directly onto trucks for offsite disposal, or temporarily stockpiled to prevent contamination of other areas;
- Trucks shall be loaded within the site where runoff and possible spills during loading will be controlled and contained;
- Measures shall be put in place to ensure contaminated soil is not tracked offsite on wheels of trucks;
- Each truck will have a tracking document³ signed onsite and collected at the receiving facility to track each load of material;
- Trucks shall have their loads covered by tarpaulins during transport of material to licensed landfill. These shall be affixed before leaving site;
- Stockpiling shall be in accordance with Section 3.1.3;
- A permit/manifest shall be obtained by the Contractor from the disposal destination prior to transportation and the Contractor is responsible for obtaining this approval;

³ Driver's log sheets will be sufficient as tracking documents.

- All contaminated material removed from site shall be disposed as per the procedures set out in Section 4.1;
- All weighbridge dockets shall be retained by the Contractor and provided to the Engineer to the Contract.

Health and safety precautions identified in Section 5 shall also be followed.

Additional procedures for specific situations are provided in the following sections.

3.1.3 Stockpiling of contaminated soils

It is possible stockpiling of contaminated soil on site may be required due to phasing of work, or other construction constraints. Where possible stockpiling should be avoided and, if required, the time material is stockpiled shall be minimised as much as practical.

Any material that is suspected to be contaminated that requires stockpiling shall be managed by the Contractor as below:

- Sediment control measures (refer Erosion and Sediment Controls in Chapter X) shall encircle the stockpile, this may include:
 - Earth bunds with a minimum height of 0.3 m;
 - Hay bales;
 - Silt fences;
 - Proprietary products such as filter socks etc.
- If the stockpile is to be remain for more than 1-2 days, the stockpile shall be covered with clean soil, geotextile or a polythene cover to prevent rainfall induced erosion;
- Fenced or otherwise secured so that the general public cannot have access to the stockpile;
- If the material is odorous, odour control measures shall be put in place. This could include covering the material with clean soil, a polythene cover or instituting a deodoriser system.

3.1.4 Dust generation

From an environmental and human health perspective, dust generated from contaminated soils has the potential to contain contaminants and, during windy conditions, may discharge offsite.

Where contamination is suspected/identified in Category 2 areas, in addition to the standard dust control practices that are incorporated in the Contractors Environmental Management Plans, the Contractor shall:

- Limit the amount of material to be excavated as much as practicable;
- Limit vehicle access onto contaminated areas;
- Use a water truck or portable water sprays in trafficked areas to dampen dust during dry and windy conditions;
- If required, cover stockpile material awaiting laboratory testing/removal to prevent dust generation;
- Visually monitor dust emissions in the vicinity of the excavation until exposed material has been covered by clean material; and
- Avoid work during windy conditions.

When utilising water to control dust, the Contractor shall ensure that:

- The volume of water used for dust suppression does not cause surface ponding or runoff;

- The application does not cause surface runoff that would discharge into natural water bodies; and
- The application of water does not induce soil erosion and soil pugging.

3.1.5 Stormwater and sediment control measures

Rainwater has the potential to come into contact with contaminated material and become contaminated itself. Contaminated sediment may also be entrained in the stormwater.

Where contamination is suspected/identified in Category 2 areas, the Contractor shall ensure that stormwater and sediment control procedures are put in place prior to any ground breaking works commencing and include at a minimum:

- Limiting the duration of exposure of contaminated ground as much as possible;
- Containment of any runoff during rainfall events within the excavation;
- Bund stockpiles as set out in Section 3.1.3;
- Controlled site exit points and methods to prevent contaminated soils being tracking offsite by vehicles.

The purpose of the above stormwater and sediment control measures is to prevent contaminated water from entering rivers and streams via the stormwater network.

3.1.6 Cross contamination

To avoid transferring contaminated soils from one site to another the site, all machinery and equipment shall be decontaminated prior to moving from a suspected/identified contaminated site (or any Category 1 site) to a different location.

3.1.7 Prevention of preferential pathways along pipelines

Installation of pipelines through contaminated soils can provide a flow path through which contaminants can migrate. When laying pipe work through areas of contaminated soil with high groundwater where the contaminants may be mobile, measures (such as pipe dams) shall be put in place to prevent these contaminants from travelling along the permeable bedding of the pipeline. Advice on the design of the mitigation measures (pipe dam etc.) shall be sought from the Contaminated Land Specialist.

3.1.8 Procedure for removing and reporting on unforeseen structures

It is possible that subsurface structures with potential to cause ground contamination may be encountered during the works. Structures of concern are those associated with the storage, transfer or disposal of fuels, chemicals or wastes. These may include underground storage tanks (USTs), pipelines, waste tanks or sumps, but does not include structures associated with stormwater or municipal wastewater. If unforeseen structures of this type are encountered, the Contaminated Land Specialist shall inspect the structures and advise on handling, disposal, and site validation procedures. Any abandoned drainage lines shall be capped off with concrete and inspected by the Contaminated Land Specialist prior to reinstatement.

USTs are a special case with specialist procedures set out in Section 3.2.4.

3.1.9 Soil sampling requirements and procedures

Soil sampling shall be undertaken by the Contaminated Land Specialist according to the requirements of the NES Regulations 2012 and the MfE Contaminated Land Management Guidelines No.5⁴. Soil samples shall be collected according to the following procedure:

- The materials encountered shall be described in accordance with the NZ Geotechnical Society "Guidelines for the classification and field description of soils and rocks for engineering purposes".
- Freshly gloved hands shall be used to collect soil samples and shall be placed immediately into 300 ml glass jars.
- Any equipment used to collect the samples shall be decontaminated between sample locations using clean water and Decon 90 (a phosphate-free detergent) or similar.
- Samples shall be shipped in a chilled container to an IANZ accredited laboratory under chain of custody documentation.

The Contaminated Land Specialist shall identify potential contaminants on the basis of visual and olfactory observations. However, at a minimum they shall include metals (arsenic, chromium, copper, nickel, lead and zinc), TPH, BTEX and PAH. Other contaminants may be tested for at the discretion of the Contaminated Land Specialist.

Any evidence of the presence of asbestos shall trigger testing for asbestos content in soil.

The Contaminated Land Specialist shall report the results of any testing to Lyttelton Port Company and the Contractor. It is appropriate to evaluate the results with respect to:

- NES Regulations (2012) soil contaminant standards for an industrial/commercial land use with respect to protection of human health; and
- Background concentrations for the local area.

3.1.10 Groundwater disposal

It is possible that groundwater will be encountered in excavations within Category 2 areas. Groundwater and ponded surface water within Category 2 areas shall not be discharged to stormwater unless testing confirms that contaminants are within CCC's permitted stormwater concentrations.

The Contractor shall in the first instance contact the Contaminated Land Specialist to advise if contamination is present. Disposal shall be to sewer at the discretion of CCC. Treatment of the water may be required prior to disposal. Alternatively, disposal by sucker truck and transport to a Treatment Plan may also be possible.

3.1.11 Imported material procedures

Material imported to site is generally expected to be virgin quarry material or certified cleanfill, including demolition cleanfill from the Christchurch rebuild. Any other soil imported to site that is not certified cleanfill shall be sampled by a contaminated land specialist at a rate of one sample for every 500 m³ and tested for metals and hydrocarbons as well as any other contaminants as determined by the Contaminated Land Specialist. Results must be consistent with expected background, unless otherwise authorised by consent conditions at the receiving location (i.e. the

⁴ Ministry for the Environment, 2004: Contaminated Land Management Guideline No. 5 – *Site Investigation and Sampling*, February 2004.

reclamation). It is preferable that fill is tested at its source prior to its use at the site. However, if not, then the Contractor shall stockpile the fill on site until test results are available.

Hardfill imported for backfill, if sourced directly from a quarry or supplier, does not require testing.

3.2 Additional site management procedures

These procedures relate to specific potential contaminating activities as outlined in Table 1. The relevant procedures for the type of contamination must be implemented along with the procedures in **Section 3.1**.

3.2.1 Odour control

If odorous material is uncovered during excavation works the following odour control measures shall be implemented to prevent a nuisance to neighbouring businesses and to ensure the health of workers:

- All work in the immediate vicinity of odorous material shall cease and the exposed material shall be covered, for example with tarpaulin, polyethylene sheeting or a layer of clean soil to prevent further discharge of odour. The contractor shall then seek advice from the Contaminated Land Specialist.
- The Contaminated Land Specialist shall assess the potential for volatile compounds and advise on health and safety requirements. Assessment of volatility may include use of a Photoionisation Detector (PID) and soil sampling and testing;
- Wind conditions shall be assessed and if necessary work shall cease until conditions are more favourable for minimising discharge of odour;
- A ventilation or other mitigation system, for example odour suppression sprays, shall be established if natural dispersion is not adequate; and

Health & safety procedures as set out in Section 5 shall be employed

3.2.2 Product control

Petroleum-based products may occur in soil on Category 2 sites in close proximity to fuel storage facilities. Petroleum-based products could include petroleum fuels (e.g. petrol, diesel), solvents, tar and creosote. Petroleum-based products can cause discharges if not managed appropriately and may affect the safety of workers, visitors and the general public as well as the environment. Preventing and managing vapour discharges is discussed in Section 3.2.3.

The following procedures shall be implemented at Category 2 sites where it has been identified that there is a potential for petroleum-based product to occur. The following procedures shall be modified as necessary by the Contaminated Land Specialist in conjunction with the Contractors HSO to ensure a safe working environment for workers is maintained:

- No hydrocarbons are to drain to ground during excavations; all leaks are to be collected in drain trays or collection vessels;
- Store all petroleum products away from waterways. An oil tray and suitable absorbent material shall be placed on the ground under all petroleum product storage tanks, drums, etc. The oil tray and absorbent material shall be removed and disposed of by the Contractor prior to Contract completion;
- All valves, taps, pumps etc. on tanks containing petroleum products must be kept locked or secured at all times. All reasonable precautions against release of the contents due to vandalism shall be taken; and

- Machinery cannot be refuelled near waterways.

Free hydrocarbon product may be encountered on soils in areas that have been subject to petroleum industry activities or storage tanks. If free product is encountered, work shall cease and the Contaminated Land Specialist advised immediately. The Contaminated Land Specialist will advise on containment and disposal procedures, which may include use of a spill kit or removal by sucker truck and disposal at an approved facility.

3.2.3 Control of VOCs

Volatile organic compounds (VOCs) are the vapour component of petroleum fuels, solvents and heavy end hydrocarbons such as tar and creosote. They can occur as vapour in soil even where a source of the vapours (i.e. hydrocarbon product) is not present. Hazardous atmospheres may occur if VOCs are present and the safety of workers, visitors and the general public compromised.

The following procedures shall be implemented at every project site where there is potential for or it is known that VOCs occur. The following procedures shall be modified as necessary by the Contaminated Land Specialist in conjunction with the Contractor to ensure a safe working environment for workers is maintained:

- Before starting an excavation in a low or high potential for contamination area, the potential for VOC exposure must be assessed. If VOCs have been identified as potentially present, VOC levels at the excavation site shall be tested.
- VOC levels shall be measured using a photoionisation detector (PID), or an alternative VOC monitor. The results shall be compared with Work Place Exposure Standards (Table 2) and appropriate PPE selected (see Section 5).
- Wind and temperature conditions can affect levels of VOCs in the working area. VOC levels shall be reassessed if these conditions change. If necessary work shall cease until conditions are more favourable for minimising volatile inhalation risk and odour dispersion;
- Ventilation shall be established if natural dispersion is not adequate; and
- Health & safety procedures as set out in Section 5 shall be employed.

Table 2: Workplace exposure limits

Exposure scenario	Exposure limit TWA ppm	STEL ppm
VOCs total (adopted n-hexane limit)	20	60
Benzene	1	2.5

Reference: Workplace Exposure Standards and Biological Exposure Indices

3.2.4 USTs (fuel and other chemicals)

There is high potential to encounter USTs within some Category 2 areas. USTs may contain fuel or chemicals, and there is often the potential for USTs to have leaked to surrounding soils. Some are contained within concrete bunds but this is not always the case. Any USTs, bunds and associated pipe work identified within the excavation shall be removed⁵:

- Notify the Contaminated Land Specialist as soon as the UST is suspected or encountered;
- Notify Environment Canterbury and the Christchurch City Council before any works begin;

⁵ The removal shall be in accordance with the Regional Plan rules and the NES (soil)

- Engage a sub-contractor certified in removal of fuel/chemical tanks if the Contractor does not hold this certificate;
- Breakout overlying concrete (if present);
- Expose the top and sides of the tanks by pulling back the overburden soil;
- Seal all upper tank openings;
- Remove concrete anchors;
- Lift the tank from the excavation;
- Seal all lower tank openings, and prepare tanks for transport (e.g. label according to dangerous goods class);
- Remove any obviously contaminated bedding material under direction from the Contaminated Land Specialist;
- Transport the tank offsite to a licensed tank disposal location under the appropriate dangerous goods certification;
- Contaminated Land Specialist to undertake validation sampling and reporting as per the MfE guidelines, this may require the excavation to be left open for a period of 5-7 days; and
- Backfill the excavation with suitable material once the Contaminated Land Specialist has provided written instruction to do so.

3.2.5 Asbestos handling procedures

There is potential for pipework or buildings to contain asbestos, or for asbestos (either as fragments or free fibres) to be identified within soils on site (particularly in fill or in areas where historic buildings have been demolished). If ACM including pipes or building cladding is encountered on site, the Contractor will notify the Project Manager and the Contaminated Land Specialist and follow the procedures below:

- Demolition of asbestos-containing buildings must be done under the supervision of an approved asbestos contractor. A sub-contractor with the necessary certification is to be engaged if necessary;
- Any cutting or excavation of asbestos pipe is to be undertaken in wet conditions with contractors wearing full face and body protection;
- All workers on site must wear P2 masks as a minimum;
- Work shall not proceed if conditions are windy;
- All asbestos contaminated material, or potentially contaminated material, will be loaded directly onto trucks to be transported to Kate Valley Landfill. Material on the trucks needs to be covered prior to transport;
- Stockpiling of asbestos contaminated material is to be avoided wherever possible. If it must be stockpiled, the stockpile will be covered with a suitable geotextile to prevent generation of dust and transport of asbestos off-site;
- Asbestos products, and all personal protective equipment used to handle it, shall be double-bagged and disposed of at an approved disposal facility;
- Disposal receipts shall be provided to the Contaminated Land Specialist and LPC Project Manager.

4 Soil Disposal

4.1 Disposal of contaminated soil

All soils excavated from Category 2 areas shall be assumed to be contaminated unless testing (as per Section 3.1.9) has indicated that soils are clean. Contaminated soils shall be kept separate from other excavated material where possible in order to minimise cross-contamination and high disposal costs.

If sampling is required, it can be undertaken in situ (pre testing prior to excavation) or from stockpiles following excavation. All sampling must be undertaken by a Contaminated Land Specialist⁶. Be aware that laboratory testing takes 5-7 working days and methodology should account for this potential delay.

The results of the testing will dictate the disposal locations. As an indication, broad guidelines are as follows:

- If the levels of contaminants are less than background concentrations then these materials may be disposed of to cleanfill (subject to approval from the cleanfill operator; see Section 4.3). This may also include disposal at the reclamation works at Lyttelton Port.
- If the levels of contaminants are greater than background but less than the Burwood Landfill acceptance criteria then these materials can be disposed of within the Burwood Landfill in the locations directed by the site operator.
- If the levels of contaminants exceeds the Burwood Landfill acceptance criteria, options for pre-treatment, disposal to the facility at Texco Remediation or disposal to Kate Valley should be sought.
- Excavated materials containing asbestos require disposal to Kate Valley Landfill with the prior approval of the operator.

Records of the material disposed (weighbridge dockets etc.), and the location of disposal shall be kept for all loads.

4.2 Disposal of hydro excavation materials

Materials from all hydro excavation (slurry etc.) works undertaken at Category 2 sites must only be disposed of at the designated location at the Burwood Landfill as directed by the site operator.

4.3 Disposal of un-contaminated soil

Soils from Category 2 that have been pretested (see Section 3.1.9) and proven to be uncontaminated may be transported to cleanfill for disposal, subject to approval from the cleanfill operator, or retained on site.

The loading of trucks and transport to the cleanfill shall be as per standard soil handling procedures.

Records of the material disposed, and the location of disposal should be kept.

⁶Where pre-testing is required for disposal or health and safety purposes then testing shall be undertaken in accordance with Ministry for the Environment Contaminated Land Management Guidelines. All testing shall be undertaken by a Contaminated Land Specialist. Analysis results will be compared to the receiving facility acceptance criteria and most recent and relevant human health assessment criteria.

5 Health and Safety Procedures

These health and safety procedures relate to the risk to workers as a result of moderate potential for significant ground contamination. These are additional to standard health and safety requirements of the Contractor during excavation works. The procedures in Section 5.1 must be implemented for all works in Category 2 sites, with additional procedures in Section 5.2 for specific contaminating activities (refer Table 1). The Contractor must incorporate these health and safety procedures should be incorporated into their overall health and safety plan for the site.

5.1 General requirements

Health and Safety requirements shall be managed through site specific and job specific safety authorisations (JSA's). The following procedures are to be used as a guide for the preparation of these JSA's. The following procedures deal with health and safety matters relating to contaminated ground only and do not cover other hazards on site.

These general procedures are designed as a base level for all sites, and are designed to cover the generic health and safety set up and controls related to contaminated ground. Specific hazard management procedures for some Category 2 areas are provided in latter parts of this section, depending on the contaminating activity present.

5.1.1 Site establishment

The following shall be put in place by the Contractor prior to ground works commencing:

- The site is to be fenced with 1.8 metre secured fencing to restrict entry to authorised workers and prevent access by the general public. Appropriate warning signs (e.g. "Restricted entry", "Danger open excavations") shall be erected around the fenced site;
- Health and safety inductions and daily prestart meetings shall be completed; and
- Health and safety facilities as required by the hazard management procedures, such as wash facilities, personal protection equipment stores and first aid points shall be provided.

5.1.2 General safety requirements

Contractor's staff, sub-contractors and visitors shall be required to undergo a site specific safety induction before entering and/or commencing work. The purpose of the safety induction is to make sure staff, sub-contractors and visitors are aware of the hazards related to contaminated soil relevant to the site, safe working procedures, safety equipment and requirements and the action plan in case of an emergency.

The Contractor is to appoint an environmental safety officer (ESO) for the duration of the works. The ESO shall be responsible for ensuring health and safety procedures are adhered to and that the risks associated with the potential hazards are controlled.

The following general safety procedures shall be followed by all staff entering and/or working in the immediate area of the project activities:

- All incidents shall be reported to the ESO;
- Workers shall be made aware of potential hazards on site so they can be identified and appropriate control measures can be taken to ensure the safety of workers, and passers-by;
- Site workers shall avoid unnecessary contact with site soils;
- Site workers shall avoid exposure to asbestos containing material;

- Site workers shall wear personnel protective clothing and equipment as outlined in Section 5.1.5;
- A first aid kit and fire extinguisher must remain and be available on site at all times;
- Hand washing facilities must be provided onsite.

5.1.3 Emergency procedures

It is the responsibility of the ESO to develop an emergency response plan (ERP) and ensure everyone working on the site is familiar procedures to be carried out in an Emergency. This plan must be tested onsite to ensure that the availability of appropriate emergency services and equipment prior to the start of works. These will include:

- The Assembly Point;
- The location of the nearest telephone;
- Location of the nearest first aid kit, fire extinguisher; and
- Appropriate local medical emergency numbers.

The ESO must be notified immediately of any injury or accident occurring at the site. If serious harm occurs WorkSafe NZ (or the Ministry of Business Innovation and Employment prior to WorkSafe NZ being established) must be notified immediately.

The following is a list of emergency numbers:

Emergency	111
Christchurch Hospital	03 364 0640
Christchurch Fire Department	03 372 3600
Christchurch Police	03 363 7400
MBIE Health and Safety Inspectors	0800 20 90 20
Contaminated Land Specialist:	To be determined
Contractor:	To be determined

5.1.4 Hazard identification

Works within Category 2 sites can be expected to encounter a range of contaminated ground conditions, including exposure to the following contaminants:

- Heavy metals;
- Hydrocarbons (fuels, oils and greases);
- Solvents;
- Asbestos;
- Volatile contaminants.

Exposure to the above can result in acute and long term adverse health effects, some of which manifest themselves long after the exposure occurs. It is important that the ESO makes the workers aware of these risks and the importance of complying with the procedures set out in this document.

Workers on contaminated sites can also be subject to unusual stresses, for example, manual work while wearing dust masks or respirators, or exposure to elevated concentrations of contaminants. The Contractor shall undertake continual monitoring and checks that any site workers in Category

2 areas do not have any pre-existing condition which might place them at risk as a result of such stresses.

The ESO shall ensure that all personnel are familiar with the application and use of the equipment and procedures specified in this plan, in addition to the Contractor's standard Site Safe procedures before commencement of site work. No personnel are to commence work without prior knowledge and understanding of this plan and with the Contractors safety requirements.

5.1.5 General hazard minimisation procedures

Works undertaken in Category 2 areas are likely to encounter contaminated soil and groundwater. Therefore it is appropriate for all workers, sub-contractors and visitors adopt the Contractor's health and safety measures to prevent exposure to potentially contaminated soils. The procedures set out below aim to prevent workers, sub-contractors and visitors being exposed to the soils by use of appropriate PPE as well as behavioural practices.

Workers may be exposed to contaminants via the ingestion of soil, skin contact with contaminated soil or inhalation of vapours. To prevent this exposure, the following procedures must be followed by workers who are likely to come into contact with soil or contaminants:

- Wear cloth coveralls;
- The cloth coveralls shall be removed at the end of each day and shall be stored at the work site. ***The coveralls shall not be left in vehicles or taken home*** (this is to prevent tracking contaminated material to the workers' homes);
- The coveralls shall be laundered weekly by a commercial laundry, unless heavily soiled in which case they shall be washed daily. The coveralls shall under no circumstances be taken home and washed;
- Wear P2 dust masks during dusty conditions;
- All staff physically involved in excavations, handling soil or working in excavations shall wear chemical resistant disposal gloves which shall be regularly changed;
- Minimise hand to mouth contact;
- Wash hands and face prior to eating, drinking using the toilet or smoking;
- Do not eat or drink within the excavation area.

The Contractor must review any new work element and continually monitor and assess whether there are any new associated hazards, and whether these can be eliminated, isolated or minimised. If these hazards are related to ground contamination, the Contractor shall seek advice from the Contaminated Land Specialist. The Contractor shall then instruct all staff, sub-contractors and visitors on the health and safety procedures associated with the new hazard.

5.2 Additional hazard management for specific Category 2 areas

The following sections outline the measures to minimise the effects of the hazards associated with specific contaminating activities as identified in Table 1.

5.2.1 Explosion risk control

Volatile components have the potential to produce an explosion risk if present in air at levels above the lower explosion limit (LEL). The following sets out the procedures that the Contractor shall follow for monitoring the presence of volatile organic compounds and mitigating potential explosive risk. To manage the potential explosion risk, the Contractor shall:

- Only use machinery fitted with spark arrestors to excavate and handle contaminated materials;
- Treat any excavation greater than 1 m depth and narrower than 3 m, using confined space procedures. This will require persons entering excavations to be trained and competent in confined space entry, and will require the appropriate emergency response plan, permits safety and rescue equipment to be present. It is the responsibility of the Contractor to ensure their staff are trained, have practiced the ERP and comply with all the relevant regulations relating to confined space entry;
- A LEL meter shall be onsite at all times, monitor the atmosphere continuously and placed as near as practical to the excavation face of all excavated areas;
- No work shall be undertaken while explosive gases are present above the lower explosive limit;
- A ventilation system shall be established where required to dissipate explosive gases to below the LEL;
- A fire extinguisher must be kept on site at all times.

5.2.2 Inhalation of toxic gases

To minimise the risks associated with toxic gases the following measures will be undertaken:

- Before the start of work each day, and following any break longer than 15 minutes the atmosphere in the area of works shall be tested and recorded;
- All staff working in an excavation shall wear personal gas meters;
- If the results show concentrations of H₂S greater than 2 ppm, half face respiratory masks (with appropriate cartridges) must be worn. If results of H₂S are above 10 parts per million (ppm), all work must cease until the levels reduce below that level;
- If the levels of O₂ are greater than 21.5% or less than 19.5 % all work must cease and staff must leave the excavation;
- If levels of CO₂ are greater than 5,000ppm all work must cease and staff must leave the excavation;
- If concentrations of CO are greater than 25 ppm all work must cease until levels reduce;
- Appropriate respiratory protection shall be made available to workers, including half or full face mask with the appropriate cartridges to reduce the inhalation of organic compounds.
- The Contractor is responsible for providing workers with this equipment, are trained in the correct wearing of, and ensuring it is used where appropriate; and
- During all works within landfill materials the appropriate rescue systems shall be in place and tested as required by the confined space regulations.

5.2.3 Inhalation of asbestos fibres

Respiratory protection shall be worn at all times when there is a risk that asbestos-containing material (ACM) could be exposed during earthworks. This shall be assessed daily by the Contractor. The minimum requirement if ACM is present is a P2 dust mask. Half face respirators with asbestos fibre filters may also be required depending on the review of the nature and extent of ACM present by the Contaminated Land Specialist.

Work involving the removal of ACM shall be observed by a person certified under the Asbestos Regulations (1992).

6 Works Verification

6.1 Information required by LPC

In conjunction with the Contaminated Land Specialist, the Contractor is required to complete a Works Verification Form (included in Appendix C) for each earthworks project. The Works Verification Form is to be submitted to LPC's Project Manager and Environmental Manager. The Works Verification Form includes items such as:

- Confirmation that the soil disturbance works are complete;
- Whether or not contaminated material was encountered during the works;
- Confirmation that soil disturbance works were completed according to the CSMP and details of any variations during the works;
- Information regarding any environmental incidents during the works;
- Results of any contamination tests undertaken; and
- Confirmation of the disposal destination of clean and contaminated soils and the verification test results undertaken for disposal permitting.

The following information also needs to be appended to the Works Verification Form:

- Copies of weigh bridge summaries for the disposal destination for contaminated soil;
- Disposal volumes for uncontaminated soil removed and disposed;
- Records of visits by council representatives;
- Details of any complaints (by the public or Council); and
- Details of any health and safety incidents related to the contamination and how they were resolved.

The Contractor is required to provide the above information within 1 month of completion of works to which the information relates.

6.2 Validation sampling

The requirements for validation sampling will be determined on a case-by-case basis by LPC and the Contaminated Land Specialist. It is anticipated that validation sampling will only be required on sites that will remain unsealed on completion of works or where unexpected contamination is identified that may present a risk to future site users or the environment.

Any validation sampling results will be appended to the Works Verification Form.

Appendix A: Category 2 Map

(Insert appropriate map)

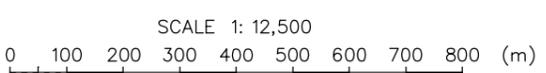
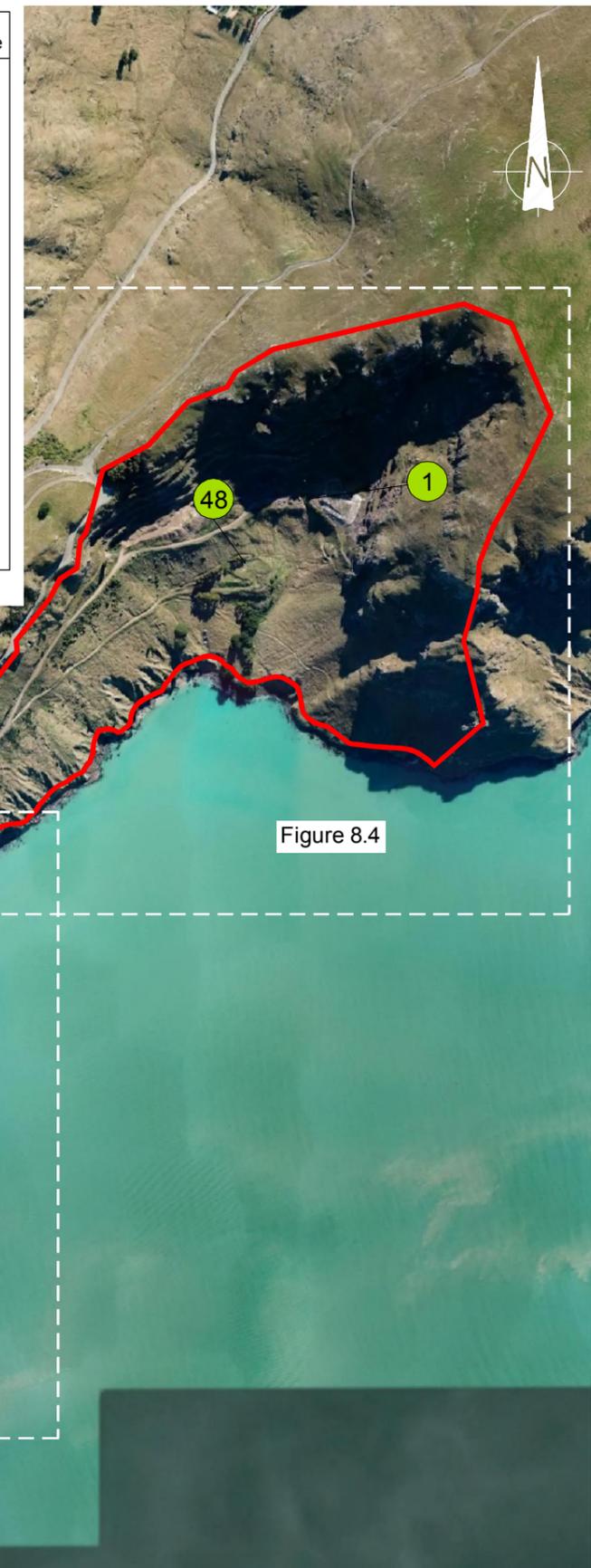
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LEGEND

- Petroleum or petrochemical industries or storage
- Storage tanks or drums for fuel, chemicals or liquid waste
- Wood treatment or preservation and bulk storage of treated timber
- Gasworks
- Asphalt or bitumen manufacture or bulk storage
- Port activities
- Landfill Sites
- Specific potentially contaminating activities (see table)
- Abandoned asbestos cement water pipes
- Asbestos cement service ducts in reefer area
- Asbestos cement subsoil drains under slot drains
- Potential coal spillage to sea in this area
- Sewage Pumping Station
- Substation with Transformer
- Substation with Transformer with oil filled switchgear and circuit breaker.
- Site of old substation

No:	Description	Historical Date
1	LPC Quarry	1980
2	Incinerator Site	1967
3	LHB rubbish dump sites	1963
4	LHB rubbish dump sites	1963
5	LHB rubbish dump sites	1963
6	LHB rubbish dump sites	1963
7	Settling tanks	1976
8	Part demolishment of workshop	Late 1970's
9	Sewage Treatment Plant	Current
10	Oil tanks	Late 1970's
11	Wash settling tank	1980's
12	Wash settling tank	1980's
13	Coal stockpiles	Early 1950's
14	Coal shipping	Early 1950's
15	Petrol and Oil tanks	1970's
16	Loxodonta cyclotis effluent	1950's
17	Gasworks	1950's
18	Old railworks and sheds	1950's
19	Underground diesel tank	1980's
20	Underground diesel tank	1980's
21	Coolstore	1950's
22	Sinclair Melbourne - small craft repairs	1980
23	Drydock	Current
24	Patent slip	Current

No:	Description	Historical Date
25	Caltex Oil and Grease plant	1970's
26	Tank Farm	Current
27	Discharge plant washdown settling tank	1979
28	Wash pad settling tank	1980's
29	Straddle bay washpad	1976
30	Mechanical workshop	1950's
31	Wash settling tank	1981
32	Old underground Diesel tank	1970's
33	Relocated 9000L Refuelling tank	1987
34	Asbestos cement sewer & stormwater drains	1980's
35	Asbestos cement service ducts	1980's
36	Old grain silos	1990
37	40,000L abandoned fuel tanks	1980's
38	Abandoned fuel tanks	1980's
39	Asbestos cement water pipes	1980's
40	Diesel and Petrol Tanks	Current
41	Vehicle washpad tank	Current
42	Army barracks	1940's
43	CQ1 Coal wharf	Current
44	Coalyard	1980's
45	Old incinerator wash discharge to sea	1980's
46	Military magazines	1940's
47	Gun emplacements	1940's
48	Old council dump	1960's



NOTES:
 Aerial photo sourced from Google Earth(Copyright: 2012). Image Copyright Image@2013 DigitalGlobe.
 Property boundaries sourced from Land Information New Zealand data as at 8-Jul-2013 (Crown Copyright Reserved).

Tonkin & Taylor
 Environmental and Engineering Consultants
 105 Carlton Gore Road, Newmarket, Auckland
 www.tonkin.co.nz

DRAWN	RBS	Oct. 14
DRAFTING CHECKED		
APPROVED		
CADFILE :	53312.005-CEMP-F8.1.dwg	
SCALES (AT A3 SIZE)	1: 12,500	
PROJECT No.	53312.005	

LYTTELTON PORT COMPANY
 GROUND CONTAMINATION CEMP
 LYTTELTON, CHRISTCHURCH
 Lyttelton Port, Potentially Contaminated Activities

FIG. No. **Figure 8.1** REV. **0**

Appendix B: Contractor Checklist

Contractor's Checklist

Task	Talk to/ liaise with	Completed?
<i>Tendering stage</i>		
Read through contaminated land technical chapter		
Locate area of works on Contamination Risk Area Map	Confirm interpretation with LPC	
Choose Category 1/2/3 SMP (Appendix A-C) based on location. <i>Read and understand Category SMP</i>	Discuss any questions with LPC	
<i>Job awarded/ Pre-earthworks stage</i>		
Appoint Contaminated Land Specialist (CLS)	Consultants/CLS, LPC may be able to assist	
Discuss proposed works with CLS and provide them with copy of the Category SMP for works.	CLS	
Arrange disposal permits for any excavated material that has to be disposed off-site.	Christchurch City Council and fill operators, CLS if sampling required	
Arrange permits for water discharge if necessary	Christchurch City Council, CLS if sampling required	
Set up hazard boards, site fencing, PPE, wheel washes, etc. as required by Category SMP.		
Undertake staff training as per Category SMP and have start-of-works briefing with CLS	All staff, CLS	
<i>During earthworks</i>		
Ongoing monitoring by staff, with CLS as required by Category SMP	CLS	
Any unexpected contamination or contamination-related incidents – immediately talk to LPC and CLS	LPC, CLS, Council if required	
Record all material being disposed off-site and imported to site		
Maintain earthworks controls and erosion and sediment and erosion controls as per Category SMP		
Undertake testing as required for soil disposal and validation	CLS	
<i>Earthworks completion</i>		
Complete Works Verification Form	CLS, LPC	
Ensure all other resource consent requirements are met		

Appendix C: Works Verification Form

Works Verification Form - Category 2 sites

Job name:		
Location:		
Dates and duration:		
Summary of works:		
Contaminated soil/ water identified? (If yes, detail actions undertaken)		
Material disposed (fill name and volume disposed):	Cleanfill:	
	Landfill:	
Imported material:	Source:	
	Volume:	
Test results (including validation sampling):		
Form completed by:		Date:
Contractor's Project Manager:		Signed:
Contaminated Land Specialist:		Signed:

Appendix D: Incident and Monitoring Form

Incident Reporting Form

In the event of an incident, the following steps are to be taken:

- Stop work in the immediate vicinity of the contamination incident and isolate the area by taping, coning or fencing off.
- Advise the Site Manager who is to then advise LPC and the Contaminated Land Specialist.
- Implement contaminated soil Health & Safety procedures as per the SMP.
- Implement surface water, sediment, dust and other controls as required as per the SMP.
- Update the Hazard Board as required.
- Implement specific controls as advised by the Site Manager and Contaminated Land Specialist.
- Ensure monitoring and disposal records are kept, including the form below.

Task	Details	Date/Time & Person
Isolate area of contaminated incident	Materials used, areas:	
Arrange disposal of contaminated material offsite as required	Disposal location and volumes:	
Implement additional controls as per the SMP and as advised by the Site Manager and Contaminated Land Specialist	Additional control details:	
Monitoring of water/air/soil (to be done by Contaminated Land Specialist)	Monitoring results:	
Notify Christchurch City Council and ECan as required	Person/team notified from CCC: ECan:	
Incident resolved and site returns to normal	How did resolution occur, what additional actions were taken:	

Monitoring Form

This form can be used for soil testing, water testing or air monitoring.

Date/Time	Parameter/location monitored	Who by	Site results/observations	Lab results (if applicable)	Comments

APPENDIX B

INSPECTION CHECKLISTS

GB Quarry, HC&R JV

Monitoring checklist for discharge points

File reference

Monitoring date;

Monitoring undertaken by;

Weather conditions;

Photograph taken showing condition of monitoring location Y/N

Monitoring standard	Standard met (Y/N)	Comments
The production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials		
Any conspicuous change in the colour or visual clarity in the Harbour		
Any emission of objectionable odour		
The rendering of fresh water unsuitable for consumption by farm animals (unlikely to be applicable for most discharges)		
Any significant adverse effects on aquatic life		
Add additional performance standards as appropriate		

GB Quarry, HC&R JV

MAINTENANCE ACTIONS FOR SEDIMENT CONTROL STRUCTURES

		File reference			
Inspection Date		Weather conditions			
Inspection by					
Sediment Control structure	Trigger	Maintenance Action	(Y/N)	Complete	
Sediment Retention pond (SRP)	Forebay more than 20% full	Empty Forebay and remove sediment			
	Main pond more than 20 % full	Empty pond and remove sediment			
	Floating decant blocked or sunk	Empty pond and repair decant			
	Scouring at discharge point from pond	Place material to dissipate energy from discharge			
	Level spreader not level	Re-level & seal with geotextile or concrete			
	Erosion of bund	Armour bund by either placement of geotextile or rock			
	Poor operating performance		Reduce catchment area, by diverting runoff into adjacent catchments and control structures		
			Close down spoil area and immediately stabilise		
		Add flocculent system to pond			
Sediment fence	Fabric flapping in wind	Reattach fabric to guide wire and increase number of fabric locks. If reqd install additional waratahs			
	Build-up of sediment greater than 150 mm in depth resulting in straining structure	Clean sediment away			
	Large rocks distorting fence alignment	Remove rocks			
	Bottom of silt fence not properly anchored	Dig fence into ground and secure pegs to keep in position			
	Undercutting of fence by concentrated flow	Identify options to avoid concentrated flow or replace with DEB			
	Silt fence broken off top wire	Install additional clips on top wire, in very windy locations a netting fence ma be required to keep the silt fence in place.			
	Failure	Replace with super silt fence. Install runoff diversion channel / bund and divert to DEB			

Filter sock	Sock full and over topping	Replace with new section of sock or place new section in front of old section		
-------------	----------------------------	-------------------------------------------------------------------------------	--	--

Control structure	Trigger	Maintenance Action	(Y/N)	Complete	
Filter sock (continued)	Undercutting of sock by concentrated flow	Use tie downs to improve ground contact. Disperse flow upstream of sock.			
Drainage flumes & pipes	Connections coming apart	Improve anchoring and joins			
	Scour at outlet	Install T bar diffuser on outlet for pipes or place armour or sand bags for flumes			
Clean water diversion drain	Blockages	Remove material			
	Scouring at outlet	Use sand bags or rock to dissipate energy			
Decanting earth & rock bunds (DEBs) Include the Rock Filter Bunds RFBs	More than 20 % full with sediment	Empty DEB			
	Scouring of drain	Install geotextile cloth			
	Scour at exit point	Install pipe exit or sand bag over flow point to provide erosion resistant surface			
	Insufficient capacity filling quickly	Poor performance	Recalculate catchment area and enlarge DEB or provide additional DEB's		
			Increase size or construct additional DEBs		
			Reduce catchment by divert excess runoff or by diverting excess runoff		
			Undertake batch dosing with flocculent or install flocculent blocks or flow activated flocculent system upstream of DEBs		
	Improve armour in water tables, rock checks, crimped straw mulch on disturbed surfaces	Close down spoil area and immediately stabilise			
Water tables and culverts	Blockages or build-up of material	Remove material			
	Scouring	Use sand bags or rock to dissipate energy			
Stabilised areas	Poor vegetation growth	Additional hydro seeding and re-scarifying; fertilising			
	Paving not providing adequate protection	Repair any damage to surface from overland flow or vehicles			
	Weed infestation	Weed removal with wick booms, spraying or hand pulling as necessary			

Note: Sediment removed from SRPs, DEBs and sediment fences will be disposed of to spoil fill areas

APPENDIX C

COMPLAINTS REGISTER TEMPLATE

GB Quarry, HC&R JV				
COMPLAINT LOG				File reference
Date of Incident		Time of Incident		Weather conditions at time of Incident
Date of Complaint		Time of Complaint		
Name		Address		Contact Details
Complaint				
Signed				
Details of Investigation				
Action taken				
Future Actions				
Reporting	Complainant	Site supervisor		
Signed	Project Manager			

APPENDIX D

NOISE SCHEDULES

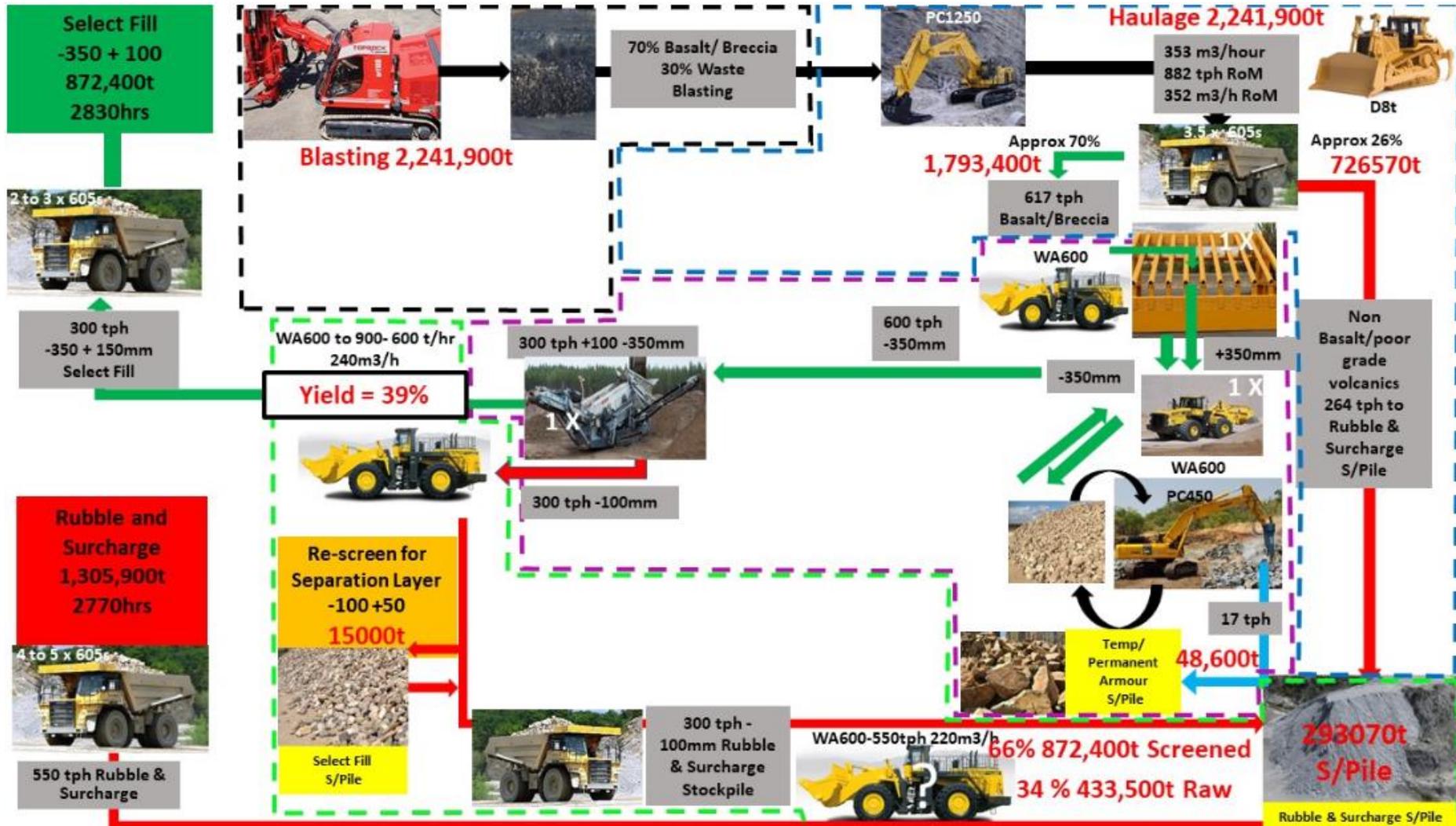
Activity	Description	Reference	Octave band sound pressure level (dB at 10 m)								L _{Aeq} dB at 10 m
			63	125	250	500	1k	2k	4k	8k	
Demolition	Petrol hand-held circular saw cutting concrete floor slab (3kW)	BS 5228-1 C.4.70	72	89	81	80	80	82	86	85	91
	Backhoe mounted hydraulic breaker (69kW)	BS 5228-1 C.5.6	90	79	75	78	78	83	91	92	88
	Tracked excavator (35t)	BS 5228-1 C.5.18	76	79	75	75	76	73	70	65	80
	Dump truck idling	Estimate	63	63	63	63	63	63	63	63	70
	Angle grinder grinding steel (2.3 kW)	BS 5228-1 C.4.93	57	51	52	60	70	77	73	73	80
	Diesel generator (4 kW)	BS 5228-1 C.4.85	69	69	67	60	59	60	56	53	66
Seawall rebuild	Tracked excavator (35t)	BS 5228-1 C.5.18	76	79	75	75	76	73	70	65	80
	Dump truck tipping fill (29t)	BS 5228-1 C.2.30	85	74	78	73	73	74	67	63	79
Wharf rebuild	Tracked mobile crane (55t)	BS 5228-1 C.3.29	81	77	69	67	62	60	61	51	70
	Hand-held welder (welding piles)	BS 5228-1 C.3.31	67	68	69	68	69	66	61	56	73
	Angle grinder grinding steel (2.3 kW)	BS 5228-1 C.4.93	57	51	52	60	70	77	73	73	80
	Diesel generator (4 kW)	BS 5228-1 C.4.85	69	69	67	60	59	60	56	53	66
Paving	Vibratory roller (8.9t)	BS 5228-1 C.5.20	90	82	73	72	70	65	59	54	75
	Asphalt paver + tipper lorry (18t)	BS 5228-1 C.5.31	72	77	74	72	71	70	67	60	77
General civil works	Tracked mobile crane (55t)	BS 5228-1 C.3.29	81	77	69	67	62	60	61	51	70
	Hand-held welder (welding piles)	BS 5228-1 C.3.31	67	68	69	68	69	66	61	56	73
	Diesel generator(4 kW)	BS 5228-1 C.4.85	69	69	67	60	59	60	56	53	66

APPENDIX E

MATERIAL SAFETY DATA SHEETS

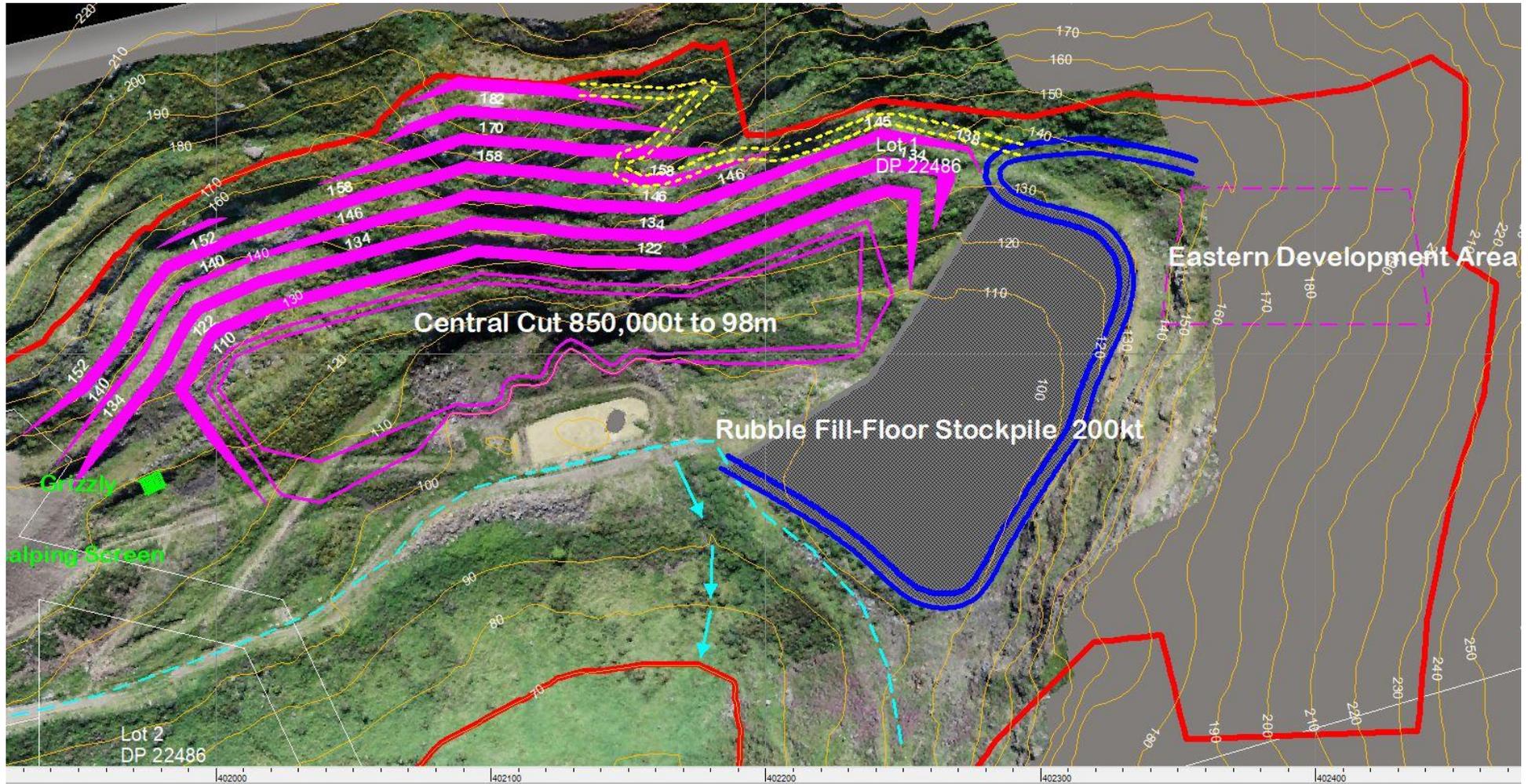
APPENDIX F

QUARRY PROCESS FLOW DIAGRAM



APPENDIX G

INITIAL QUARRY PLAN



APPENDIX H

D2.1 QUARRY PERFORMANCE SPECIFICATION

D2.1	Quarry Performance Specification
-------------	-----------------------------------------

Project:	Stage 1 Land Reclamation and Quarry Management
Contract:	1900
Location:	Lyttelton Harbour
Principal:	Lyttelton Port Company Limited



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1. WORK DESCRIPTION

1.1 Location of Work

The location of the quarry is at Gollans Bay, Lyttelton Harbour. Boundaries of the quarry are marked out in the consent conditions.

1.2 Background

LPC has quarried Gollans Bay Quarry (The Quarry) as a source of armour rock for a number of years, after the 2011 earthquake the quarry was inaccessible due to the rockfall risk from the bluffs above the main access route to the quarry, Old Sumner Road. Christchurch City Council (CCC) is currently making these bluffs safe as part of the Sumner Road re-opening Project that will have the added benefit of providing a safe access path to The Quarry via Old Sumner Road. The Sumner road project involves rock scaling and construction of a catch bench for which CCC are utilising The Quarry to tip excess material from the rock remediation works. Once these works are completed the Council will make safe the benches below the tip head. There is also a possibility that the Council may remove some of the stockpiled material.

1.3 Description of Work

The main components of this contract include the design, supply of all labour, materials, plant and equipment to complete the following works:

- Initial Survey and Safety Assessment of The Quarry
- Design of The Quarry, maximizing the rock volume of The Quarry.
- Development of a Quarry Management Plan
- Investigations to confirm the composition of materials within The Quarry floor and location of natural ground in The Quarry floor (Possible contaminated Material)
- Quarrying, which will include drilling and blasting
- Sorting and supply of materials as required for reclamation purposes
- Stockpiling armour grade material (maximum armour size up to 8 tonne)
- Testing of existing demolition rubble stockpile and develop options for disposal
- Rehabilitation of The Quarry – as set out in the Environmental section of the P&G Specification.
- Comply with Health and Safety at Work (Mining Operations and Quarrying Operations) Regulations 2016.
- Comply with all Resource Consent Conditions
- Other activities as directed by LPC

1.4 Site Possession

The Contractor will have exclusive possession of The Quarry site as identified in the Contract drawings throughout the project duration. The Contractor shall be responsible for health and safety matters within The Quarry and is required to keep The Quarry secure from the Public. The Contractor shall comply with LPC's instructions as to care of the site and shall take all reasonable practical steps as to the care and protection of the Works.

The Survey data included in the Tender Documents does not account any material that the Council may move, or remove, between issue of the Tender Documents and Contract Award. The Contractor will be required to complete a survey after taking Possession of site and before any material is moved or removed from The Quarry.

1.5 Design

The design of The Quarry is to be undertaken by the Contractor. The design of The Quarry is to include the overall design of the whole Quarry maximizing the volume of rock able to be quarried. As part of the design the Contractor is to identify where material will be extracted for

Stage 1 Land Reclamation without limiting the overall volume available from within The Quarry. The main design attributes will:

- Assess and address any residual rockfall risk and overall safety prior to entering The Quarry;
- Maximise the long term volume of rock able to be extracted from within the quarry;
- Identify The Quarry area required to support supply of the required size of rock to the Stage 1 Reclamation;
- Maximise the supply of available armour rock up to 8 tonnes, and
- Comply with all Consent Conditions.

Construction drawings and specifications required for The Quarry will need to be accepted by the Engineer before the quarrying works can begin. Note that, testing, investigation works, works required to make the quarry safe and sorting of 'ready to go' material can commence on submission of the quarry management plan and demonstration that The Quarry is safe to enter

1.6 Works

The Quarry works shall be undertaken as set out below in Quarry Management.

2. QUARRY MANAGEMENT

2.1 Quarry Management Plan

The Quarry Management plan will inform LPC of the areas and timing of Quarrying activities that maximise the amount of rock that can be extracted from Gollans Bay Quarry. The draft Quarry Management Plan included within the Resource Consent Application is to be used as a basis for the Contractor to develop the site and project specific Quarry Management Plan.

2.2 Prior to Site Possession the Quarry management Plan will need to be accepted by the Engineer. Drill and Blast Plan and Blast Report

Shot plans and post- blast reports are required for all blasting operations although in the situation where secondary blasting is being carried out one report giving the required detail will be sufficient. Primary blast plans shall have such details as blast hole location, depth, length, burden, spacing etc including explosive type, charge weight priming and initiation method.

All explosive details must also be recorded in a fit-for-purpose quarry diary.

Draft templates of the drill and blast plans, blast report and quarry diary must be included in the Quarry Management Plan.

2.3 Explosives

The Contractor shall supply all explosives required to carry out the work in a safe manner.

The Contractor must comply with all relevant legislative requirements in regard to the storage, transport and use of explosives. The Contractor shall furthermore have a verifiable and ongoing training programme in place to ensure that the Contractor and key staff are holders of the necessary Certificates of Competency as required under existing and any proposed legislation/regulations that pertain to explosives and their use in quarries.

2.4 Top Soil, Organic Material and Rubbish

Any top soil stripped from the quarry will need to be stored in the quarry, top soil will be used in the nodes that are part of the consent conditions, see the quarry rehabilitation section below for

more detail. Organic material (Vegetation) and rubbish will be removed from the quarry to an offsite facility.

2.5 Quarry Floor

Several investigations of the quarry floor have been undertaken by LPC, there has been some suggestion that the quarry floor may contain material imported from the Port that has been “stored” in the quarry floor.

The Riley and Ashby reports have been included in Part F of the Contract Documents for information. As part of the quarry design an investigation of the quarry floor is required to confirm the existence and if found the extent of any imported material.

3. QUARRY REHABILITATION

Following completion of a stage, or area, of The Quarry, the Contractor shall undertake works to rehabilitate that stage or area of the quarry to ensure compliance with the relevant Resource Consent Condition(s).

In summary rehabilitation works shall comprise of creation of up to 20 planting nodes by:

- a. Ripping a portion of the flat bench not less than 8m long and 4 m wide
- b. Placement of weed free topsoil or overburden to a depth of 500mm
- c. Hydroseeding the topsoil to prevent erosion, maintain will strike has been achieved
- d. Planting of 25 plants per node spaced not closer than 1m apart
- e. Plants shall be local genetically-sourced species selected from Table 1 – D2.1:
- f. Plants shall be root trainer or PB2/3 grades of approximately 25-50cm in height at the time of planting.

For specific details refer to the relevant section/conditions of the Resource Consent

Table 1 – D2.1

Plant Species	Common Names
<i>Coprosma propinqua/robusta</i>	Mikimiki/karamu
<i>Cordyline australis</i>	ti kouka/cabbage tree
<i>Dodonaea viscosa</i>	akeake
<i>Hebe strictissima</i>	koromiko
<i>Kunzea ericoides</i>	kanuka
<i>Myoporum laetum</i>	ngaio
<i>Melicytus ramiflorus</i>	mahoe
<i>Olearia paniculata</i>	akiraho
<i>Phormium cookianum</i>	mountain flax/wharariki
<i>Pittosporum tenuifolium</i>	kohuhu
<i>Pseudopanax arboreus</i>	whauwhaupaku/five finger
<i>Poa cita</i>	wiwi/silver tussock
<i>Festuca novae-zelandiae</i>	hard tussock

<i>Griselinia littoralis</i>	kapuka/broadleaf
<i>Sophora prostrata</i>	kowhai
<i>Muehlenbeckia complexa</i>	Pohuehue
<i>Hoheria angustifolia</i>	Houhere/narrow-leaved lacebark
Wetland Plants	
<i>Cordyline australis</i>	ti kouka/cabbage tree
<i>Carex secta</i>	purei
<i>Phormium tenax</i>	harakeke/flax
Rare Plants	
<i>Festuca actae</i>	Banks Peninsula fescue
<i>Olearia fragrantissima</i>	fragrant tree daisy
<i>Microlaena polynoda</i>	bamboo grass
<i>Veronica laudiana</i>	Banks Peninsula sun hebe

The Contractor shall allow to monitor and maintain the planting, monthly during the summer months and bi-monthly during winter months for a period of 2 years post planting. Any dead or dying plants shall be replaced and weed species cleared using mechanical means. If the Contractor notes that the same type of plant is regularly dying, the Contractor shall cease replanting that type of plant.

Adjacent to the habitat nodes, the Contractor shall collapse the vertical batter slope using explosives or mechanical methods in order to create 'rock piles' for lizard habitat. The bench shall be collapsed over a length of between 10-30m and at least half of the vertical height. The Contractor shall collapse the benches in 30 locations as directed by the Engineer.

APPENDIX I

RESOURCE CONSENT APPLICATION REPORT/DECISION RMA/2017/869 LAND USE CONSENT FOR THE QUARRY OPERATIONS

3 July for Land Use Consent to undertake quarrying operations within the identified Quarry area of Gollans Bay Quarry

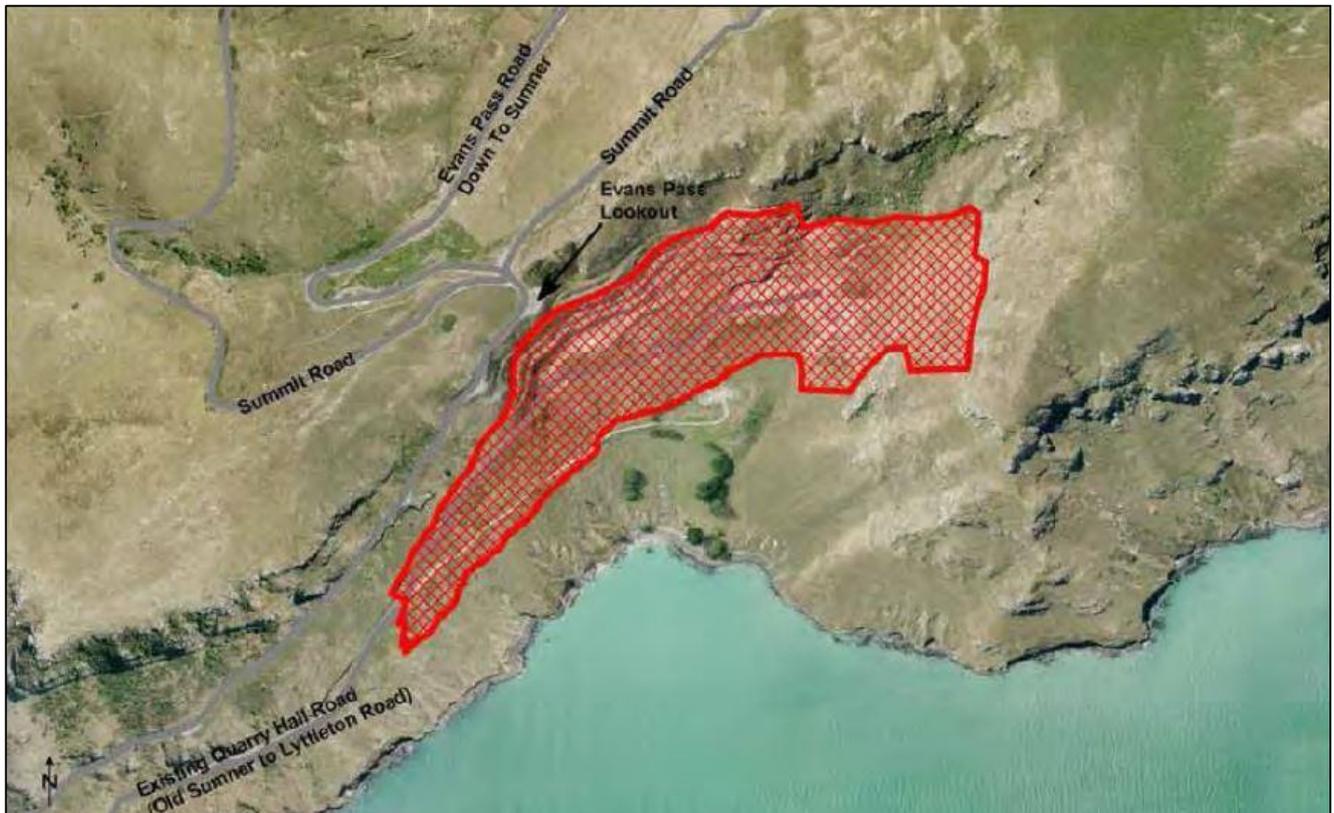
Report / Decision on a Non-notified Resource Consent Application

(Sections 95, 104 and 104A)

Application Number:	RMA/2017/869
Applicant:	Lyttelton Port Company Limited
Site address:	231 Old Sumner-Lyttelton Rd
Legal Description:	Lot 1, Lot 5 Pt Lot 6 DP 22486, Lot 5 DP 54492, Pt RS 55 (CB32F/307), Lot 1-2 DP23001 (CB3D/251)
Zoning:	Specific Purpose Lyttelton Port Zone
Overlays and map notations:	Liquefaction management Area; Remainder of Port Hills and Banks Peninsula Slope Instability Management Area; Rockfall Management Area 1 and 2; Natural Character of the Coastal Environment
Activity Status:	Controlled
Description of Application:	Land use consent to undertake quarrying operations within the identified Quarry Area of Gollans Bay Quarry

Introduction

The Canterbury earthquakes of 2010 and 2011 severely damaged the Lyttelton Port. The applicant has now begun a programme of Port recovery activities, and as part of that overall programme, they seek consent to undertake quarrying operations within Gollans Bay Quarry.



Gollans Bay Quarry Area footprint - Source Appendix 21.8.4.3 Christchurch District Plan

Gollans Bay quarry comprises material from the Lyttelton Volcanic Group which erupted as part of the Lyttelton Volcano sequence approximately 11 million years ago. The quarry was first established in the late 1950s and provided material for maintenance and development at the Port from then until 2011 when it had to be closed for

safety reasons after the Canterbury earthquakes. Since then Lyttelton Port Company Limited has had to import material from elsewhere.

The proposal is to excavate the quarry in a series of benches, starting at the top of the slopes and working progressively down-slope. Some of the larger rock is to be used to armour various seawalls, while the rest will be used for general fill. The quarry extraction design includes excavating below the surrounding ground level, leaving a pit some 20m deeper once the work is completed.

Access to the quarry will be along the existing quarry haul road which runs along Old Sumner Road and then down to the eastern end of the coal stockyard. The haul road will be one way with a number of passing bays along the route. Works to upgrade the haul road have already commenced under an existing land use consent.

The proposed works are described in full in section 2 of the applicant's AEE and in Appendix 1 and 2 of the application. The majority of the rock will be won from the eastern face and the quarry floor. In summary the work will consist of the following:

- a. Prior to quarrying commencing erosion and sediment control measures, safety facilities and traffic management systems will be set up, hut sites will be established and stockpiling and sorting areas will be established then rock picking clearance to manage the risk of rock fall;
- b. Reinstate the existing access roads along the northern wall of the quarry;
- c. Face development generally working east to west but this will depend on material requirements. The detail of excavation will be contained in the Quarry Management Plan which will be revised at regular intervals during the life of the quarry. Faces will be approximately 12m high and benches will have a width of at least 6m with a protection bund around each bench.;
- d. Excavation using a digger will be completed in the softer rock and blasting in the harder rock;
- e. The harder, large blocks of rock would be separated from the finer material and stockpiled separately for use as armour rock. The finer fractions and the softer rock would be used as bulk fill;
- f. As each section of the quarry is completed, rehabilitation would commence; and
- g. Upon completion of the bulk excavation of the quarry, a small area (or areas) will be left operational to supply material for the wider Port.

A bund is to be constructed along the southern boundary of the quarry to contain and direct stormwater to a pond at the western end of the site. When the quarry base is deepened to lower than 70 m RL, then ponded runoff will need to be pumped to the pond.

As noted in the AEE the design of the quarry is "first and foremost dictated by safety factors". Safety is also very relevant in the rehabilitation approach which is largely reliant on natural succession in areas which have, where practical, been manipulated in the quarrying process to provide habitat nodes on the benches.

A request for further information was made on 12 May 2017 on matters relating to potentially contaminated material in the base of the quarry, factors taken into account in modelling noise from the quarry, the quarry area slope stability risk values, the role of the Construction and Environmental Management Plan (CEMP) rehabilitation timing, management of surrounding native bush, potential for wetland planting in the base after quarrying completed.

The applicants provided the following information in response to the above request:

- The material on the floor of the quarry is to be deposited in the 10ha reclamation. Material deemed unacceptable will be sent to an authorised site.
- The siren that will be sounded before blasting is generally not expected to be heard in residential areas but if it did the noise would not be unreasonable and would not change predicted noise levels.
- The type of blasting technique will depend on the rock type. The adoption of delayed blasting techniques potentially reduces noise impact but other techniques are available. In the past in this quarry around 95% of blasting was by the delayed technique. Occasionally for small sections of rocks other methods are used but these involve a smaller charge and so the noise emission is unlikely to be greater.
- The Construction and Environmental Management Plan (CEMP) is not referred to in the conditions as its content is outside the scope of the matters of control in the rule.
- Revegetation within each quarried section will occur within the first planting season following completion subject to the area being safe to work, the creation of debris slopes and the area not being required in the future for port purposes.
- There is to be no direct management of patches of bush outside the quarry but weed control within the quarry is designed to control species that could invade native vegetation.
- The intended batter slopes are in the [geotechnical] Riley report and are from 45° to 79° depending on rock type. These batter slopes will not be actively revegetated but they will be modified to create a surface

conducive to natural revegetation by native species, although targeted weed control is proposed. Based on past experience this approach will result in colonisation by both native and exotic plants.

- The monitoring process to assess wetland plant habit suitability in the base of the quarry will involve a series of photographs over time for two years following completion of rehabilitation works. At this stage an assessment will be undertaken by an experienced ecologist to determine the extent and approach to restoration planting.

Resource consent is required as any quarrying activity within the footprint of the Quarry Area shown in Appendix 21.8.4.3 is a controlled activity.

A separate application is being made to Environment Canterbury for an air discharge consent for the dust associated with the quarrying activity.

The existing environment

The application site and surrounding environment are described in section 4 of the Assessment of Effects submitted with the application. In summary, Gollans Bay is a broad, shallowly indented bay with steep uniform slopes and bluffs above. The quarried benches are a notable feature of the backdrop and as such the quarry is visible from many locations within this part of the harbour and from parts of Sumner Road.

Gollans Bay Quarry has provided rock for the port for several decades for port maintenance and was a major source of rock for the Cashin Quay development in 1950s/60s as well as a source of rock used by Canterbury Regional Council for river protection. Most of the proposed quarry footprint includes past quarried slopes, benches and quarry floor that support mainly exotic weeds. The upper part of the proposed footprint is undisturbed by previous quarrying and vegetation there is mostly exotic grasses and weeds, with some regeneration of native shrub and plants.

The application identifies that several rare or threatened plants and lizards are likely to be present within the upper benches of the quarry where native scrubland regeneration is most advanced, or to undisturbed slopes above the existing quarry. These species include Banks Peninsula Blue Tussock, Annual fern, Waitaha gecko and Southern grass skink.

Planning Framework

The operative Christchurch district plans are under review. The Independent Hearings Panel has made a number of decisions on specific parts of the Proposed Replacement District Plan, including 'Strategic Directions and Strategic Outcomes'. Some of the rules have legal effect pursuant to section 86B of the Resource Management Act, while others are fully operative or treated as operative pursuant to section 86F of the Act. The rules applicable to this proposal have been assessed and the breaches are identified below. Relevant objectives and policies are discussed in a later section of this report.

Christchurch District Plan

The site is zoned as Specific Purpose (Lyttelton Port) Zone within the Christchurch District Plan. This zone applies to land occupied and owned by the Lyttelton Port Company for the purposes of the operation of port activities and its recovery and growth needs. The zone is divided into three management areas to recognise and provide for the elements of recovery within the Port, one of them being the Port Quarry area at Gollans Bay which is the area subject to this application.

The proposal requires resource consent under the following rule in the Christchurch District Plan:

- **Specific Purpose Zones – Lyttelton Port 13-8.4.1.2 – C2 (Previously numbered 21-8.2.2.2 – C2)**
Port Quarrying activity within the quarry footprint of the Quarry Area as shown in Appendix 21.8.4.3 is a Controlled activity, with the Council's control limited to
 - a) Slope stability and natural hazard mitigation – 13-8.5.3.1
 - b) Management of terrestrial ecology and rehabilitation – 13-8.5.3.2
- **Natural Hazards 5-6.1.3 C26 and C27**
Controlled Activity as quarrying within the Rockfall Areas 1 and 2 with the Council's control matters listed in **5.6.1.5 Slope Instability Areas** limited to:
 - a. Effects of natural hazards on people and property
 - b. Location, size and design of roads, structures, access in relation to natural hazard risk
 - c. Clearance of vegetation of other natural features
 - d. Potential for activity to exacerbate natural hazard risk
 - e. Mitigation of effects as they impact slope instability hazards

The proposal meets all the built form standard applying to Quarrying in the Port Quarry area; in particular it meets the noise and vibration standards. There are no built form standards that apply to quarrying under the Natural Hazard provisions. The proposal falls within the limits for storage of hazardous substances.

Replacement Christchurch District Plan

I agree with the applicant's assessment of the Replacement District Plan with regard to the Natural and Cultural Heritage chapter as follows:

- Chapter 9.1 addresses indigenous biodiversity and ecosystems. Rule 9.1.3 (f) states "The rules in Subchapter 9.1 do not apply to the Specific Purpose (Lyttelton Port) Zone". This sub-chapter has been appealed to the High Court by Forest and Bird. However, the appeal does not relate to this exemption and an email from Forest & Bird confirming that has been provided.
- Chapter 9.5 sets out rules that apply to identified sites of Ngāi Tahu Cultural Significance. The rules are not relevant because this is a Controlled activity. Notwithstanding, LPC is volunteering a condition for an accidental discovery protocol.

Christchurch City Plan

There are no relevant City Plan rules that relate to this activity.

National Environmental Standard (for Assessing and Managing Contaminants in Soil to Protect Human Health)

As noted in the application, demolition material from the earthquakes has been placed in the base of the quarry. It is possible that this material may include material that is hazardous including asbestos. At some stage during quarrying the applicant is intending to take this material away and use it for Port reclamation or similar purposes. The Lyttelton Port Company (LPC) has a global consent from the Christchurch City Council (RMA92025316) which relates to a number of its landholdings, including the quarry area, which provides for excavation and disposal of contaminated soil. The consent however excludes deposition of such material in the coastal marine area. LPC also have a current reclamation consent from Environment Canterbury (CRC111659) which specifically provides for deposition in the coastal marine area subject to detailed procedures relating to acceptance of material with only material on an approved list being accepted. All other material is therefore taken to an authorised facility. On the basis of these consents it is considered that no additional consent is required for this activity under the NES.

Written approvals [Sections 95D, 95E(3)(a) and 104(3)(a)(ii)]

Sections 95A(3)(a) and 95B(2) of the Resource Management Act enable an application to be processed without public or limited notification on any affected persons where a rule in a Plan or a National Environmental Standard provides for this.

In this case, rule 13-8.4.1.2.d in the Lyttelton Port zone and rule 5.6.1.3.e in the Natural Hazards rules provide that any application arising from these rules will not be publicly or limited notified.

Effects on the environment and adversely affected persons [Sections 95A, 95B, 95E(3) and 104(1)(a)]

As a controlled activity, Council's control to impose conditions is reserved to matters relating to slope stability, natural hazard mitigation, and management of terrestrial ecology and rehabilitation.

Slope Stability and Natural Hazard Mitigation

A slope stability hazard assessment was prepared by Riley Consultants on behalf of the applicant and was attached as Appendix 2 of the application.

The assessment confirms that no significant or persistent defects through the quarry were observed and no large scale or active faults have been mapped in close proximity to the quarry. In addition, no static groundwater tables were observed or recorded in proximity to the quarry.

It confirms that the existing faces in the quarry generally show good stability. The existing batter slopes have performed well during the earthquake sequence. In evaluating long-term batter stability, consideration has been given to seismic effects. Therefore the batters have been designed such that larger failures under 500-year return period seismic conditions have a Factor of Safety in excess of 1.0 and for a lesser 100-year return period earthquake a Factor of Safety greater than 1.2.

The assessment recommends batter angles, maximum slope heights and minimum bench widths and concludes that if these are met then the natural hazard risk to workers and infrastructure is considered to be at an acceptable level. It also acknowledges that there are other operational risks such as possible topping in the basaltic lava and small rock falls that will need to be managed through scaling, and recommends blasting trials to evaluate the best technique.

This assessment provides information relating to the quarry design with the goal of enabling an arrangement that maximises access to the resource while creating a quarry profile which will withstand earthquakes to the degree that they create an acceptable risk. It is noted that the quarry is largely self-contained in the sense that falling material from the quarried faces will fall into the quarry itself and that there is therefore limited risk to people or property below the quarry. The progressive quarrying will actually lower the floor of the quarry thereby reducing the risk of rock fall below the site.

Council engineering staff have raised concerns regarding the basis for choosing the factors of safety referred in the Riley Assessment. Information was requested on this matter and additional explanation provided. Following this a meeting was held between the applicant's geotechnical engineer and Council engineering staff to discuss this matter where it was clarified that the MBIE guidelines were used to choose a conservative force level as a basis for modelling of likely impacts on the various rock types within the quarry with various seismic events.

A further matter raised by Council engineering staff relates to the natural hazard risk outside the quarry site which could impact on the quarry. This concern is based on the experience with Sumner Road and efforts to reduce the risk of rockfall impacts on occasional users of the road. In response to this concern the applicants have clarified their approach by proposing amendments to the Quarry Management Plan requiring the following:

- 6.3 *A geotechnical report on the slope stability which includes an assessment of the risk of rock-fall from the bluffs located immediately to the east of Evans Pass; and*
- 6.5 *A description of any works required to ensure that there are no unacceptable risks associated with potential rock-fall from the bluffs located immediately to the east of Evans Pass; and*
- 6.6 *Details of monitoring of slope stability and associated risk of rock-fall within the quarry footprint and from the bluffs located immediately to the east of Evans Pass, which is to be carried out during extraction activities.*

I consider this approach is appropriate given the ongoing risk associated with the quarry site being impacted from beyond the site. I note that this risk cannot be easily predicted and that ongoing monitoring and clearance is the most practical approach.

Finally it is noted that the Slope Stability report sets out in Table 7 recommended batter profiles for the different rock types which have been based on their analysis of stabilities. I recommend that these be the subject of a consent condition.

Management of terrestrial ecology and rehabilitation

The following matters of control relating to management of terrestrial ecology and rehabilitation are set out in 13-8.5.3.2 and consist of:

- a) Methods to manage adverse effects on existing terrestrial ecology and in particular lizards' species and to enhance indigenous habitats as part of site rehabilitation;
- b) Methods to stabilise disturbed ground;
- c) Methods to ensure the geotechnical stability of rock faces for mitigating long-term natural hazard risk to land outside of the Specific Purpose (Lyttelton Port) Zone;
- d) Whether the plant species selected for rehabilitation works are appropriate native species; and
- e) The extent to which the type of methods selected will reduce the adverse visual effects of haul road formation.

The third matter regarding the geotechnical stability of rock faces has been assessed above.

An Ecology Assessment was prepared by RMA Ecology Ltd. on behalf of the applicant and was attached as Appendix 3 of the application. This report provides an assessment of the ecological values within the existing worked quarry and proposed quarry footprint, and identifies approaches and methods by which unavoidable adverse effects on indigenous plant communities and wildlife can be minimised or mitigated.

Existing values were acknowledged as consisting of:

- Vegetation communities characterised by weed species, principally gorse, broom, Old man's beard, spur valerian (*Centranthus ruber*), Pride of Madeira (*Echium candicans*), pig's ear (*Cotyledon orbiculata*), common

polypody (*Polypodium vulgare*), pampas (*Cortaderia selloana*), boneseed (*Chrysanthemoides monilifera*) and exotic pasture grasses.

- Exotic plants which dominate the site, with many considered to be ecological weeds.
- No obvious sign of pest animals, however it is likely that rats and rabbits are present at the site; possums may be present in the taller scrub and forest in areas nearby or further along the Sumner Road area outside of the quarry area.
- Abundant sign of geckos around rock outcrops within the upper northern slopes and on the ridges above Gollans Bay quarry on LPC land and on adjoining Council Reserves. No sightings or sign of skinks or geckos were found on the quarry floor, lower slopes or mid-slope areas.

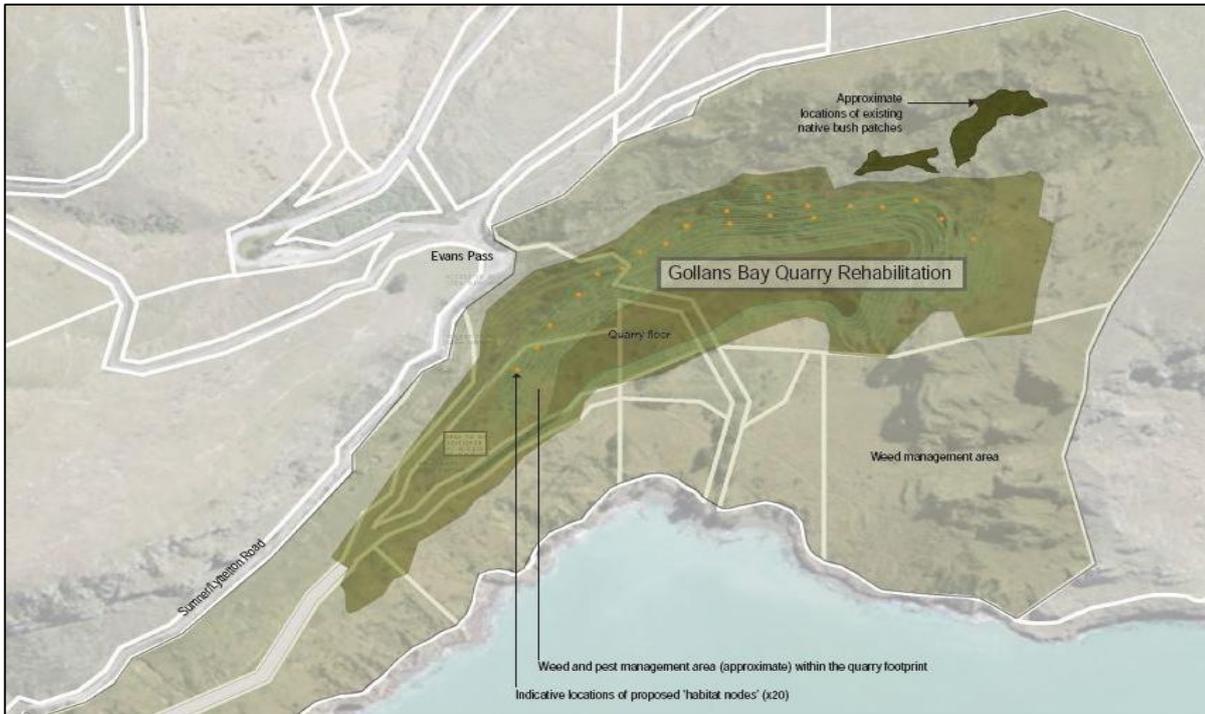
The assessment explains that ecological significance is measured against the criteria for assessing ecological values of a site in the Canterbury Regional Policy Statement. When judged against the ten criteria for assessing significance, the lower and middle quarry benches and faces dominated by weedy communities do not trigger any of the criteria. The upper benches and slopes, and the undisturbed areas within the footprint trigger at least one criteria, that of rarity. The rarity criterion states that a site is deemed ecologically significant if it contains (Criterion 4); *Indigenous vegetation or habitat of indigenous fauna that supports an indigenous species that is threatened, at risk, or uncommon, nationally or within the relevant ecological district.*

Due to signs of Waitaha gecko presence, Naturally Uncommon Banks Peninsula blue tussock and the Nationally At Risk Southern grass skink, the upper 25 % of the site (3 ha) is considered to support vegetation and habitats of fauna that are ecologically significant in terms of Criterion 4.

A Quarry Rehabilitation Plan (QRP) has been prepared by Boffa Miskell as part of this application. The proposed methods contained in the QRP are based on the recommendations in the Gollans Bay Quarry Ecological assessment prepared by RMA Ecology referred to above. The QRP contain a number of recommended methods to manage adverse effects on existing terrestrial ecology, summarised in the AEE as follows:

- a) Introducing variability to the cut faces including debris slopes to enable native plants to establish over time and will provide lizard habitat;
- b) Introducing a growth medium (e.g. weed-free topsoil) on some sections of benches and plant nursery-raised trees to create habitat nodes from which natural establishment of surrounding surfaces by native plants is accelerated;
- c) Controlling invasive ecological weeds within accessible parts of the quarry footprint, and invasive or unwanted ecological weeds from colonising areas outside of the quarry footprint;
- d) Salvaging lizards where possible on the upper benches on the eastern face of the quarry subject to safety requirements;
- e) Rehabilitating faces to create rock debris habitat for lizards; and
- f) Facilitating the establishment of vegetation cover by passive means, and by active planting of habitat nodes, as a means to supporting diverse native shrubland that in turn will support skinks and geckos.

The indicative planting nodes and the area subject to weed control are shown below:



Source: Boffa Miskell Rehabilitation Plan

The reports clearly identify the ecological values in the quarry site and surrounding area and the potential to enhance these over time. They also identify the challenges in rehabilitating areas within the quarry area due both to safety concerns relating to accessing the upper reaches and to weed infestation. The rehabilitation measures set out an approach which is sufficiently detailed in relation to each of four phases of progressive rehabilitation, mechanical manipulation of the quarry to achieve good growing media, revegetation and weed control. It is considered that the rehabilitation approach and measures contained in the draft QRP are appropriate and sufficiently detailed given these challenges and have the potential to result in enhanced ecological values in the area.

Conclusion of effects

On the basis of this assessment it is considered that the potential adverse effects of the proposed re-establishment of quarrying on this site are limited, and that there is potential for enhancement of ecological values in the area over time.

Relevant objectives, policies, rules and other provisions of the Plan [Section 104(1)(b)(vi)]

Regard must be had to the relevant objectives and policies in the Christchurch District Plan. Of particular note, Chapter 3 of the Christchurch District Plan contains a number of high level strategic objectives to guide the recovery and future development of the City. In addition the following objectives and policies are particularly relevant to the re-establishment of quarrying at the Gollans Bay quarry:

- 13.8.2.1 Objective – Recovery and growth of Lyttelton Port
- 13.8.2.1.1 Policy – Elements of recovery
- 13.8.2.1.2 Policy – Management areas and activities
- 13.8.2.2 Objective – Effects of Lyttelton Port recovery and operation
- 13.8.2.2.1 Policy – Recovery opportunities to reduce adverse effects
- 13.8.2.2.3 Policy – Port quarrying activities

The applicant provided an objective and policy assessment in section 7 of the application addressing these objectives and policies. I agree with this assessment which indicates that the application is consistent with the above objectives and policies in the Plan. In particular, I note that the recovery and growth of the Port cannot occur without quarried material and that this is most efficiently achieved by utilising the Port's own quarry which is close to the Port. Regarding the direct impacts of the quarrying activity referred to in policy 13.8.2.2.3 these are quite limited due to the quarrying being set in a bay away from the residential areas of Lyttelton, such that noise and vibration are within the Plan's standards and are not expected to be particularly noticeable. Further the

application sets out a detailed approach to progressive rehabilitation of the quarry in accordance with the second element in this policy.

The Natural Hazard Objectives and policies are also relevant. These provisions were not assessed in the application. The only objective in the Natural Hazards Chapter refers back to Strategic Objective 3.3.6. This Objective specifically refers:

- b. New critical infrastructure or strategic infrastructure may be located in areas where the risks of natural hazards to people, property and infrastructure are otherwise assessed as being unacceptable, but only where:
 - i. there is no reasonable alternative; and*
 - ii. the strategic infrastructure or critical infrastructure has been designed to maintain, as far as practicable, its integrity and form during natural hazard events; and*
 - iii. the natural hazard risks to people, property and infrastructure are appropriately mitigated**

The Port of Lyttelton is listed as strategic infrastructure and I assume this would include the quarry. Technically the quarry is not “new” but as it has not been operational for a long period I consider it could reasonably be considered to fall within this part of the objective. I also note that clause d of this objective refers to “*the repair of earthquake damaged land*” being facilitated as part of the recovery.

I consider that the proposals contained in the proposed Quarry Management Plan provide for appropriate mitigation of natural hazard risks to people and property both by a series of steps being taken prior to any quarrying activity and by the final design of the quarry faces. This approach is also consistent with the following policies:

5.2.2.1.2 Policy - Manage activities to address natural hazard risks

- a. Manage activities in all areas subject to natural hazards in a manner that is commensurate with the likelihood and consequences of a natural hazard event on life and property.*

5.2.2.1.3 Policy - Infrastructure

- a. Avoid locating new critical infrastructure where it is at risk of being significantly affected by a natural hazard unless, considering functional and operational requirements, there is no reasonable alternative location or method.*
- b. Enable critical infrastructure to be designed, maintained and managed to function to the extent practicable during and after natural hazard events.*
- c. Recognise the benefits of infrastructure and the need for its repair, maintenance and ongoing use in areas affected by natural hazards.*

Non-notification of this application is consistent with strategic Objective 3.3.2 of the Christchurch District Plan which states that requirements for notification and written approval are to be minimised when implementing the Plan.

Part II of the Resource Management Act and any other relevant matters [Section 104(1) and 104(1)(c)]

I consider the proposal to be in keeping with Part II of the Act as it will provide for the restoration and maintenance of the Port of Lyttelton which is required for the economic wellbeing of Canterbury. It will also provide for rehabilitation of the site to enable the return of indigenous flora and fauna, subject to the limitations placed on this rehabilitation due to safety concerns.

General notification provisions [Sections 95A(1), 95A(4) and Section 104(3)(d)]

In this case, rule 13-8.4.1.2.d in the Lyttelton Port zone and rule 5.6.1.3.e in the Natural Hazards rules provide that any application arising from these rules will not be publicly or limited notified. Notwithstanding this, I am satisfied that there are no special circumstances or other aspects of the application that warrant public notification.

Recommendations

That, for the above reasons:

- A. The application be processed on a **non-notified** basis in accordance with Sections 95A - 95F of the Resource Management Act 1991.
- B. The application **be granted** pursuant to Sections 104, 104A, and 108 of the Resource Management Act 1991, subject to the following conditions:
 1. The development shall proceed in accordance with the information and plans submitted with the application, including the further information dated 24 May 2017. The Approved Consent Documentation has been entered into Council records as RMA/2017/869 (149 pages).

General

1A. The following definitions shall apply to the conditions on this consent:

- Consent Authority Manager means the Head of Resource Consents Unit, Christchurch City Council, or nominee.
- Habitat Node means a node of native plants approximately 3-4m wide and 6-7m long consisting of hardy, fast-growing native species to be planted at approximately 100m intervals across the quarry site.
- Lizards means the Waitaha Gecko and Southern Grass Skink.
- Tangata Whenua means Te Hapū o Ngāti Wheke (Rāpaki) and Te Rūnanga o Ngā Tahu.

1B This Resource Consent shall lapse 10 years after the commencement of the consent in accordance with Section 125(1) of the Resource Management Act, 1991.

2 The Consent Holder shall inform the Consent Authority Manager in writing when this consent is first exercised.

Location of the Quarry

3 The quarrying associated with this consent shall not generally exceed the footprint as shown in Figure 1 of Assessment of Environmental Effects attached to and forming part of this consent.

4 Works shall be limited to:

- 4.1 The extraction of minerals and overburden by mechanical means, including blasting and using excavators, from an open quarry;
- 4.2 The stacking, depositing and storage of quarry material;
- 4.3 The crushing, screening or handling of quarry material;
- 4.4 The transporting of quarry material; and
- 4.5 Any other activities and buildings ancillary to the above activities including rehabilitation and mitigation of hazard risks from rockfall.

Quarry Management Plan (QMP)

5 At least two working days prior to the commencement of the works specified in condition 4, the Consent Holder shall provide a QMP to the Consent Authority Manager. A copy of the QMP shall be provided to Tangata Whenua.

6 The QMP shall be prepared by a suitably qualified person(s) and its purpose is to set out the measures required for the safe excavation and removal of quarry material. The QMP shall include, but not be limited to, the following:

- 6.1 An overview of the proposed quarry excavation methods, including explosives to be used in blasting;
- 6.2 Details on the proposed staging of quarrying activities;
- 6.3 A geotechnical report on the slope stability which includes an assessment of the risk of rock-fall from the bluffs located immediately to the east of Evans Pass; and
- 6.4 Stabilisation techniques to be used, including final bench design consistent with a geotechnical assessment.
- 6.5 A description of any works required to ensure that there are no unacceptable risks associated with potential rock-fall from the bluffs located immediately to the east of Evans Pass; and
- 6.6 Details of monitoring of slope stability and associated risk of rock-fall within the quarry footprint and from the bluffs located immediately to the east of Evans Pass, which is to be carried out during extraction activities.

7 A QMP prepared under condition 6 may be amended at any time. Any amendments shall achieve the purpose of the QMP and shall be provided in writing to the Consent Authority Manager. A copy of any amended QMP shall also be provided to Tangata Whenua.

- 8 The consent holder shall carry out the quarrying in accordance with the QMP and the Quarry Rehabilitation Plan (QRP). The results of the monitoring carried out in accordance with the QMP during extraction activities shall be made available to the Consent Authority on request.

Quarry Rehabilitation Plan (QRP)

- 9 At least two working days prior to the commencement of the works specified in condition 4, the Consent Holder shall provide A QRP to the Consent Authority Manager. A copy of the QRP shall be provided to Tangata Whenua.
- 10 The purpose of the QRP is to set out the proposed rehabilitation works for the quarry. To achieve this purpose, the QRP shall include but not be limited to the following topics:

General

10.1 Details of:

- (a) The proposed rehabilitation having particular regard to the QMP, including any staging;
- (b) Access and safety constraints identified by the QMP; and
- (c) On-going monitoring and review of the most suitable techniques for successful rehabilitation, including the monitoring of natural succession processes.

Mechanical manipulation of quarry

10.2 A description of the methods used to prepare the site for a Habitat Node by adding variability to rock faces, including but not limited to:

- (a) The creation of loose rock and gravel slopes through depositing material or collapsing (with explosives) the upper faces; and
- (b) Breaking-up of hard rock bench surfaces by machine ripping where the rock or soil substrate allows.

Revegetation

10.3 A description of the how the following methods will be used to achieve revegetation of the quarry site:

- (a) Hydro-seeding of grasses for fast initial cover in areas of high erosion; and
- (b) Planting of woody native plants in each Habitat Node as a means to provide relatively quick establishment of plants and a subsequent seed source, and where practicable incorporate rare and/or threatened native plant species found at the quarry.

Targeted weed control

10.4 A description of ongoing weed control as set out in the Weed Control Management Plan required under condition 18 of this consent.

Monitoring and reporting

10.5 A description of the monitoring programme that will include measures that report on:

- (a) Plant survival within planted nodes and replacement planting (if necessary) that is undertaken until plants are established;
- (b) The progression of plant communities from weed plants towards native plants;
- (c) Damage to plantings or native plant communities caused by pest animals, as observed during maintenance of planted areas, and the need for any pest animal control as a result; and
- (d) The effectiveness of the weed control programme implemented through the Weed Control Management Plan required under condition 18 of this consent.

10.6 A report shall be prepared annually for a period of 10 years after the first commencement of this consent detailing the results of the monitoring carried out as under condition 10.5.

10.7 The annual report prepared under condition 10.6 shall be provided in writing to the Consent Authority Manager within one month of completion of the report.

- 11 A QRP prepared under condition 9 may be amended at any time. Any amendments shall achieve the purpose of the QRP and shall be provided in writing to the Consent Authority Manager. A copy of any amended QRP shall also be provided to Tangata Whenua.

- 12 The consent hold shall carry out the quarry rehabilitation in accordance with the QRP

- 12A Rehabilitation of each completed quarry section within six months of the area being stabilised such that it is safe to carry out the work.

Lizard Management Plan (LMP)

- 13 Prior to commencing work under this consent, the Consent Holder shall engage a geotechnical engineer to conduct a site inspection of the quarry to determine, in consultation with an appropriately experienced ecologist, whether a salvage operation for Lizards from the quarry site is safe and feasible.

- 14 If the inspection required by condition 13 determines that the salvage operation is not safe and feasible, the Consent Holder shall prepare a report that sets out in detail the reasons why and the report shall

be provided to the Consent Authority Manager. A copy of the report shall be forwarded to Tangata Whenua.

- 15 If the inspection required by condition 13 determines that a salvage operation is safe and feasible, the Consent Holder shall prepare a LMP and shall provide the LMP to the Consent Authority Manager. A copy of the LMP shall be forwarded to Tangata Whenua. The purpose of the LMP shall be to detail the locations and methods to salvage Lizard in areas safe to do so. The LMP that shall include, but not be limited to:
 - 15.1 A description of the salvage locations;
 - 15.2 Salvage methods to be used;
 - 15.3 Timing of salvage operations;
 - 15.4 Proposed release/relocation area(s) for Lizards; and
 - 15.5 Management of release areas to enable as far as practicable the survival of the relocated Lizards.
- 16 A LMP prepared if required by condition 15 may be amended at any time. Any amendments shall achieve the purpose of the LMP and shall be provided in writing to the Consent Authority Manager. A copy of any amended LMP shall also be provided to Tangata Whenua.
- 17 The consent hold shall carry out a Lizard salvaging operation in accordance with the LMP.

Weed Control Management Plan (WCMP)

- 18 At least ten working days prior to the commencement of the works specified in condition 4, the Consent Holder shall provide a WCMP to the Consent Authority Manager. A copy of the WCMP shall be forwarded to Tangata Whenua.
- 19 The purpose of the WCMP is to minimise the spread of invasive weeds from the quarry to neighbouring properties as far as practicable. To achieve this purpose, the WCMP shall include but not be limited to:
 - 19.1 A description of the methods to control invasive ecological weeds within accessible parts of the quarry;
 - 19.2 A description of the methods to monitor for and control weed species that could invade native vegetation on LPC land adjoining the quarry; and
 - 19.3 A description of the methods to monitor for and control weed species that could potentially invade neighbouring properties not owned by the Consent Holder.
- 20 Weed control measures in the WCMP shall follow best practice advocated by Environment Canterbury.
- 21 The Consent Holder shall regularly monitor the presence of weed species within and the quarry footprint and the immediate surrounds and the results shall be incorporated into the monitoring report required under condition 10.6.
- 22 The WCMP may be amended at any time. Any amendments shall achieve the purpose of the WCMP as set out in condition 19 and shall be provided in writing to the Consent Authority Manager. A copy of any amended WCMP shall also be provided to Tangata Whenua.
- 23 The consent hold shall carry out weed control measures in accordance with WCMP.

Te Hapū o Ngāti Wheke (Rāpaki) Accidental Discovery Protocol

- 24 If kōiwi (human skeletal remains), wāhi taonga (resources of importance), wāhi tapu (places or features of special significance) or artefact material are discovered, the consent holder shall:
 - 24.1 Stop work immediately;
 - 24.2 Immediately advise the affected Papatipu Rūnanga, Te Hapū o Ngāti Wheke (Rāpaki) or their representatives of the disturbance; and
 - 24.3 Allow a site inspection by Te Hapū o Ngāti Wheke (Rāpaki) and their advisors, who shall determine whether the discovery is likely to be extensive and whether a thorough site investigation is required.
- 25 Material discovered shall be handled and removed by tribal elders responsible for the tikanga (custom) appropriate to their removal or preservation.

Review

- 26 Pursuant to Section 128(1) of the Act, the Christchurch City Council may, on the last 5 working days of May and November, serve notice of its intention to review the conditions of this consent for the purposes of dealing with any adverse effect on the environment which may arise from the exercise of the consent.

Reported and recommended by: Patricia Harte, Consultant Planner

Date: 3 July 2017

Reviewed by: Ruth Markham-Short, Planning Team Leader

Date: 3 July 2017

Decision

That the above recommendations be adopted for the reasons outlined in the report.

Commissioner:

Name: David Mountfort

Signature: 

Date: 3 July 2017

APPENDIX J

CRC 111657 TO DISCHARGE CONTAMINANTS TO AIR FROM UPGRADE OF HAUL ROAD

RESOURCE CONSENT CRC111657
Pursuant to Section 104 of the Resource Management Act 1991
The Canterbury Regional Council (known as Environment Canterbury)

GRANTS TO: Lyttleton Port Company Limited

A DISCHARGE PERMIT: To discharge contaminants to air.

DATE DECISION: 3 June 2011

EXPIRY DATE: 3 June 2046

LOCATION: Lyttleton Port, LYTTLETON

SUBJECT TO THE FOLLOWING CONDITIONS:

- 1) The discharge of contaminants into air shall be from:
 - (a) The upgrade and construction of a haul road between Te Awaparahi Bay and Gollans Bay Quarry, Lyttelton, at or about map reference NZTM BX24:7882-7217 or NZMG 260 M36: 8882-3378; and
 - (b) The construction of a reclamation at Te Awaparahi Bay, Lyttelton Harbour, at or about map reference NZTM BX24: 7853-7171 or NZMG 260 M36:8853-3332; as shown on Plan CRC111657(C-A4-6679) which forms part of this consent.
- 2) The contaminants shall be only dust from:
 - (a) The stockpiling, crushing or handling of material;
 - (b) The load out of material and the movement of vehicles associated with the handling of material;
 - (c) Transport of material within the area defined on Plan CRC111657; and
 - (d) The deposition of material associated with the reclamation and upgrade and construction of the haul road.
- 3) The consent holder shall ensure that the discharge of dust shall not cause suspended or deposited contaminants which are offensive or objectionable beyond the boundary of the property on which this consent is exercised.
- 4) Prior to any discharge commencing, a copy of this consent shall be given to all persons undertaking activities authorised by this consent.

CONSTRUCTION DUST MANAGEMENT PLAN

- 5)
 - (a) Prior to the exercise of this consent, the consent holder shall provide a Construction Dust Management Plan to the Canterbury Regional Council, Attention: RMA Compliance and Enforcement Manager.
 - (b) The Construction Dust Management Plan shall set out all practicable measures to avoid or mitigate adverse effects on the environment resulting from the discharges of construction dust in order to ensure compliance with the conditions of this consent.
 - (c) To achieve the purpose of the Construction Dust Management Plan such measures shall include but not be limited to:
 - (i) Spraying water onto unconsolidated surfaces;
 - (ii) Assessing meteorological conditions in advance to determine whether water carts and any other dust minimisation measures need to be activated;
 - (iii) Reducing vehicle speeds in high risk conditions;
 - (iv) Identifying persons responsible for carrying out all actions needed in order to meet the requirements of this consent; and

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- (v) Detailing the training needed for employees and contractors to enable them to ensure the requirements of the Construction Dust Management Plan are met.
- 6)
 - (a) The Construction Dust Management Plan may be amended at any time and shall be provided in writing to the Canterbury Regional Council, Attention: RMA Compliance and Enforcement Manager, within 30 days of the amendments being completed.
 - (b) Any amendments shall achieve the purpose of the Construction Dust Management Plan.
 - 7) A copy of the Construction Dust Management Plan provided in accordance with Condition (5) or amended in accordance with Condition (6) shall be kept on site at all times.

COMPLAINTS

- 8) A record of complaints relating to construction dust emissions from the site shall be maintained. Each record, where practicable, shall include:
 - (a) Location of the reported dust nuisance;
 - (b) Date and time of the complaint;
 - (c) A description of wind speed and wind direction when the complaint occurred;
 - (d) Weather conditions at the time of complaint;
 - (e) Any possible cause of the dust complaint;
 - (f) Any corrective action taken to address the cause of the complaint; and
 - (g) Name of complainant, if offered.
- 9) This record shall be provided to the Canterbury Regional Council, Attention: Compliance and Enforcement Manager by the 30 April each year or on request.

ADMINISTRATION

- 10) The Canterbury Regional Council may, on any of the last five working days of May or November, serve notice of its intention to review the conditions of this consent for the purposes of:
 - (a) dealing with any adverse effect on the environment which may arise from the exercise of the consent and which is appropriate to deal with at a later stage; or
 - (b) requiring the adoption of the best practicable option to remove or reduce any adverse effect on the environment.

Issued at Christchurch on 3 June

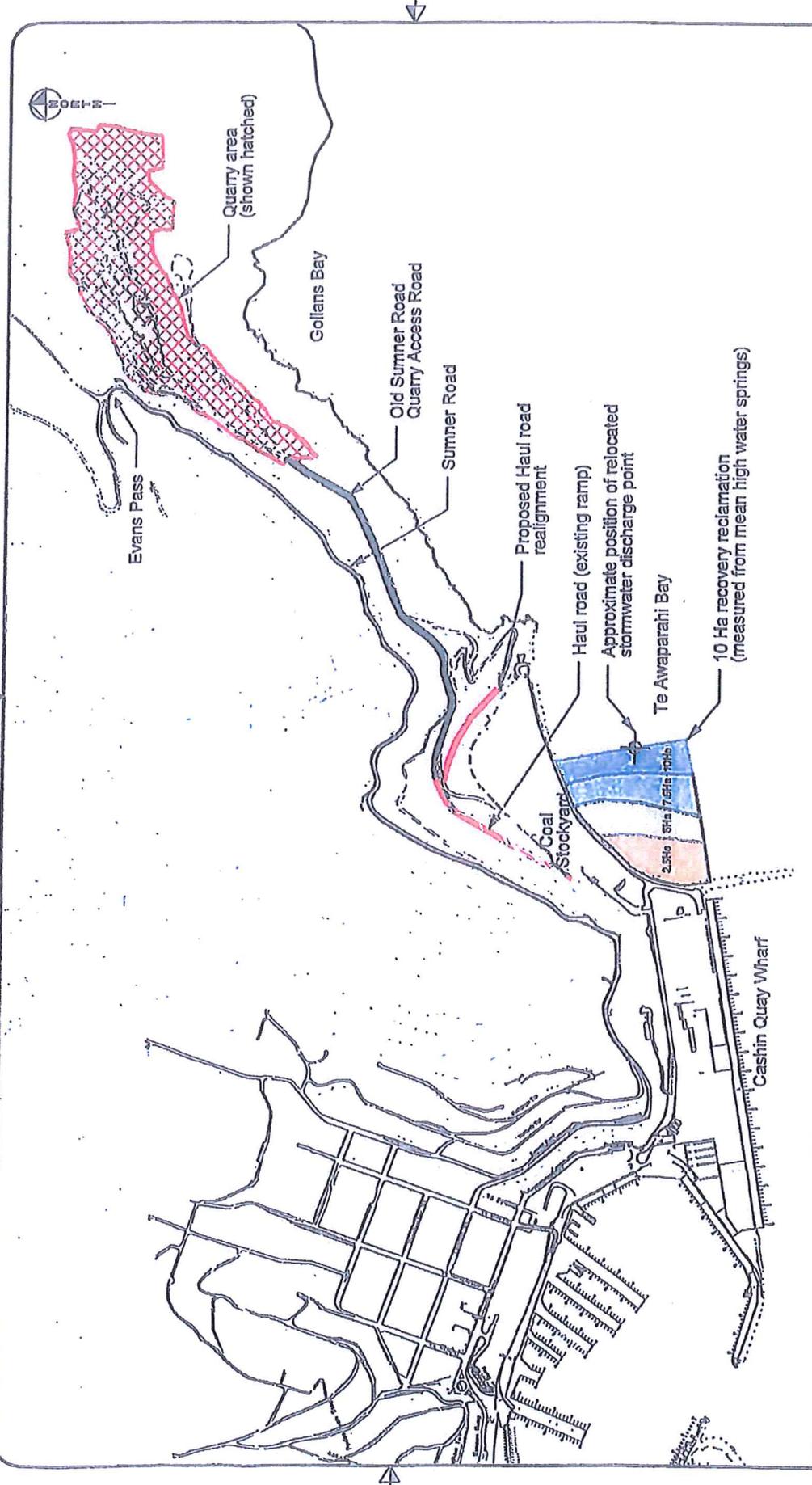
Canterbury Regional Council

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Everything is connected

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CRC11657



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Recovery reclamation general location map

lpc Lyttelton Port of Christchurch

Private Reg Unit
 100 Cashin Quay
 Lyttelton
 New Zealand

Ph: 03 378 8110
 Fax: 03 378 7022
 www.lpc.co.nz

APPENDIX K

CRC 175552 TO DISCHARGE CONTAMINANTS TO AIR AT THE QUARRY

9 June 2017



Lyttelton Port Company Limited
Attn To: Jared Pettersson
Private Bag 501
Lyttelton 8841

Customer Services
P. 03 353 9007 or 0800 324 636

PO Box 345
Christchurch 8140

P. 03 365 3828
F. 03 365 3194
E. ecinfo@ecan.govt.nz

www.ecan.govt.nz

Dear Jared,

Notice of Resource Consent Decision

Record Number(s): CRC175552
Applicant Name: Lyttelton Port Company Limited
Activity Description: To discharge contaminants into air.
Decision: Granted

Decision

The decision of Environment Canterbury is to grant your application on the terms and conditions specified in the attached resource consent document. The reasons for the decision are:

- The activity will achieve the purpose of the Resource Management Act (1991).
- The activity is consistent with the policies of the regional plan or national policy statement.

Commencement of consent

Your resource consent commences from the date of this letter advising you of the decision.

If you object to or appeal this decision, the commencement date will then be the date on which the decision on the appeal is determined.

Lapsing of consent

This resource consent will lapse if the activity is not established or used before the lapse date specified on your consent document. Application may be made under Section 125 of the Resource Management Act 1991 to extend this period.

Your rights of objection and appeal

- **Objection to Decision**
If you do not agree with the decision of the consent authority, you may object to the whole or any part in accordance with Section 357A(1)(g) of the Resource Management Act 1991 (RMA). Notice of any objection must be in writing and lodged with Environment Canterbury **within 15 working days** of receipt of this decision in accordance with Section 357C(1) of the RMA.

- **Right to Appeal**

You may appeal the decision of the consent authority to the Environment Court in accordance with section 12 of the RMA. , The notice of appeal must be lodged with the Court within 15 working days of receipt of this decision, at PO Box 2069, Christchurch. A copy of the appeal should also be forwarded to Environment Canterbury within the same timeframe.

If you are in any doubt about the correct procedures, you should seek legal advice.

- **Objection to Costs**

Section 357B of the RMA allows you to object to costs. Your objection must be received **within 15 working days** of the date on which you receive your invoice. Your objection must be in writing and should clearly explain the reasons for your objection as detailed in section 357C of the RMA.

Monitoring of conditions

It is important that all conditions of consent are complied with, and that the consent holder continues to comply with all conditions, to ensure that the activity remains lawfully established.

You can find online Information regarding the monitoring of your consent at www.ecan.govt.nz/monitoringconsent.pdf.

Charges, set in accordance with section 36 of the Resource Management Act 1991, shall be paid to the Regional Council for the carrying out of its functions in relation to the administration, monitoring and supervision of resource consents and for the carrying out of its functions under section 35 of the Act.

Further information about your consent

For some activities a report is prepared, with officer recommendations, to provide information to the decision makers. If you require a copy of the report please contact our Customer Services section. You can find online information about your consent document at www.ecan.govt.nz/yourconsent.pdf.

Queries

For all queries please contact Customer Services Section quoting your CRC number noted above.

Thank you for helping us make Canterbury a great place to live

Yours sincerely



Consents Planning Section

cc:
Chapman Tripp
Attn To: Jo Appleyard
PO Box 2510
Christchurch 8140

RESOURCE CONSENT CRC175552

Pursuant to Section 104 of the Resource Management Act 1991

The Canterbury Regional Council (known as Environment Canterbury)

GRANTS TO: Lyttelton Port Company Limited

A DISCHARGE PERMIT (S15): To discharge contaminants into air.

COMMENCEMENT DATE: 09 Jun 2017

EXPIRY DATE: 09 Jun 2052

LOCATION: Gollans Bay Quarry, Lyttelton Port

SUBJECT TO THE FOLLOWING CONDITIONS:

General

- 1 The discharge of contaminants into air shall be from the Gollans Bay Quarry located on Old Sumner Road, Lyttelton within the land parcels as shown on Plan CRC175552 (Drawing No. 150825-FIG3), attached to and forming part of this consent.
- 2 The contaminants shall be only dust from:
 - a. Extraction and blasting of rock and aggregate;
 - b. The stockpiling, crushing, screening or handling of rock and aggregate;
 - c. The loading and unloading of material associated with the handling of rock and aggregate;
 - d. Transport of material within the area defined on Plan CRC175552;
 - e. Movement of vehicles;
 - f. Unconsolidated surfaces (fugitive dust)
 - g. The consequential extraction, handling, stockpiling and transport of soil/loess associated with (2) (a) to (d);
- 3 The consent holder shall ensure that the discharge of dust shall not cause suspended or deposited contaminants, which are offensive or objectionable, beyond the boundary of the site on which this consent is exercised.
- 4 A copy of this consent shall be kept on site and made available to all persons undertaking activities authorised by this consent prior to any discharge authorised by this consent commencing.

- 5 Subject to complying with the conditions of this consent, the operating procedures within the quarry shall be undertaken in accordance with the Quarry Management Plan (QMP) prepared by Riley Consultants (April 2017)(Report reference: 150825-D). The QMP may be amended at any time. Any amendments shall be consistent with the conditions of this resource consent.

Dust Management Plan (DMP)

- 6 Prior to exercise of this consent, the consent holder shall provide the Dust Management Plan (DMP) to the Canterbury Regional Council, Attention: Regional Leader – Monitoring and Compliance. The DMP may form part of the Construction and Environmental Management Plan for the Gollans Bay Quarry.
- 7 The DMP shall set out all practicable measures to avoid or mitigate adverse effects on the environment resulting from the discharge of quarry related dust and shall include, but not be limited to:
- a. Spraying water onto unconsolidated surfaces when necessary;
 - b. Minimising areas of exposed soil/loess;
 - c. If necessary, minimising the drop heights and overloading when transporting and processing aggregate;
 - d. Assessing meteorological conditions in advance to determine whether water carts and any other dust minimisation measures need to be activated;
 - e. Managing vehicle speeds as required;
 - f. Identifying persons responsible for carrying out all actions needed in order to meet the requirements of this consent; and
 - g. Handling and stockpiling practices.

Advice Note: The consent holder may require a land use consent to discharge contaminants to land if any dust suppressants are being used to stabilise any exposed surfaces within the site.

- 8 The DMP shall be approved in writing by the Canterbury Regional Council, prior to discharge authorised by this consent first commencing and the consent holder shall undertake all activities authorised by this consent in accordance with the approved DMP.
- 9 The DMP may be amended at any time. Any amendments to the DMP shall be approved in writing by the Canterbury Regional Council. The consent holder shall undertake all activities authorised by this consent in accordance with the amended DMP.

- 10 A copy of the DMP provided in accordance with condition (8) or amended in accordance with condition (9) shall be kept on site at all times.

Complaints

- 11 A record of complaints relating to dust emissions from the site shall be maintained. Each record, where practicable, shall include:
- a. Location of the reported dust nuisance;
 - b. Date and time of the complaint;
 - c. A description of wind speed and wind direction when the complaint occurred;
 - d. Weather conditions at the time of complaint;
 - e. Any possible cause of the dust complaint;
 - f. Any corrective action taken to address the cause of the complaint; and
 - g. Name of complaint, if offered.
- 12 The complaints record shall be provided to the Canterbury Regional Council, Attention: Regional Leader – Monitoring and Compliance by 30 April each year or on request.

Rehabilitation

- 13 The final landform shall be managed in order to minimise the long term dust issues from the site

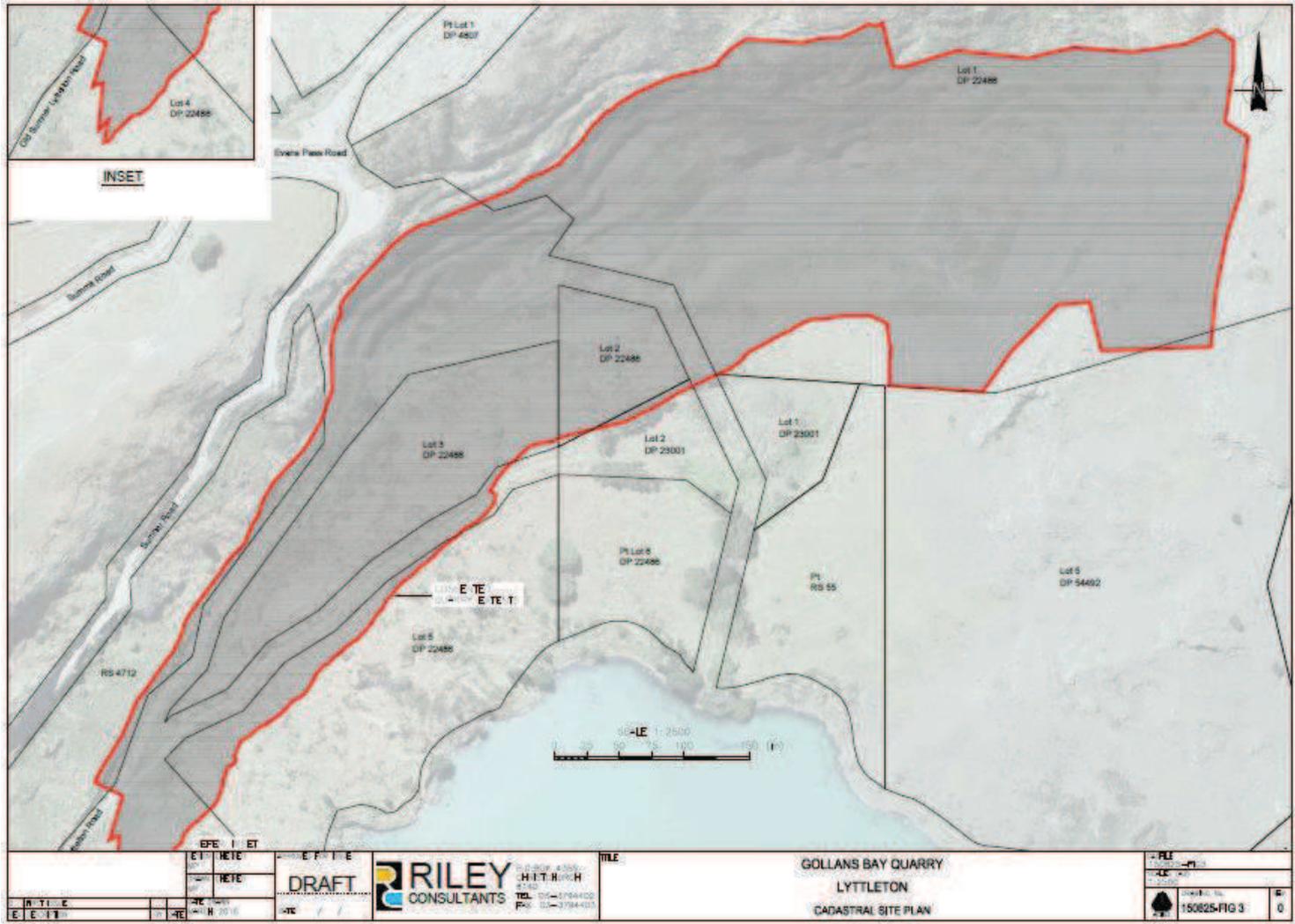
Administration

- 14 The Canterbury Regional Council may annually on the last working day of May or November, serve notice of its intention to review the conditions of this consent for the purposes of:
- a. Dealing with any adverse effect on the environment which may arise from the exercise of this consent; or
 - b. Requiring the consent holder to carry out monitoring and reporting instead of, or in addition to, that required by the consent.
- 15 The lapsing date for the purpose of section 125 of the Resource Management Act 1991 shall be 30 June 2022.

Issued at Christchurch on 9 June 2017

Canterbury Regional Council

Plan CRC175552 – Gollans Bay Quarry site



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Exercising of resource consent CRC175552

It is important that you notify Environment Canterbury when you first start using your consent.

GRANTED TO: Lyttelton Port Company Limited
A DISCHARGE PERMIT (S15): To discharge contaminants into air.
LOCATION: Gollans Bay Quarry, Lyttelton Port

Even if the consent is replacing a previous consent for the same activity, you need to complete and return this page.

Providing this information will:

- Validate your consent through to its expiry date
- Minimise compliance monitoring charges
- Help provide an accurate picture of the state of the environment.

If consent CRC175552 is not used before 30 Jun 2022 this consent will lapse and no longer be valid.

Declaration:

I have started using this resource consent.

Action taken: (e.g. pasture irrigated, discharge from septic tank/boiler/spray booth etc).

Approximate start date (*Note: this may be different to the date the consent was granted*): _____

Signed: _____ **Date:** _____

Full name of person signing (please print): _____

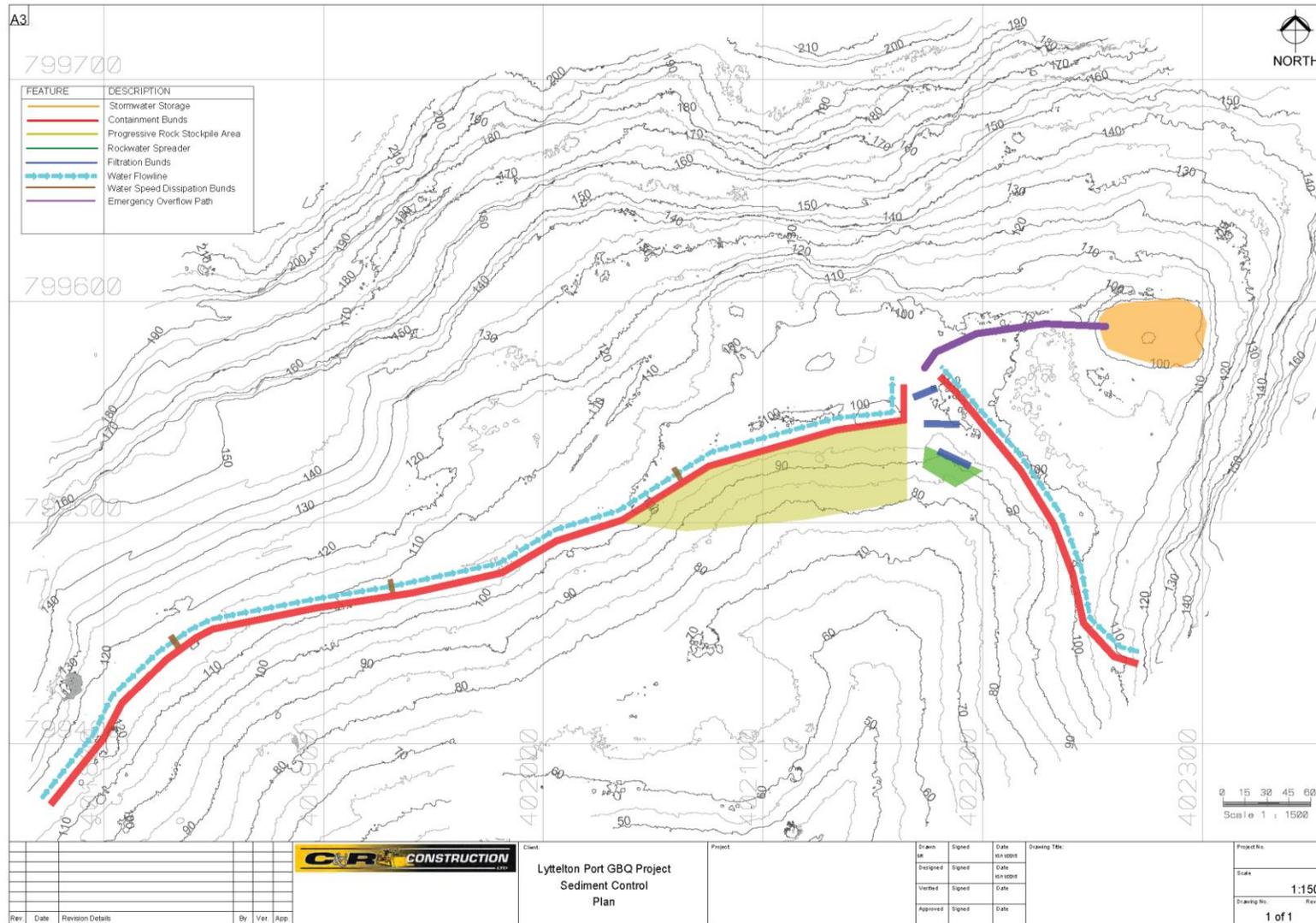
Please return to:

Environmental Protection - Administration
Environment Canterbury
PO Box 345
Christchurch 8140

File: CRC175552

APPENDIX L

SEDIMENT CONTROL PLAN R2



APPENDIX M

BLASTING MANAGEMENT PLAN – RED BULL POWDER COMPANY



Blasting Management Plan

Lyttelton Port Reclamation
HC&R



Blasting Management Plan

HC&R



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1. OVERVIEW

The Reclamation Project is a key project for The Lyttelton Port Company (LPC). The project involves large volumes to be drilled and blasted in both Trachyte Dyke and Basaltic lava rock formations. The rock materials for the Stage 1 of the Te Awaparahi Bay Dredging and Reclamation Project are to be sourced from the Gollans Bay Quarry under the LPC Port Recovery Plan.

Blasting is deemed necessary to both aid and allow excavation of the materials and allow the production of both large armour rock and select fill to fulfill product requirements throughout the project. This Blasting Management plan covers all drilling and blasting requirements for the quarry development that is proposed for the LPC project, being completed for Heron Construction – C&R Development's joint venture HC&R with Red Bull Powder Company as a sub-contractor.

Drilling and blasting requires careful design and appropriate controls to ensure blasting is carried out in a safe, efficient and compliant manner. Red Bull have identified the following controls as being necessary for this project;

- a. All blasting must be completed using Red Bull's blasting authority system that covers all mark out, drilling, blast loading, firing and blast clearances
- b. Adjacent areas must be carefully managed, including site traffic management requirements and the exclusion of construction staff and equipment during firing times
- c. Local community and Te Hapu o Ngati Wheke liaison is to be managed by HC&R who will inform affected neighbours of site drilling and blasting activities
- d. Environmental consideration and controls to meet site requirements
- e. All blast designs will be aimed at minimising effects to high wall stability, optimal fragmentation for armour rock and excavation for production efficiency
- f. All explosives will be stored in on-site magazines that meet all The Health and Safety at Work Act 2015 regulations (HSWA). Delivery of explosive to on site magazines will be provided by Red Bull Shotfirers utility vehicle and delivery truck.
- g. A site specific Firing Procedure is required with sentries posted (Red Bull / C&R personnel) around the site during firing to ensure that the site is clear and secure
- h. Monitoring of the environmental effects, including inclement weather/lightning, and ground vibration/blast noise/air overpressure where required
- i. Compliance reporting as required for noise and vibration monitoring
- j. To minimise the disruption to construction activities, blasts will be fired at site Lunch, smoko and end of shift periods (During light hours)
- k. Red Bull's Safe Standard Operating Procedures (SSOP's) and drilling and blasting safety manuals will be followed at all times

These controls are addressed in this document based on the information available at this time. Some aspects may need to be updated to include more project specific details as that information becomes available.



2. PRE BLAST CHECKLIST / AUTHORITY TO BLAST

RedBull utilise a blasting authority system to cover all aspects of the blasting process. There is a separate component for the mark out, blasting, and post blast clearance processes. Each includes sign-off by the Shotfirer and a HC&R Site Representative. The authority system includes the following;

- a. Pre mark out inspection
- b. Mark out documentation
- c. Pre blast inspection
- d. Blast preparations
- e. Blast documentation
- f. Final checks
- g. Final sign-off and authority from Site Representative to fire the blast
- h. Post blast inspection and sign-off

The authorities identify and require additional controls and Manager Approval where triggered in the relevant sections. A copy of the authority system is attached as Appendix 1. This authority system will be used to control all blasting on this project.

Daily site meetings regarding blasting are also proposed. A morning meeting on blast days in conjunction with HC&R pre shift meeting will be held between the Shotfirer and a HC&R Site Representative to confirm all relevant items on the blast authority are covered off prior to commencing with loading the blast.

A pre blast meeting will also be held an hour prior to the blast to verify that all final checks have been completed and the authority can be signed off and authority given by the Shotfirer and HC&R Site Representative to proceed with the blast.

A meeting record sheet will be completed on each blasting day to record the two meetings. This sheet includes a section on change management to cover any actions required to resolve any hold points identified in relation to the authority system. A copy of the meeting record sheet to be confirmed with HC&R will be attached Appendix 2.

3. BLAST METHODOLOGY, BLAST DESIGN AND VIBRATION MANAGEMENT, PROCEDURES AND SAFETY MEASURES

3.1. GENERAL BLASTING METHODOLOGY

Production blasting will utilise a Quarrying methodology for all blasting being carried out on existing developed benches with approximately 12m face heights. Blasts will be designed to control any final walls of the Gollans Bay Quarry while leaving minimum 6m bench width. Blasts will be designed to ensure all rock mass movement is controlled appropriately for the blasting conditions on site. Drilling will be carried out with RedBull Sandvik Rock Ranger 700 drill rig.

Explosives utilised will be predominantly bagged ANFO and packaged emulsion, Bulk emulsion explosives can be used in wet hole conditions with acceptable access. Note pricing is based on ANFO, the need for MPU will change pricing.

We propose to use non-electric detonators supplied by Austin Detonator, with standard surface delay timing options. Non-electric initiation is industry standard for quarry and mine blasting. We have an electronic initiation option available that can be used if deemed necessary for vibration control, timing outside of nominal nonel timing or safety reasons for an extra over rate.

Electronics are more expensive, but allow more flexibility in regards to blast timing and design. Electronics also provide additional vibration and high wall control due to increased timing accuracy which may not be applicable to early works but could prove crucial for accurate final wall blasting in the later stages of the project.

RedBull will provide Technical and Safety Data Sheets for all products proposed for use on site prior to drilling and blasting commencing. (List of SDS attached as appendix 7)

Charge masses and timing will be controlled in accordance with any specific blast designs.

All blasts will be stemmed with high quality stemming material provided by HC&R to mitigate air overpressure and stemming ejection.

3.2. BLAST DESIGN AND VIBRATION MANAGEMENT

All blasting will be carried out once any overburden and vegetation has been removed to expose the competent basalt rock. The blast design and vibration mitigation is to be implemented in stages: *theoretical vibration levels* and *signature holes* to determine initial blasting parameters suitable for the site (if required); using this information *trial blasts* will be designed and once these are successfully completed, *production blasts* will commence. The individual processes are outlined below. These steps will be used as required and some steps may be removed as deemed necessary for the level of vibration control required onsite.

1. **Theoretical Vibration Levels** are calculated using Scaled Distance Analysis Empirical formula and nominal constants for rock blasting.
2. **Signature Hole Analysis (if required):** Single holes will be fired and the vibration signature analysed for different charge masses. From this, appropriate Maximum Instantaneous Charge (MIC's) and blast timings can be identified for trial and production blasting.
3. **Trial production blasting:** A series of small trial blasts will be carried out using:
 - The information obtained by Scaled Distance calculations and Signature Hole Analysis
 - Confirming MIC
 - Optimum timing and predicted PPV

- The Shotfirers on-site assessment of geology, rock structure, safety and any other site specific issues.
4. **Loop back to step two**, if vibration exceeds a target level.
 5. **Proceed with production blasting and monitor continually**: Regularly revert to blast design procedure and whenever vibration exceeds target.

3.3. DEVELOPMENT BLASTING

Prior to full production blasting, initial and ongoing development blasting will need to be carried out in the Gollans Bay Quarry. Development blasting is essential in preliminary works to provide access, bench leveling and general quarry tidy up.

We propose that 89 – 102mm diameter holes will be drilled to provide the necessary blast results for developing the site.

Development blast designs will be designed in such a way that the fragmentation is adequate for excavation after blasting. Blasting will be designed to relevant pit design and bench heights appropriate for the rock type as supplied by HC&R site representative. RedBull's shotfirer will design these blasts in accordance with the relevant Mark out SSOP's.

Blasting is proposed to be carried out on an as required basis and all blasting liaising is to be carried out between the RedBull Regional Manager and HC&R site representative.

All development blasts will be stemmed with high quality stemming material to mitigate airblast and stemming ejection.

3.4. PRODUCTION BLASTING

Once the blast design process outlined above has been completed and the appropriate parameters for the site determined, production blasting will commence. Blasting noise and vibration will be managed and monitored in accordance with the Blast Management Plan to ensure compliance and meet reporting requirements.

We propose 89 - 102mm holes predominantly, to be drilled to the appropriate burden, spacing and depths determined by trial blasts. Smaller hole diameters allow better explosive distribution of small charges and can provide better vibration control through limited charge masses.

Full height cuts for areas that require blasting are proposed to maximize the production volumes. Blasting will be designed to relevant pit design and bench heights appropriate for the rock type as supplied by HC&R site representative.

Blasting is proposed to be carried out on an as required basis and all blasting liaising is to be carried out between the RedBull Regional Manager and HC&R site representative.

Blast designs will look to target appropriate fragmentation to maximize the optimal rock sizing for the project. Blasts can be modelled through blast design software to predict particle sizing where accurate and reliable geotechnical information is made available. Predicted can be compared to actual and appropriate design modifications made to blast parameters over time, and model inputs refined.

Charge masses will be controlled in accordance with trial blasting results to control vibration and airblast effects if required to meet site environmental compliance.

All blasts will be stemmed with high quality stemming material to mitigate airblast and stemming ejection.

All site personnel and public will be excluded from the blast location; a 200m exclusion to the side and behind all blasts and 300m in front of the blast location is to be in place. All personnel must be in a position behind machines or out of direct line of site to the blast. The site would need to be shut down for blast times and the blast area completely isolated. Calculation for exclusion zones (Appendix 4)

Firing procedures will be as set out in RedBull SSOPs (Appendix 3)

3.5. FINAL WALL BLASTING

Both Pre-Split and Cushion blasting methodologies have been put forward as options for final wall control for the project. Trials are to be used to identify the most appropriate and cost effective method for the geology and project design.

Pre-Split blasting is an effective blasting technique for final wall stability, control and back break. The method is to fire the pre-split holes prior to the production holes, this provides separation between the production blast and the final wall reducing the back break substantially. Generally to gain the best final wall results pre-split holes are fired without stemming, noise will be considered in pre-split blasting designs if this technique is required.

Cushion blasting can be an effective blasting technique in the correct geology to help maintain final wall stability, control and back break. The best method for cushion blasting is to fire a single row of holes at a smaller spacing width and charge. This is completed on the final wall once all material in front has been excavated. Firing the single row of cushion holes allow optimal face movement while reducing back break substantially. Cushion row holes are stemmed with high quality stemming.

Additional controls are required to account for larger geological faults or drastic changes in geology, including geotechnical design to meet site ground conditions and controls on excavation to ensure final walls are not over or under excavated.

3.6. BLAST PROCEDURES

All blasting on site will be carried out within the blasting authority system detailed in Section 2 above.

Blasting will be carried out to meet the production demands of the project. All blast liaisons are to be carried out between RedBull's Shotfirer or Manager and a HC&R Site Representative.

RedBull's SSOP's for drilling and blasting apply to all drilling and blasting activities at all times. These can be bound and submitted separately to HC&R if required. The list of applicable SSOP's is attached in Appendix 3 of this document. Copies will be updated as required.

All site personnel and equipment are to be excluded from the blast area. An exclusion zone will apply for all blasts, and must be agreed on by RedBull and HC&R. RedBull's safe blasting distance calculator. An example safe blasting distance calculation is attached as Appendix 4. This calculation will be used in conjunction with site parameters to establish the required isolation for blasting onsite when blasting commences.

Where required blasts will be monitored in a minimum of two locations for vibration and air overpressure, the proposed locations will be neighbouring stakeholders and the historic battery point emplacements. Additional locations will be monitored as and if required.

Blasts are to be initiated using remote firing devices, with a blasting cable and electric firing device kept available on site as a back-up.



Firing procedures are to be as per Red Bull's Blasting Firing SSOP 6.13, attached in Appendix 3, including the following;

- a. Shotfirer and Blast Guard responsibilities
- b. Requirements prior to the firing window
 - Blast preparation and verification
 - Exclusion of personnel and equipment
 - Blast Guards moving to positions
- c. Confirming approval to proceed with the blast
- d. Firing window requirements
 - Communication protocols
 - Blasting warning sirens
 - Firing protocols
- e. Requirements post firing
 - Blast clearance
 - Communication protocols
 - Blasting all clear sirens

Shotfirer and Blast Guard radio communication protocol for during firing windows is attached separately as Appendix 5.

3.7. **BLASTING QUALITY AND SAFETY MEASURES**

All blasting will be controlled through the use of a blasting checklist with appropriate hold points.

1. Check that the weather is conducive to safe blasting; the shot may be cancelled if deemed unsafe by the shotfirer. RedBull shotfirer to notify HC&R as soon as this decision is made so arrangements can be made to advise adjacent residents.
2. Blast Preparation
 - 2.1 Pre Loading
 - 2.1.1 All holes dipped and depths recorded, back filled or re drilled if necessary
 - 2.1.2 Detonators for top and bottom decks must be identified visually prior to loading
 - 2.2 Loading
 - 2.2.1 Design MIC is in accordance with site parameters
 - 2.2.2 Deck lengths and stemming heights checked
 - 2.2.3 Blast timing to be checked and ensure correct
 - 2.2.4 Stemming to be with clean chip, the person who starts stemming a hole is to finish it
 - 2.2.5 Shotfirer to remain in the blast area at all times until shot clearance
3. A "no smoking" zone to be established in the blast area and within 10m of any vehicle used to transport explosives to site. (Blast area to be delineated by Blasting sandwich boards or cones)
All vehicles carrying explosives to drive directly to the blast area; no parking in public car parking.
4. Designated blast guards are to have expectations and requirements clearly explained;
 - 4.1 Locations to be defined
 - 4.2 Radio channel specified
5. Shotfirer to confirm blast has been loaded as per the approved blast design and to site parameters, blast mats are in place and monitoring equipment is set up.
6. Blast guards, traffic control (if required) and environmental manager (or representative) to meet at the blast area a minimum of 15minutes prior to blasting
7. Blast exclusion zone is cleared
8. 10 minutes prior to the blast, blast guards take positions
9. Final blast checks and wiring completed
10. Final warnings are given at 30 seconds (3 sirens), 10 second countdown to firing over radio and the blast is fired
11. Following the blast
 - 11.1 Post blast radio call is made
 - 11.2 A visual check of the blast will be carried out and all clear given over radio and sirens (2 short sirens) sounded
 - 11.3 Blast guards can stand down
12. In the event of a misfire RedBull's misfire policy and contingency plans will be followed.

Following a misfire the blast exclusion zone for firing will revert to the blast area. The blast exclusion zone will apply again when the blast is prepared for firing.

4. EXPLOSIVE PRODUCTS

4.1. DETONATORS

Non-Electric (Nonel) or Electronic detonators are proposed for blasting onsite. Non-Electric Detonators are proposed to complete majority of blasting onsite. Electronic detonators may be used for blasting where vibration control, critical timing or where Nonel initiation is deemed inappropriate. Electric Detonators will only be used as a back up to remote firing non-electrics if initiation is required.

SDS documents are held for all detonators types onsite and transported in RedBull vehicles and magazines.

4.2. HIGH EXPLOSIVES

RedBull will use a combination of Cast Boosters, Packaged Emulsion and Detonating Cord for bulk explosive initiation at Gollans Bay Quarry.

SDS documents are held for all explosive types onsite and transported in RedBull vehicles and magazines.

4.3. BULK PRODUCTS

RedBull carry out blasting operations with bulk blasting products. Bagged ANFO is proposed to be used for blasting onsite. If required, bulk emulsion can be used in wet hole blasting although this is a variation to the pricing.

ANFO is delivered in 20kg bags to onsite magazines, Bulk emulsions are delivered by Mobile Processing Units (MPU) where and if applicable.

SDS documents are held for all explosive types onsite and transported in RedBull vehicles and magazines.

4.4. STORAGE AND TRANSPORT

All RedBull's explosives are stored in accordance with HSW Act 2017 requirements. Magazines are built and maintained in accordance with HSNO COP55 and the AS2187.2 Standard – Explosive Storage, Transport and Use. All explosives will be stored either at RedBull's designated and certified remote storage magazines on the Gollans Bay Quarry site or RedBull's Frasers West Explosives Reserve in East Otago.

All explosives and precursors will be transported to and onsite in accordance with HSW Act and NZS 5433 Transport of Dangerous Goods on Land requirements in a RedBull Ute, MPU or delivery truck.

5. HEALTH AND SAFETY

Health and Safety will be managed in accordance with the RedBull Health and Safety Management Plan and SSOPs, along with the HASWA act 2015, Quarrying and Mining Regulations 2015 with associated Codes of Practice and C&R operational Health and Safety Systems as detailed in the C&R *Health and Safety Management Plan, C&R SMP V1 2017* and LPC safety requirements as needed. All RedBull staff working at this site will be inducted as per LPC and HC&R safety requirements covering both procedural and PPE requirements. All RedBull staff will be required to comply with all aspects any site-specific safety requirements.

A list of relevant RedBull drilling and blasting SSOP's is attached in Appendix 3.

All RedBull operations concerning the life cycle of explosives (including manufacture, storage, handling, transport, use and disposal) are conducted in compliance with the HSWA Hazardous Substances Regulations 2017, and all relevant amendments.

RedBull will attend HC&R Daily Prestart meetings / Hazard Reviews as required on site, along with RedBull Toolbox meetings, Take 5's, Job Hazard Assessment (JHA's) and complete incident/near miss reports whilst on site. Toolboxes and JHA's can be submitted monthly whilst incident/near miss reports will be submitted within 24 hours of any event if required.

RedBull will provide blast guard training to nominated site representatives and RedBull personnel in the early stages of the project. A register will be maintained of people who have been trained, and it will be a requirement that anyone who is proposed as a blast guard has completed the training and is listed on the register.

Explosives awareness training will also be provided for site personnel working in the excavation areas and with the excavated material. RedBull will give a presentation at site toolboxes covering off on our drilling and blasting procedure, the products we use, and what to be aware of when excavating a muckpile or processing material from a muckpile in the unlikely event of a misfire. A poster will also be provided to go on site noticeboards or in operator's machines. An example poster is attached as Appendix 6.

RedBull's operations are supported by a fully electronic Safety Management System which is accessible in real time via mobile devices issued to each of our operational personnel. This allows for ease of access to our current SSOP's and the online completion of forms such as JHA's, Take 5's, Authorities to Work and Plant Pre-Start Checks. The electronic completion of forms allows the quantity and quality of completed safety records to be monitored remotely by RedBull's management team.

RedBull's Shotfirer will be in sole control of each blast and will have full authority over all safety aspects of the blast. RedBull's blasting procedures will be followed and blasting exclusion zones will be identified and agreed upon prior to blasting commencing.

All personnel will hold all required competencies (detailed in Section 6 below) and have the appropriate level of experience to be able to perform their job on site in a safe and compliant manner.

5.1. **JOB RISK ASSESSMENT AND TAKE 5**

Before any work/task is carried out, RedBull's site personnel will conduct a task specific take 5 and Job Hazard Analysis (JHA) if the task is not covered under an SSOP.

All staff working within the blast area will be required to sign on to the Authority system described in section 2 of this document. The site hazard board is to be updated with any hazards that apply to all site personnel by HC&R. Take 5's will be completed by RedBull staff that are working on site that come across a new hazard or task not covered by the JHA.

The Take 5 and JHA documents are included within Appendix 3.

6. STAFF COMPETENCIES

Minimum competencies required for RedBull personnel for the relevant roles are detailed below.

6.1. **SHOTFIRERS**

- a. Current Certified Handlers Certificate (supersedes Approved Handlers Certificate as they expire) and Controlled Substance License for explosives with all relevant lifecycles
- b. Sign off to all relevant RedBull SSOPs
- c. NZ Driver's license with Dangerous Goods Endorsement for legally transporting explosives on New Zealand roads
- d. Current First Aid certificate
- e. Client site inductions

6.2. **DRILLERS**

- a. Wheels Tracks and Rollers Endorsement
- b. Class 5 license for driving drill rig transporters
- c. Client site inductions

Current copies of all required competencies will be provided.

7. SLEEPING SHOTS PROCESSES

No blasts are proposed to be slept onsite, unless in the event of a misfire resulting in a blast being unable to be fired on the day of loading / or unforeseen circumstances which render firing the blast unsafe on the day of loading. In this instance RedBull's SSOP 6.14 Sleeping of Blast Patterns, attached in Appendix 3, is to be followed. This procedure includes the following;

- a. RedBull and HC&R Responsibilities
- b. Safety and environmental considerations
 - Degradation risk for explosives products
 - Ground conditions
 - Risk of unauthorised access by people or vehicles
 - Risk of animals damaging the initiation system
 - Risk of premature detonation
- c. Risk assessment
 - Explosives being used
 - Site specific information
 - Blast location
 - Inclement weather conditions
- d. Controls required
 - All loaded holes must be stemmed
 - All holes must be isolated (CTD's / harness wire must be disconnected and removed from the blast site)
 - All explosives other than those loaded within stemmed holes must be removed from site and stored in a certified magazine overnight
 - Unauthorised access must be prevented; barricades and security (where appropriate), warning signs, and flashing lights (spaced at a maximum of every 20m around the perimeter of the blast site)
 - All other relevant procedures will apply once the slept blast is to be readied for firing

8. MISFIRE PROTOCOLS

A misfire is best defined as a blast hole which has failed to detonate, in part or whole, for any reason. RedBull's SSOP 6.09 Misfires, attached in Appendix 3, is to be followed if misfires are discovered. This procedure includes the following;

- a. Responsibilities
- b. Explanations of misfire situations
- c. Stand-down times
- d. Exclusion zone requirements
- e. Shotfirer notification requirements
- f. Muckpile recovery actions
- g. Re-firing protocols

Explosives cartridges or ANFO / Bulk Emulsion may not be initiated due to dislocation or separation but these are effectively inert unless subjected to excessive heat, shock or electrical current. If discovered during excavation, excavation must cease immediately, the area must be isolated and RedBull contacted to inspect and remove.

If any uninitiated or suspected uninitiated detonators or boosters are found during excavation, excavation must cease and RedBull must be notified immediately. RedBull will have a Shotfirer on site as soon as possible to inspect and make arrangements in line with the Misfire SSOP.

Electronic initiation reduces the likelihood of encountering misfires during firing windows. Electronic firing systems will not allow firing unless all detonators are communicating prior to the firing command is sent. As the pricing for blasting at Gollans Bay Quarry is based on non-electric detonators, electronics would come at an additional cost.

No blasts are proposed to be slept onsite, unless in the event of a misfire resulting in a blast being unable to be fired on the day of loading. In this instance RedBull's SSOP 6.14 Sleeping of Blast Patterns, attached in Appendix 3 is to be followed.

9. EMERGENCY PROCEDURES

If an Emergency situation occurs onsite all RedBull staff will follow Gollans Bay Quarry Evacuation and Emergency Procedure as outlined by LPC and HC&R in the site induction process.

If the emergency occurs while blasting is being carried out emergency services are to remain clear of the blast area. Emergency services are to only enter the blast area with permission and under the supervision of the Shotfirer if absolutely necessary.

If the emergency situation happens during the firing window the blast will be aborted and proceed again once the situation has been resolved.

If the emergency situation occurs directly involving explosives the applicable RedBull Emergency Response Plan is to be followed:

Relevant RedBull Emergency Plans include;

- a. Transport Emergency Response Plan
 - This is carried in all RedBull vehicles and specifies the controls required for any explosives related incidents during transport and use
- b. LPC Explosives and Magazine Emergency Response Plan
 - This covers explosives storage and how emergencies are to be handled if they involve explosives.

RedBull SSOP's provide controls for managing risks associated with the complete life cycle for explosives (MPU, magazine, manufacture, storage, transport, handling, use, and disposal) in compliance with HSWA, and all work activities relating to drilling and blasting operations.

10. ENVIRONMENTAL IMPACTS MANAGEMENT

The summary table below details the measures and monitoring mechanisms we will undertake to mitigate adverse effects of drilling and blasting on the environment and the local community.

Adverse Effect	Mitigating Measures	Monitoring
Ground vibration	<ul style="list-style-type: none"> • Blast Design • Surface delays • Option to use electronic initiation for accurate timing and vibration control 	<ul style="list-style-type: none"> • Seismograph readings at minimum 2 defined locations • Review blast design parameters when ground conditions changes or vibration peaks occur • Comply to site stipulated limits
Over break	<ul style="list-style-type: none"> • Blast Design • Vibration Control • Cushion blasting 	<ul style="list-style-type: none"> • Trial shots • Review results
Air overpressure	<ul style="list-style-type: none"> • Option to eliminate use of surface delay detonators • High quality stemming and appropriate stemming controls and procedures • Blast design to eliminate face burst 	<ul style="list-style-type: none"> • Record air overpressure with Seismographs
Dust emission	<ul style="list-style-type: none"> • Drill rig to be fitted with dust extractor • Use water while drilling collars 	<ul style="list-style-type: none"> • Dust monitoring carried out by HC&R
Noise from blasting	<ul style="list-style-type: none"> • Option to eliminate surface timing delays by using 'noiseless' down-hole electronic initiation. • High quality stemming and appropriate stemming heights 	<ul style="list-style-type: none"> • Noise monitoring by RedBull's seismographs
Flyrock	<ul style="list-style-type: none"> • Use only high quality stemming material • Stemming height to be properly controlled • Blast design to eliminate face burst 	<ul style="list-style-type: none"> • QC on stemming used • Video blasts to identify flyrock problems before they emerge
Site safety	<ul style="list-style-type: none"> • Warning sirens pre- and post-blast • Blasting at regular times • Drill and Blast activity signage • Site exclusion zones to be implemented for all blasts • Sentries to be posted around the site • Communications via stakeholder liaison and staff via prestart / tool box meetings 	<ul style="list-style-type: none"> • Shotfirer and HC&R Safety Representative / Stakeholder Representative

11. STATUTORY COMPLIANCE AND REPORTING

11.1. REGULATORY COMPLIANCE AND REPORTING

Blasting is to be carried out in accordance with Resource Consent conditions held by LPC.

At least 24hrs prior to blasting commencing, RedBull will submit a Particular Hazardous Works Notification to Work Safe NZ to cover all blasting. Suitable community and Iwi liaison should be carried out by LPC or HC&R which includes notification that blasting is to take place.

All blasting will be conducted in accordance with Work Safe NZ, EPA, Resource Consent conditions and relevant local body requirements. A comprehensive Blast Log will be filled out for each blast, indicating blast plan, explosives used, and number of holes.

A Summary of expected blast reporting and documentation is listed below:

- a. Video Recording of all blasts
 - Stored on RedBull servers, available to LPC and HC&R on request
- b. Daily downloads and seismograph event reports for each monitor for each blast
- c. Dangerous Good Transport Declarations completed and submitted for all transport of explosives to and from Gollans Bay Magazines, information provided will cover;
 - Type of explosive, explosive quantities, UN number, Haz chem, flashpoint, departure and arrival destination address and DG declaration including date and signature of approved person.
- d. Blastlogs completed and submitted for each blast covering;
 - Total explosive used, number of holes, time, date, drill m, BCM, Powder factor, blast patterns and hole diameter. Additional information can be added to fulfill QMP requirements.
- e. Authority to blast documentation
- f. Risk Assessments and any other safety documentation

11.2. NOISE AND VIBRATION COMPLIANCE STANDARDS

Construction Noise and Vibration limitations and requirements are set out in the *QCEMP, Quarry Construction Environmental Management Plan*.

Section 3 sets out the Noise criteria and limits that are to apply for the project.

Noise

Plant

The noise limits set out below are not deemed to be a compliance issue for Red Bull proposed plant and equipment to be used onsite for drilling and loading of blasts. All construction noise monitoring is to be carried out by HC&R.

Table 3-1: Construction Noise - Residential Receivers

	Time	dB L _{Aeq(T)}	dB L _{Amax}
Weekdays	0630h-0730h	55	75
	0730h-1800h	70	85
	1800h-2000h	65	80
	2000h-0630h	45	75
Saturdays	0630h-0730h	45	75
	0730h-1800h	70	85
	1800h-2000h	45	75
	2000h-0630h	45	75
Sundays and Public Holidays	0630h-0730h	45	75
	0730h-1800h	55	85
	1800h-2000h	45	75
	2000h-0630h	45	75

Table 3-1: Construction Noise - Industrial Receivers

	Time	dB L _{Aeq(T)}	dB L _{Amax}
All Days	0730h-1800h	70	-
	1800h-0730h	75	-

Blasting

Blasting noise or air overpressure is set out in the Christchurch District Plan, noise from blasting associated with the quarrying area at Gollans Bay quarry shall not exceed 120dB_L at any point within the notional boundary of any dwelling. The notional boundary of a dwelling is defined as a line 20 metres from the exterior wall of any dwelling or the legal boundary where this is closer than 20m to the dwelling, CDP 13.8.4.2.5 Vibration.

Monitoring for noise will be undertaken as per the CNMP requirements, following the DIN4150 standards.

Monitoring results will be supplied to LPC and HC&R within 5 working days.



Vibration

Vibration predictions will be completed as required under the CNMP. Initial blasting onsite will set to define the project attenuation criteria over and above the generic guidelines in the CNMP.

Monitoring for vibration will be undertaken as per the CNMP requirements, following the DIN4150 standards. Under the Christchurch District Plan Vibration from blasting associated with the quarrying area at Gollans Bay quarry shall not exceed 5mm/s at any point within the notional boundary of any dwelling respectively. The notional boundary of a dwelling is defined as a line 20 metres from the exterior wall of any dwelling or the legal boundary where this is closer than 20m to the dwelling, CDP 13.8.4.2.5 Vibration.

Monitoring results will be supplied to LPC and HC&R within 5 working days.



APPENDIX 1 - REDBULL AUTHORITY SYSTEM TO MARK OUT, BLAST, AND POST BLAST INSPECTION



APPENDIX 2 – DAILY BLAST MEETING RECORD SHEET
(Format and detail TBC by both parties)



**APPENDIX 3 - REDBULL DRILLING AND BLASTING SSOP'S, JHA AND TAKE
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APPENDIX 4 - SAFE BLASTING DISTANCE CALCULATION



APPENDIX 5 - SHOTFIRER AND BLAST GUARD RADIO COMMUNICATION PROTOCOL



APPENDIX 6 – EXPLOSIVES AWARENESS POSTER



APPENDIX 7 – SDS

The following SDS (MSDS) will be supplied to HC&R for the Lyttelton Port Reclamation in regards to the products to be used by RedBull onsite for the project.

- a. Non-electric detonators (Austin Detonator)
- b. Electronic (E*Star) detonators (Austin Detonator)
- c. Cast Boosters (Beston)
- d. Ammonium Nitrate (Yara)
- e. Ammonium Nitrate Emulsion (ANE) (RedBull)
- f. RedStar Emulsion (RedBull)
- g. ANFO (RedBull)
- h. RedPak Packaged Emulsion (RedBull)
- i. Gasser 1 (Redox)
- j. Gasser 2 (Redox)
- k. Diesel (BP)

APPENDIX N

EMERGENCY RESPONSE PLAN – RED BULL POWDER COMPANY



Emergency Response Plan

Lyttelton Port Reclamation
HC&R



Emergency Response Plan

HC&R

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1. PURPOSE

This Emergency Response Plan has been developed to support the RPC Emergency Response Plan in the event of an emergency response at the Gollans Bay Quarry Explosive Magazine site. All additional emergencies unrelated to explosives, RedBull staff will follow site specific ERP outlined in site inductions.

2. SITE SPECIFIC HAZARDS & DETAILS

2.1 Location & Layout

Physical Address of Magazine	Old Sumner Rd Lyttelton, Christchurch
------------------------------	------------------------------------------

The Gollans Bay Quarry magazine storage is located inside the Lyttelton Port Company quarry boundary. The only access to the site is along the Old Sumner road in Lyttelton, the quarry is on private land with no public access. The quarry/magazine site is approximately 2.5km from the township of Lyttelton and sits on the coastline above the port itself.

- The neighbouring land that the quarry boundary backs on to is un-occupied rural privately owned land, which Summit road runs through.
- The nearest property directly north is set in the residential district of Sumner, this property is approximately 1.2 km from proposed magazine site and 800m from the nearest blasting location.
- The nearest property directly West is set in the Lyttelton itself, this property is approximately 1.8 km from proposed magazine site and the nearest blasting location.
- Lyttelton Port Company offices and the port workings are approximately 1.8 km south west of magazine site. The port has large fuel storage tanks at the western end of the port, these are located 3.4 km from magazine location.

All dwellings and nearby infrastructure are located outside the control zones for explosives identified in the Health and Safety at Work (Hazardous Substances) Regulations 2017 as shown by the pressure circle drawings shown in the site plan (Appendix 5) 5Ka for residential or sensitive non related receivers and 9 kPa for non-associated onsite receivers.

3. HAZARD SUBSTANCES, LOCATION AND MAX QUANTITY STORED ON SITE

Test Certificate	Product	Allowable Quantity
Magazine 1 (Explosive) REMU051167-9	Blasting Explosive Type B (ANFO) (1.1D)	7,500 kg
	Blasting Explosive Type E (Packaged Emulsion) (1.1D)	
	Boosters without detonators (1.1D)	
	Detonating Cord (1.1D, 1.4S)	

Magazine	Product	Allowable Quantity
Magazine 2 (Detonators) REMU051168-4	Detonators (1.1B, 1.4B, 1.4S)	5000 units

Description of RedBull Magazines and Plant

Magazines

There are two site Magazines onsite these are used for the storage of Class 1 explosives, in accordance with the quantities in the magazine summary table above. The magazines are located south of the quarry with relevant certification and documentation under AS2187 Part1 Storage.

Magazines are built and certified to AS2187 standard as specified in the HSWA Hazardous Substance Regulations 2017. Certificates for each magazine are attached as appendix 6

MPU

All RedBull MPUs contain fire extinguishers, first aid kits, relevant safety data sheets (MSDS), DG declarations if carting dangerous goods and company standard safe operating procedures.

Utility Vehicles / Delivery Truck

All RedBull vehicles contain fire extinguishers, first aid kits, relevant safety data sheets (MSDS), DG declarations if carting dangerous goods and company standard safe operating procedures.

Drill Rig

All RedBull drill rigs contain fire extinguishers, first aid kits, relevant safety data sheets (MSDS) and company standard safe operating procedures.

4. REDUCTION

Reducing a risk or hazard from the potential to cause harm is the primary objective in any hierarchy of control. RPC has a defined risk matrix and will review the hazards and where possible, eliminate or reduced any associated risk.

RedBull Powder Company has undertaken extensive Hazard identification and risk management measures in order to reduce the likelihood of an emergency situation occurring. Initial hazard identification will take place prior to magazine usage on the Gollans Bay magazine site.

Ongoing risk assessment processes ensure active risks are managed for any potential for reduction opportunities.

An overview of the risk reduction exercises undertaken include

- Hazard Identification
- Incident Reporting
- Health & Safety Meetings
- Emergency drills

Further improvements on identifying, assessing and reducing newly identified hazards and the level of risk posed is managed as outlined in the RedBull Powder Health & Safety Management Manual.

5. READINESS

In preparing for an emergency at the Gollans Bay Magazine site, the following assumptions have been made:

- NZ Fire and Emergency Services will take the role of lead agency
- NZ Police will assist with formally placing roadblocks and evacuation of nearby residents
- ST. Johns Ambulance will assist with any medical emergencies

5.1 Protective Resources available on site to control an emergency

- Fire extinguishers and first aid kits in Utility vehicles
- Personnel familiar with the site and hazardous substance locations
- Personnel with current First Aid Certification

5.2 Site Specific Emergency Procedures

In preparing for an emergency at the Gollans Bay Magazine site, a number of site storage and explosive specific emergency procedures have been developed. These Include:

- Safe Evacuation
- Managing and Dealing with Fire
- Unintended Initiation
- Electrical Storm (lightning)
- Earthquake

Refer to Appendix 2 of this Emergency Response Plan Document for these procedures in full. Changes identified are managed via the RedBull Change Management Process. All additional emergencies not involving storing and the use of explosives, RedBull staff will follow LPC and HC&R emergency response plans outlined in site inductions.

5.3 Infrastructure that maybe affected by an emergency

The Gollans Bay Magazine site is on an open quarry site, with the only infrastructure onsite being a site office, quarry plant and machinery.

Off-site and nearby infrastructure are deemed to be located outside the control zones for the maximum quantity of explosives to be stored on site as stated above 2.1 Location.

All emergency contact details for organisations and infrastructure that may be affected by a major incident are enclosed within this document in Appendix 3.

6. RESPONSE

6.1 Command philosophy and structure to be activated in an emergency so that it is clear what actions will be taken, who will take the actions, and how, when, where they will be taken.

The level of response is determined by the severity of real and potential impacts and the action required to manage the event and resume normal operations.

RPC has three emergency classifications:

LEVEL 1 – CONTAINED	No threat to life Contained to one location, Can immediately be controlled Not expected to escalate	Normal RedBull Incident Management Process followed
LEVEL 2 – TIME/RESPONSE CRITICAL	Significant injury or threat to life, property or environment Dependant on rapid response to control Likely require external support Potential to extend beyond the immediate area / boundary	Initiate relevant Emergency Response Plan Call 111 and RPC Emergency contact on 0273828477
LEVEL 3 – MAJOR INCIDENT	Major threat to human life, property or environment Cannot be contained with resources available on the work site Will require external support Likely to impact on company’s reputation	Initiate relevant Emergency Response Plan Call 111 and RPC Emergency contact on 0273828477

6.2 Details of the person or persons who can clarify the contents of this emergency response plan if required:

General Manager	RedBull	027 837 2025
South Island Manager	RedBull	027 648 8636
Emergency Contact	RedBull	027 382 8477

Whilst a major incident is occurring and after it has occurred, the procedures for providing the local community and the local authority (for the area in which the facility and its surroundings are located) with information about the major incident are outlined in the RedBull Organisational Wide Emergency Response Plan.

6.3 On site emergency resources available

The following RedBull resources available on site to assist with a major incident involving magazines are:

- First Aid Kits
- Fire Extinguishers
- Hand Tools
- Mobile and land line phones
- Utility vehicle with 2 way radio coms and siren

6.4 Offsite emergency resources including arrangements for obtaining additional external resources (specific to the likely major incidents) and to assist the control of major incidents

- Fire Brigade
- Ambulance
- Police
- Local Authority
- Civil Defence
- District Health Boards

7. RECOVERY

Following a major incident at the Gollans Bay Magazine site, an inter-agency approach will be undertaken to ensure no further loss of life and/or to reduce the risk of harm to personnel and the environment so far as is reasonably practicable will occur.

The following are instructions for RedBull Powder Employees:

The site should be made secure and no attempt should be made to clean up or repair the damaged areas without documented formal approval from

- NZ Fire and Emergency Services **and**
- NZ Police **and**
- WorkSafe NZ **and**
- **Other agencies as identified by HC&R / LPC in their ERPs.**

This authority must come formally via the Managing Directors

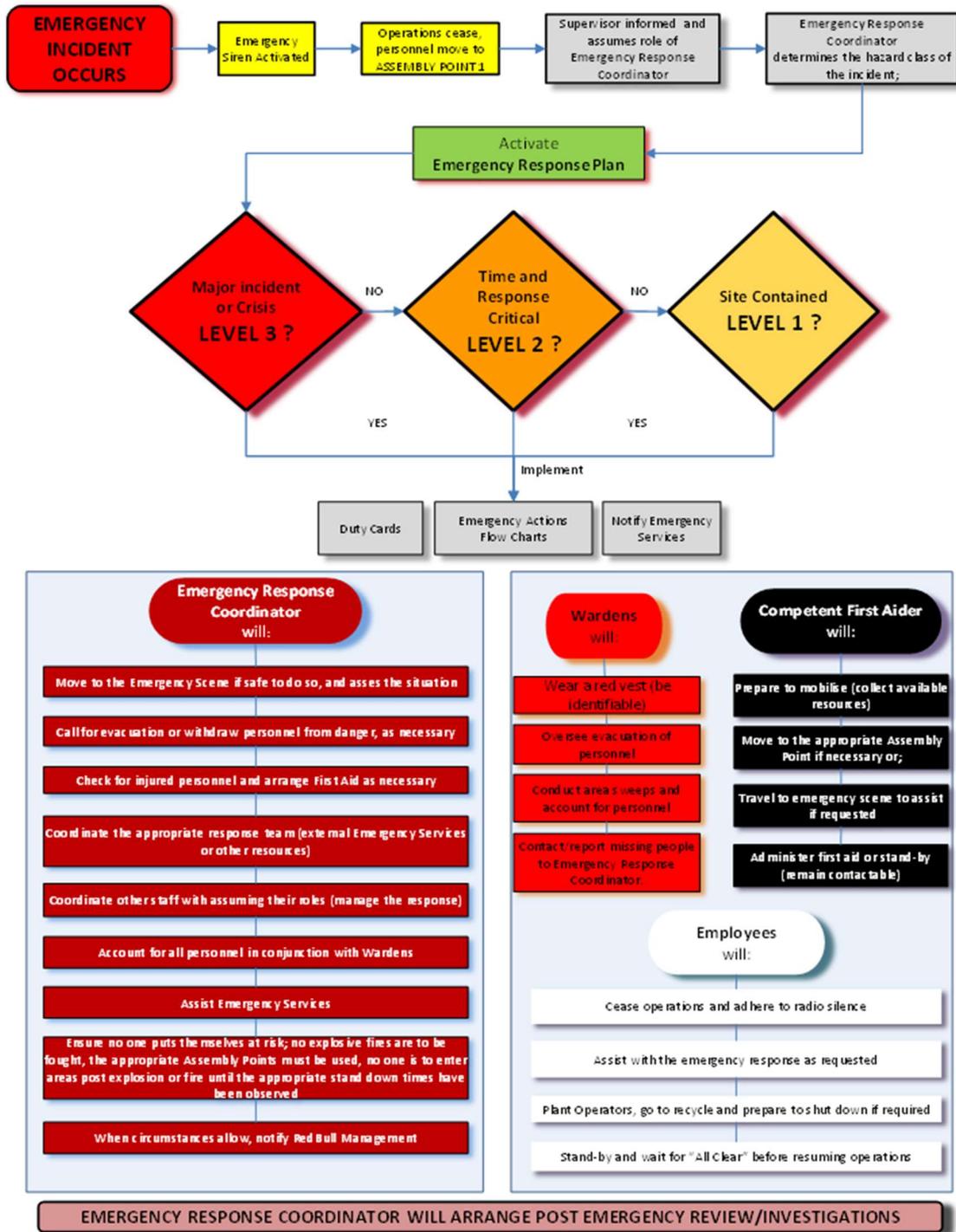
- Only actions required to make the area safe are permitted
- RedBull staff will comply with all lawful directives from the regulatory authorities
- Enquiries from the media must be re-directed to the Managing Director. (Contact Details in appendix 3)

Recovery will be dependent on the scale and severity of the incident. In all cases and in line with the Incident Management procedure, an investigation will be initiated to determine the root cause and actions determined to prevent recurrence of the event.

For Level 2 and 3 incidents, feedback from external support will be included.

Business continuity processes will be implemented at the time of the incident.

APPENDIX 1 - EMERGENCY RESPONSE FLOW CHART



APPENDIX 2 - EMERGENCY SITE PROCEDURES

2.1 Evacuation

Evacuation is signalled by the continuous sounding of a siren. Secondary calls made via 2 way radio to notify staff that may not have heard the siren. All personnel on site must safely stop what they are doing, make their way as quickly as safely possible to the emergency evacuation point (Appendix 5 site plan). All staff and visitors to be accounted for and remain at the assembly point until it's deemed safe to go back to regular duties. Any evacuation due to an emergency at the magazines, will not affect the port operations or Sumner Rd only the Gollans Bay Quarry site. Emergency evacuation will be in conjunction with HC&R ERP.

Evacuation Communication

Gollans Bay Quarry site

- The main means of activating the site emergency response plan is by activating utility vehicle sirens.
- All Shotfiring utility vehicles are equipped with sirens capable of sounding siren in the case of emergency.
- Communications are conducted via the mobile phone network and/or 2 way radio on the Gollans Bay Site radio channel.

External Communication

- Communication with the appropriate authorities will be completed via cell phone
- All off site parties that require notification of the emergency will be made aware of the situation via cell phone or 2 way radio.
- RedBull to be communicated to once all personnel are evacuated, accounted for and is safe to do so.

General Manager	RedBull	027 837 2025
South Island Manager	RedBull	027 648 8636
Emergency Contact	RedBull	027 382 8477

<u>EVACUATION ASSEMBLY POINTS</u>		
<i>Location</i>	<i>Description</i>	<i>Coordinates</i>
HAZCHEM Signage	Explosive Emergency Assembly Point	Latitude: 43° 36' 08".25 Longitude: 172° 44' 22".51

2.2 Fire

If Explosives are involved in a fire – No attempt to fight the fire should occur

Fires involving or imminently explosives **must** instantly trigger an evacuation and the area be cleared and cordoned off until the fire has burnt itself out and been left to stand for a **minimum of 48 hours**.

Fire General

When dealing with a fire, the following general rules should be followed:

- The actions for dealing with an outbreak of fire will vary according to the source, size and location. Prompt action is always critical to minimize the potential hazard
- If explosives are **NOT** involved, and it is safe to do so, extinguish the fire using extinguishers located within 30m of the magazine site or in quarry plant or equipment. If not, activate the Emergency Siren or raise the alarm by other appropriate means and clear the area of all personnel
- All outbreaks of fire must be reported to the South Island Manager as soon as practical

Fire: Mobile Processing Units (MPUS) or explosive delivery vehicles

Assess the situation:

- a. Decide based on how aggressive the fire is and if it could spread to explosives/oxidising agents. If so evacuate and isolate the vehicle (set up a 1000m minimum exclusion zone for a minimum of 24 hours after the fire burns itself out)
 - In the case of a tyre or brake fire on a vehicle carrying explosives, STANDARD PROCEDURES DO NOT APPLY. Tyre fire has the potential to spread unpredictably/uncontrollably. The vehicle must be isolated and the fire left to burn itself out as specified above
- b. Where the fire is isolated from explosives or oxidising agents (e.g., engine bay, cab) attempt to bring the fire under control and raise the alarm/request assistance
 - When the fire is contained to the engine bay, isolate the electrical system and extinguish the fire (do not attempt to lift bonnet or tilt cab, fight fire from any external access points to engine bay)
- c. Regardless of the quantities of explosives involved in a fire all personnel **MUST** be evacuated to a distance not less than 1000 meters

Notifying The Fire Brigade

For level 1 or 2 emergencies/incidents (See Appendix 1), direct the fire brigade to the entrance gate and have someone meet them there/escort them to the incident site if safe to do so when they arrive.

For a level 3 emergency situation, direct the fire brigade to the Evacuation Point and meet them there

Fire: Summary

Decisive well informed action is essential at the outbreak of fire; however, prevention is the preferred option. Compliance with safe handling, storage, housekeeping, smoking and maintaining fire breaks around dangerous goods / explosive storage facilities is crucial

No attempt should be made to clean up or repair fire damage involving explosives, ammonium nitrate, magazines or manufacturing plants other than to make the area safe.

When evacuation sirens are activated all staff must leave the site immediately

2.3 Unintended Initiation

Explosion on the bench, in Vehicles or Magazines

Immediately sound the evacuation siren (where safe to do so) and evacuate all personnel and vehicles to the appropriate Assembly Point (follow the evacuation procedure)

Notify any staff potentially unaware via cell phone.

The Emergency Response Coordinator will manage the emergency (including establishing the 1000m minimum exclusion zone in conjunction with Emergency Services)

The wardens will ensure all staff, contractors and visitors are accounted for

The Emergency Response Coordinator may extend the exclusion zone, if necessary

Upon arrival of the Emergency Services, the Emergency Response Coordinator will provide an update and advise the Emergency Services if the area is too unstable for them to enter

No personnel will be permitted within the exclusion zone until a minimum of 24 hours after all resultant explosions and subsequent fires have moderated sufficiently to allow safe access

In the event of an emergency a RedBull Director will liaise with the media (any attempts from the media to engage personnel must be passed on to RedBull Management)

2.4 Electrical Storm

This includes all personnel. Assess the progression of the storm. Where the storm appears to be approaching, prepare for evacuation if necessary. Return all explosives to magazines from utility or delivery vehicles (small quantities where this could be done relatively quickly), and securing site where safe to do so. Where evacuation seems likely, all staff onsite should move to emergency evacuation point.

When the time between a flash-lightning and hearing thunder becomes less than 4 seconds there is a danger situation and then:

All personnel must be evacuated to the site evacuation point using any available vehicles. The RedBull Manager/Shotfirer or Emergency Response Coordinator will organise for site to be swept and all personnel to evacuate following the evacuation procedure.

The lightning activity will be monitored by the RedBull Manager/Shotfirer or Emergency Response Coordinator who will determine when activities may resume (once any electrical storm activity is deemed to be more than 8 seconds away).

2.5 EARTHQUAKE PROCEDURE

During the earthquake do what you can to ensure your safety

- a. Inside, drop, cover, and hold

Move beneath or next to a rigid structure to reduce the risk of falling debris or a collapsing structure injuring you



- b. If in the open stay low and be aware of sources of risk in your immediate area (e.g. rock fall, tipping machinery)

After the shaking stops, assess the situation

- a. Where explosions, vehicle accidents, fire, medical emergencies, or loss of containment
- b. has occurred, follow the appropriate procedures detailed in this document
- c. Be aware of unstable ground / objects and the potential for aftershocks

A major earthquake would invariably lead to a site evacuation. All site personnel must assume their given roles and follow the Evacuation Procedure.

If an earthquake occurs while magazines are in use, the explosive needs to be stored if safe to do so in correct magazines, locked and staff to follow site evacuation procedure.

Notify RedBull Management as soon as practical

APPENDIX 3 – EMERGENCY CONTACTS

Emergency contact	RedBull Powder	027 382 8477
General Manager	RedBull Powder	027 837 2025
South Island Manager	RedBull Powder	027 648 8636
Managing Director	RedBull Powder	027 478 2273
RedBull Head Office	Penrose	09 5251 181 027 449 4454
State Highway 74	NZTA	NZ Police 111
Local Roads	Christchurch City Council	NZ Police 111 03 941 8999
Canterbury District Health Board	Emergency contact	Ambulance 111 03 364 0640
Canterbury Regional Council	24/7 Helpdesk	0800 765 588
Christchurch City Council	24/7 Helpdesk	03 941 8999
WorkSafe NZ	General Manager or Managing Directors Only to Notify	0800 030 040
Civil Defence	40 Lichfield St, Christchurch Central	0800 324 636



APPENDIX 4 EMERGENCY RESPONSE PLAN SUMMARY



Red Bull Powder Company – Gollans Bay Magazine Emergency Response Plan Summary

IN AN EMERGENCY DIAL

111

POLICE / FIRE / AMBULANCE

Please state the **following** when calling emergency services:

Who you are	Location of the emergency	Number of persons involved
Nature of the emergency, including the potential for explosion		

Position a person at site entrance to ensure access for Emergency Services. Contact relevant people listed below once site is deemed secure and emergency services have been informed.

Matt Cowie – (South Island Manager)		027 648 8636
RedBull Office	(09) 525 1181	
Chris Pilmer (General Manager)	(09) 525 1181	027 837 2025

Evacuation Plan

Evacuation is signalled by the **continuous sounding of a siren**. Secondary calls made via 2 way radio to notify staff that may not have heard the siren.

All personnel on site must **make their way as quickly as safely possible** to the **emergency evacuation point** (see site plan).

All **staff** and **visitors** to be **accounted for** and remain at the **assembly point** until it's deemed **safe** to go back to **regular duties**.

Fire at Magazine

Raise the alarm, Continuous Sounding of Siren, Call 111.

Evacuate to Quarry Emergency Assembly Point. Secure the area.

Provide the fire service with relevant information.

Specific firefighting measures for products stored in RedBull Magazines

If explosive is burning **DO NOT FIGHT - EVACUATE AREA**. Dangerous when exposed to heat or flame. Do not return to the area of explosion until smoke and flames have dissipated. Refer to SDS.

Lightning Strike of Magazine or Quarry

Magazine

If a thunder storm approaches the magazines the area must be evacuated to a distance deemed **safe by the person in charge**. All quarry staff to be made aware of the evacuation by 2 way radio by the quarry manager.

In Use

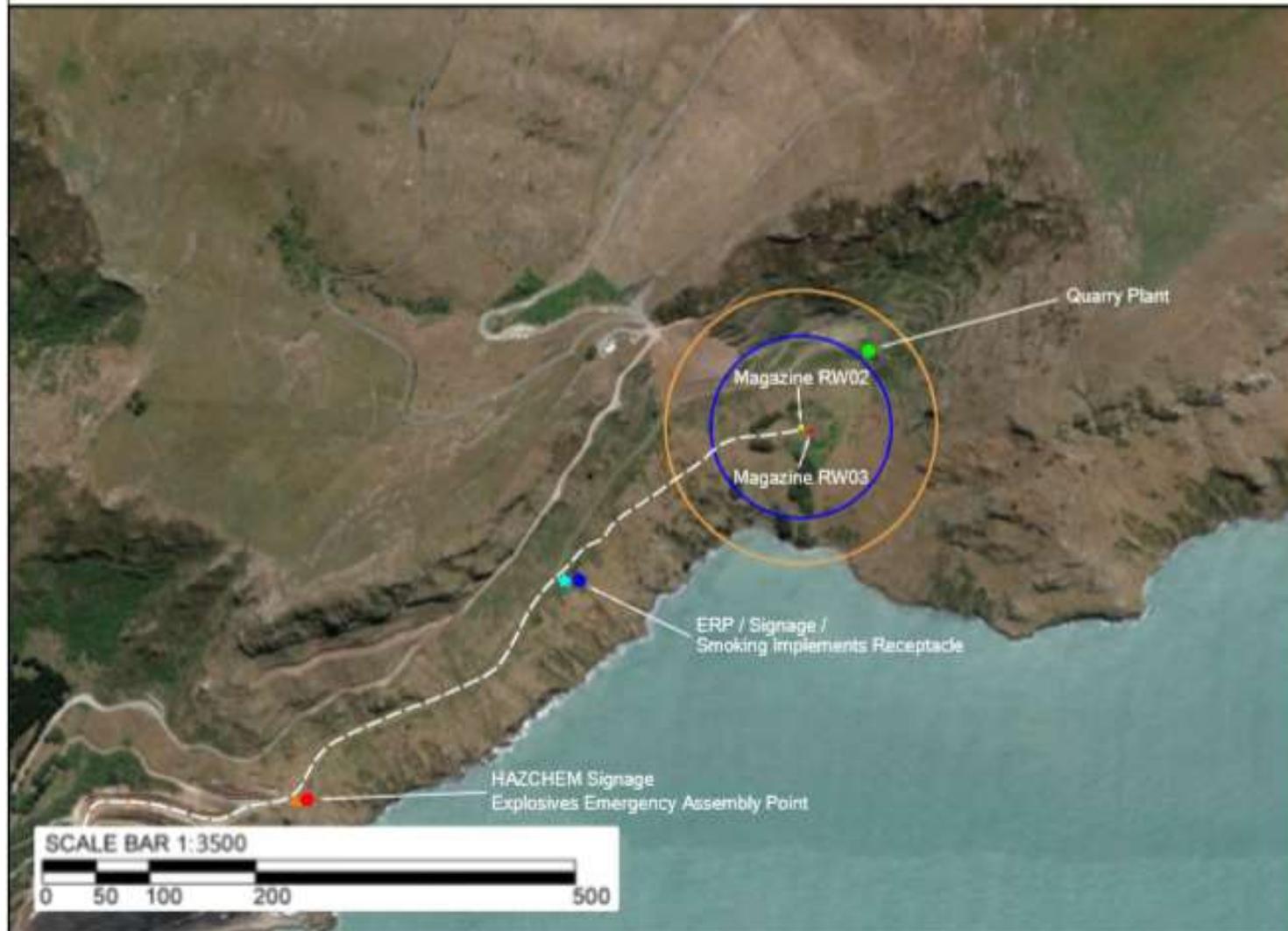
Where explosives are in **use** the area must be cleared to a distance no less than the 80m per 25kg of explosive charge mass. A **one hour** stand down after the last lightning strike must be observed before it can be deemed safe to re-enter the area.

For other emergencies not specific to the magazine follow the quarry emergency response plan

APPENDIX 5 EMERGENCY RESPONSE SITE MAP



RedBull Powder Company Ltd
 Lyttelton Port Reclamation, Gollans Bay Quarry - Old Sumner Lyttelton Road, Lyttelton
 Explosives Magazines Test Certificate Site Plan with Isolation Circles



Quarry Site Plan showing:
 - Explosives Magazines
 - Quarry Infrastructure
 - Main Quarry Features
 - Assembly Points
 - Control Zones*

*Control Zones as per Quarry Test Certificate for 7500kg 1.1D & 5000 1.1B Detonators
 (9kPa 290m, 5kPa 435m)

Site Access Co-ordinates
 -43.598494 South
 172.746658 East

Key:

Icon	Site Component
	9kPa Isolation Circle
	5kPa Isolation Circle
	1.1D Explosives Magazine
	1.1B Detonators Magazine
	Quarry Infrastructure
	SDS
	Smoking implements Receptacle
	Explosives HAZCHEM Signage
	Assembly Point
	Magazine Access Route

Scale 1:3500 (A3)

Date: 13-11-2018
 Version: 1.0



Red Bull Powder Company Ltd
 Lyttelton Port Reclamation, Gollans Bay Quarry - Old Sumner Lyttelton Road, Lyttelton
 Explosives Magazines Test Certificate Immediate Area Plan



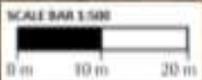
Quarry Site Plan showing:
 - Explosives Magazines
 - Fire Extinguisher locations
 - Signage

Test Certificate for 7500kg
 1.1D & 5000 1.1B Detonators

Site Access Co-ordinates
 -43.598494 South
 172.746658 East

Key:

Icon	Site Component
	1.1D Explosives Magazine
	1.1B Detonators Magazine
	Fire Extinguisher
	Magazine Access Route



Scale 1:500 (A3) 

Date: 13-11-2018
 Version: 1.0

APPENDIX 6 MAGAZINE TEST LOCATION CERTIFICATE



COMPLIANCE CERTIFICATE

Explosive Magazine Container

Issued to: **RedBull Powder Company Ltd**

Site Address: 6 Walls Road, Penrose, Auckland 1061

Postal address:

PO Box 112004

Penrose

Auckland 1642

Phone: 09 525 1181

Certificate Number:

1802MAG006

Date of issue:

09/11/2018

Date comes into force:

09/11/2018

Date of expiry:

08/11/2023

Registration Number:

CER-0301-017646

This Certificate is issued in accordance with regulations 6.23, 9.20(1)(b), and 9.20(4)(b) of the Health and Safety at Work (Hazardous Substances) Regulations 2017.

This certifies that the requirements prescribed in regulations 9.20(1)(b) and 9.20(4)(b) for a container (magazine) design compliance certificate have been met by the magazine specified below:

ID	REMU 051168-4
Location	To be determined
Explosives	Blasting Explosives
Container Type	Relocatable Magazine 6x3m Steel plate door, Protected hinges – Lock door 3 sliding steel bolts, Lightning protection Ventilation
Manufacturer	Royal Wolf
Design specifications	AS 2187.1 1998 Relocatable Magazine



Aaron Donald
Compliance Certifier
Registration # 301



4D Target Court, Wairau Valley, Auckland 0627

Phone: +64 09 443 3054

Mobile: +64 021 511 291

Email: info@hazsubs.co.nz

Website: www.hazsubs.co.nz

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Issued to: **RedBull Powder Company Ltd**

Site Address: 6 Walls Road, Penrose, Auckland 1061

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PO Box 112004

Penrose

Auckland 1642

Phone: 09 525 1181

Certificate Number:

1802MAG007

Date of issue:

09/11/2018

Date comes into force:

09/11/2018

Date of expiry:

08/11/2023

Registration Number:

CER-0301-017647

This Certificate is issued in accordance with regulations 6.23, 9.20(1)(b), and 9.20(4)(b) of the Health and Safety at Work (Hazardous Substances) Regulations 2017.

This certifies that the requirements prescribed in regulations 9.20(1)(b) and 9.20(4)(b) for a container (magazine) design compliance certificate have been met by the magazine specified below:

ID	REMU 051167-9
Location	To be determined
Explosives	Blasting Explosives
Container Type	Relocatable Magazine 6x3m Steel plate door, Protected hinges – Lock door 3 sliding steel bolts, Lightning protection Ventilation
Manufacturer	Royal Wolf
Design specifications	AS 2187.1 1998 Relocatable Magazine



Aaron Donald
Compliance Certifier
Registration # 301



4D Target Court, Wairau Valley, Auckland 0627

Phone: +64 09 443 3054

Mobile: +64 021 511 291

Email: info@hazsubs.co.nz

Website: www.hazsubs.co.nz

APPENDIX O

RED BULL BMP APPENDICES AND MSDS

Mark Out Authority

RedBull Permit to Mark Out, Blast, Post Blast Inspection



BP1234

SHOT FIRER NAME		SIGNED	
SHOT #		SHOT PLAN #	
COMPANY		DATE / TIME	
SITE		WEATHER CONDITIONS	

General Pre Mark Out Inspection – if RED box is ticked do not proceed with Mark Out – notify Manager

Yes No

- Is the access to the blast area safe?
- Is the face loaded (material not cleared from toe)?
- Is there a hazard from being struck from falling objects from the face or bench above?
- Is there any evidence of cracks or faults that could cause ground failure in your work area?
- Can the face burden be measured safely and accurately?
- Can the bench height be measured safely and accurately?
- Will the blast be Face Profiled / Surveyed?
- Blast JHA completed and signed?
- Is it safe to continue mark out according to RedBull SSOPs?

High Risk - Pre Mark Out Inspection – if yes, notify Manager. Must be signed before blasting

	Comment	Signed
<input type="checkbox"/> <input type="checkbox"/> Face height over 15m		
<input type="checkbox"/> <input type="checkbox"/> Bench Width – less than ½ face height		
<input type="checkbox"/> <input type="checkbox"/> Back Break – Existing / Expected		
<input type="checkbox"/> <input type="checkbox"/> Underground Services / Workings		
<input type="checkbox"/> <input type="checkbox"/> Toe Holes required		
<input type="checkbox"/> <input type="checkbox"/> Excessive time pressure		
<input type="checkbox"/> <input type="checkbox"/> Abnormalities in Blast Design		
<input type="checkbox"/> <input type="checkbox"/> New Site		
<input type="checkbox"/> <input type="checkbox"/> Proximity to Assets – is there a significant risk to assets from blasting		
<input type="checkbox"/> <input type="checkbox"/> Blast Vibration or Air Overpressure		

Mark Out documentation – do not leave site until completed

- Shot plan has been completed and provided for Driller

Shot Access for Drill – if RED box is ticked contact Drill Supervisor

- Can the drill access the blast areas safely (make arrangements to fix with QM)
- Drill able to drill front row according to SSOP

Quarry Manager (or delegated representative) – inspection completed, area safe to work, permit authorised

Quarry Manager Name _____ Signed _____

Date _____

Blasting Authority

RedBull Permit to Mark Out, Blast, Post Blast Inspection



BP1234

SHOT FIRER NAME		SIGNED	
SHOT #		SHOT PLAN #	
COMPANY		DATE / TIME	
SITE		WEATHER CONDITIONS	

Pre Blast Inspection – if RED box is ticked Blasting NOT to proceed

Yes No

- Is the access to the blast area safe?
- Is Quarry Site blast signage established?
- If the face is loaded (material not cleared from toe), could this effect the blast result?
- Is there a hazard from being struck from falling objects from the face or bench above?
- Is there any evidence of cracks or faults that could cause ground failure in your work area?
- Is a bench edge protection / delineation established?

Blast documentation – if RED box is ticked Blasting NOT to proceed

- Are all necessary blast permits & notifications completed?
- Blast timing and initiation point identified on shot plan?
- Timing Plan / Load Plan / Drill logs (if required) received?
- Blast hole profiles received (if face profiled)?

Blast preparations – if RED box is ticked blasting NOT to proceed

- Is there presence of water?
- Is blast signage erected / completed?
- Blast JHA completed and signed?
- Sign off from manager on High Risk items (refer Mark Out Permit)?
- Site notified blasting is being carried out and blast firing procedure understood?
- Blast time agreed and radio channels defined?
- Stemming material arranged?
- Blast isolation zone defined and any plant able to be cleared for firing?
- Is the firing position established, sentry locations defined and sentries available?

Final Checks – if RED box is ticked Blasting NOT to proceed – Contact Manager

- Stock reconciliation and DG paperwork completed?
- Surface delay connections and stemming of all holes verified?
- Quarry neighbour notifications completed where required?
- Camera set up and recording?
- Blast monitors set up #_____?
- Is the Blast isolation zone clear of plant?
- Shot Firer in firing position, sentries confirmed in position and secure?

Authority to fire the blast. Final Signoff – Quarry Manager (or delegated representative)

Sign off required prior to firing.

Quarry Manager Name _____ Signed _____

Shot Firer Name _____ Signed _____

Time _____ Date _____

Note: if the blasting initiation device fails then the Authority to fire the blast is removed.

Post Blast Inspection

RedBull Permit to Mark Out, Blast, Post Blast Inspection



BP1234

SHOT FIRER NAME		SIGNED	
SHOT #		SHOT PLAN #	
COMPANY		DATE / TIME	
SITE		WEATHER CONDITIONS	

Post Blast Inspection – if **RED** box is ticked notify managers

Yes No

Have applicable stand down times following blasting elapsed?

Is the blast area safe to access for post blast inspection?

• Hazard from falling objects from the face or bench above.
• Hazard of falling due to ground failure.

No access by others until blast inspection completed.

Blast muck pile inspected?

Any signs that the blast caused flyrock leaving blast area?

Any signs of misfired product (nonel / bulk / package)?

Any signs of back break or dangerous oversize in the muckpile

Has the blast left a high face or unsafe catch bench

Has the blast caused damage to plant or equipment

All clear given

Hazard ID to be attached and given to Quarry Manager.

Quarry Manager (or delegated representative) – Post Blast Inspection Completed

Quarry Manager Name _____ Signed _____

Shot Firer Name _____ Signed _____

Time _____ Date _____

Drilling Authority

(must be completed prior to unloading and / or drilling)



DP1234

NAME		DATE	
DRILL FLEET #		SHOT PLAN #	
SITE / LOCATION		SIGNED	
WEATHER (each day)	1	2	3

Pre Drilling Inspection – Contact Supervisor if NO is marked	YES OR NO		
	Day 1	Day 2	Day 3
Have you completed all site requirements (JHA, notifications, inducted, signed in, radio contact, whip aerial, correct PPE, etc)?			
Is your truck and light vehicle parked in a safe location?			
Is the access to the blast area safe?			
Can you operate without coming into contact with other site equipment, overhead hazards or underground hazards?			
Can the holes be drilled according to RedBull SSOPs?			
Can you operate without being struck by falling objects from the face or bench above?			
Is the blast area free of any evidence of cracks or faults that could cause ground failure in your work area?			
Has the bench edge delineation line or fence been established?			

Mark out documentation – Contact Supervisor if **RED** box is marked

Yes No

Shot plan received and clearly understood (diameter / depth / angle / direction)

Quarry Manager Name _____ Signed _____
(or delegated representative)

Date _____

Hole condition – do not leave site if **RED** box is marked

- Have the holes been dipped for correct depth
 Have the holes been closed and covered
 Have drill logs been completed and attached as required

Are the holes Wet Dry

Date Completed _____ Expected Blast Date _____

Driller _____ Signed _____

Comments:



**Safe Standard
Operating Procedures**

Blasting



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Toprock Drilling

**Safe Standard
Operating Procedures**

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Operations

6.01 Mark Out Procedure



DOCUMENT NUMBER	6.01 - MARK OUT PROCEDURE
REVISION	1.2
APPROVED BY	CHRIS PILMER
POSITION	GENERAL MANAGER

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1. PURPOSE

To provide a safe and standard operating procedure to mark out holes

2. SCOPE

This applies to ALL blasting operations handled by RedBull Powder Company and covers:

- Mark out and associated paperwork
- Face profiling requirement
- Post drilling pre blasting

3. HEALTH AND SAFETY

3.1. PPE

The following PPE required during this operation is:-

- Hard hat
- Hi-Vis clothing / overalls
- Safety boots (must be laced up)/steel capped gumboots
- Gloves (as required)
- Safety glasses
- Hearing protection (as required)

3.2. Significant Hazards

Hazards identified for this operation are:-

- Working at height (on, above, or below quarry benches or faces)
- Quarry traffic/heavy equipment
- Slips, Trips and Falls
- Uneven ground
- Bad weather –high winds
- Low visibility – early dawn or late dusk, fog
- Faulty equipment encountered - MDL

3.3. Prestart Checks

- Communication with appropriate Client / Quarry personnel to determine what outcomes they require (volume / fragmentation etc.)
- Face profiling equipment calibrated and fit for use

3.4. Risk Assessment

Take 5 or JHA

- a. RedBull and Site Inductions



4. RESPONSIBILITIES

4.1. Reporting to Quarry

All RedBull staff must have completed a current site specific induction for the Quarry or work site and sign in as required

4.2. Shotfirer Responsibility

- a. The Shotfirer is solely responsible for the mark out and outcome of the blast
- b. The Shotfirer must spend time to assess (and if necessary – reassess) the blast site, taking the following factors into account:-
 - Review previous blast logs & patterns
 - Liaising with Quarry Manager about previous blast results – improvement opportunities/changes
 - Assess rock type, jointing, faults, slips, back-breaks, overhangs and toe by inspecting the face from the toe position
- c. Decide on the blast pattern and blast hole size based on existing face, historical pattern & results and current blast requirements
- d. The Shotfirer is responsible for arranging face profiling for all faces over 20m or when deemed necessary or if requested by the client
- e. Notification to Supervisor and Management where multiple blasts are requested to be marked

4.3. Profiling Surveyor

- a. The person using the Face Profiler must be trained and competent to use the system, and;
- b. Has responsibility to ensure the information (Shot plan and profiles) is passed on to the Shotfirer and Driller as required and documentation as required

5. PROCEDURES

5.1. Mark Out

- a. The Shotfirer must establish with the Quarry Manager the following:
 - Which bench and how much volume is to be shot?
 - Whether the bench preparation is adequate and the face has been sufficiently cleared
 - What are their fragmentation requirements? (fines / armour / smaller or larger than previous)
 - Are there any specific or special firing times, procedures, or site requirements to observe?
- b. If multiple shots are to be marked for firing at the same time, and there is potential risk of any shot impacting another, then your supervisor **MUST** be notified. Multiple blast design and use of electronics will then be **REVIEWED** and **APPROVED** by management and a specific JHA completed.
- c. Once the bench and volumes are established the Shotfirer must assess and decide the burden and spacing and how the face/drill hole angle is to be determined using:
 - Face profiling or (b)
 - Bench face angle to be established via inclinometer or electronic leveller

- d. The actual face angle (even if vertical) must be measured and recorded (unless no free face is present) on the relevant forms as part of the mark-out procedure
- e. NOTE: A Tamrock Drill Rig TIMS system may be used for this purpose
- f. The Shotfirer must then mark out the blast pattern, making allowance for extra burden by moving the affected hole angle and position
 - o Shotfirer must establish a 2 metre stand- off zone using dazzle paint
 - o Holes to be marked out using dazzle spray paint
 - o Holes must be clearly identifiable (sprayed rock/ground surface)
- g. For all benches over 15m high, 2 persons are required to conduct the mark out so cross checks can be made or the blast face profiled
- h. Upon completing the mark out, the hole depths must then be calculated using measured heights and RedBull's angle and offset charts or from face profiling data.
- i. When face profiling shots all blastholes **must** be captured on the plan, with the free face and shot access included assisting blast orientation.

5.2. Documentation

- a. The Shot Plan must be drawn up along with the final hole depth and angle requirements (including sub drills) or alternatively if the blast has been face profiled the shot plan can be generated from the face profile data
- b. The Shot Plan must be clear and concise by defining the blast orientation with free face, and shot access.
- c. The written Shot Plans must be a true reflection of the actual markout.
- d. The written Shot Plan has 3 coloured copies;-
 - o White Copy - for the driller – along with any other relevant information about the blast pattern
 - o Blue Copy - for the Shot Firer
 - o Pink Copy – To stay in the Shot Plan Book and to be handed over to RedBull Office when finished

NOTE 1: Whenever a hole is at a different angle or diameter from the rest of the blast holes, this hole must be clearly marked on the shot plan and dazzled for the driller on the bench

NOTE 2: When the angle of a hole is changed, the toe burden also changes; the drilling offset chart or face profiling data must be used to cross check this

5.3. Prior to Blast

Prior to the commencement of loading the shot, the Shotfirer responsible must check the blast pattern, measure the depth of the holes and its angle (if any) with a staff and an inclinometer or any other suitable means against the design of the Shot Plan

IMPORTANT – A good blast outcome can only be achieved with a good mark-out, accurate drilling and proper loading procedures.



6. REFERENCES

- 6.1. **HSNO**
- 6.2. **Relevant Drilling SOP**
- 6.3. **Relevant Blasting SOP**



Staff Training Record

6.01 Operations Mark Out Procedure

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I acknowledge that I have read the Procedure and that I understand and will comply with the requirements encompassed by this procedure.

Staff Member

NAME	
POSITION	
SIGNED	
DATE	



Supervisor Signature

NAME	
POSITION	
SIGNED	
DATE	

Operations

6.09 Misfires Procedure



DOCUMENT NUMBER	6.09 - MISFIRES PROCEDURE
REVISION	1.1
APPROVED BY	CHRIS PILMER
POSITION	GENERAL MANAGER

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1. PURPOSE

To provide procedures for safely managing misfire situations

2. SCOPE

This applies to all blasting operations handled by Red Bull Powder Company

3. HEALTH AND SAFETY

3.1. PPE

The following PPE required during this operation is:-

- Hard hat
- Hi-Vis clothing / overalls
- Safety boots (must be laced up)/steel capped gumboots
- Gloves (as required)
- Safety glasses
- Hearing protection (as required)

3.2. Significant Hazards

Hazards identified for this operation are:-

- Unintended initiation of unfired explosives
- Flyrock
- Unauthorized access to exclusion zone
- People untrained in the use of explosives handling explosives

3.3. Prestart Checks

- Light Vehicle
- Blasting Equipment

3.4. Risk Assessment

- JHA
- Take 5

3.5. Site Procedures

- Site specific procedures to be followed if exceeding the requirements in this document

4. RESPONSIBILITIES

4.1. Shotfirer Responsibility

- The Shotfirer must notify the Regional Manager and Quarry Manager immediately when a misfire is identified or suspected

- The Shotfirer is solely responsible for handling any misfires including the control, re-firing of the blast, or excavation. SSOP – 6.12 or 6.13 Construction or General Firing Procedures must still be followed when re-firing misfired charges

4.2. **All Other Personnel**

- Any person encountering a misfire must stop what they are doing immediately and notify the Shotfirer
- All excavation must cease in the misfire or suspected misfire area until a complete inspection has been carried out by the Shotfirer and the appropriate measures taken to allow safe excavation to continue (re-firing or spotter assisted (Shotfirer) excavation)
- The area must be delineated as appropriate and unauthorised entry prevented

5. **PROCEDURES**

5.1. **Definition / Notification**

- A misfire is best defined as a blast hole(s) or part there of, which has failed to detonate for any reason
- These reasons may include, but are not limited to;
 - Down lines being lost down the hole during the product loading process
 - Down lines being lost down the hole during the stemming loading process
 - Down lines or surface delays being cut off from shrapnel or other during firing
 - Down lines not being tied in correctly
 - Product failure (detonator, booster, bulk, packaged or other)
 - Column separation or shift causing cut offs
- In all cases the Shotfirer must be notified of any suspected misfire of any sort immediately

5.2. **Misfire During Initiation**

- If while during firing a misfire is suspected an immediate stand down applies
 - Safety Fuse – 60 minutes
 - Electric / Nonel – 10 minutes
 - A Take 5 must be completed prior to any re-entry or re-firing for any misfire
 - A JHA may be required depending on severity of the misfire
- Quarry manager and RedBull Operations manager notified during the stand down period
- An inspection is to be made following the stand down time by the shotfirer alone
- Consideration must be given to any reduced burden or blast confinement prior to any re-firing
- Faulty accessories can then be removed and replaced and the shot re-fired
- Or where re-firing the blast or holes is not appropriate or possible the misfire must be dealt with as detailed below

5.3. Muck Pile Recovery Actions

- A JHA is required for all recovery of misfired products from the muck pile
- The Shotfirer will arrange for the safe disposal of the components if needed, and where required will spot any excavation work around a misfire or suspected misfire area
- If a down line is lost down a hole during the product loading process, then the hole needs to be dipped for depth, re-primed and the loading process continued
- If a down line is lost down a hole during the stemming process then the stemming needs to be removed (by hand, flushing or other approved means) to where the product is exposed and the down line recovered and the hole re stemmed
- All misfires must be delineated with dazzle paint and/or be cordoned off
- The occurrence of a MISFIRE is not always obvious from the surface. It is often not until the blasted material is excavated that misfires are discovered
- For that reason the following procedures must be followed:-
 - Where explosive product, detonating cord or primers are exposed, excavation shall STOP and the Regional Manager shall be contacted immediately (this must be understood between RedBull and all customers)
 - Unauthorised personnel should not attempt to handle or remove any component of an unfired hole. Contact is to be made with the Shotfirer / Regional Manger
 - Where it is practicable and safe, quarrying activity should be relocated to a new area of the face and continued to minimise disruption (Shotfirers discretion)
 - The hazardous area must be made safe to allow personnel to access the collar of the hole. This must be done under Shotfirer supervision
 - The Shotfirer / Regional Manager will attempt to de-prime the hole and break down the explosives. If the hole needs to be re-fired to make it safe, then this will be coordinated with the Quarry Manager.
- In the event that a MISFIRE is RE-FIRED and there is concern that the hole(s) have NOT detonated, the area must be isolated and cordoned off
- The suspected holes will then be carefully exposed under DIRECT supervision of the Regional Manager. The Regional Manger must satisfy himself that ALL products and accessories are removed prior to normal excavation operations resuming
- Where there is doubt as to the RE-FIRED holes a full inspection shall be carried out and excavation monitored
- If in doubt about a possible MISFIRE, the Shotfirer to inspect the area
- Incident Report forms must be completed and submitted in line with RedBull policy
- Any undetonated explosives or accessories must be returned to a magazine or disposed of accordingly. See disposal below.

5.4. Disposal

- JHAs are required for any internal product disposal
- Small quantities (less than 12 kg per blast hole, as defined by appendix H of AS2187) can be disposed down blast holes covered with ANFO or Bulk Emulsion
- Larger quantities (over 12kg) to be stored in a magazine and destroyed by the NZDF
- Where NZDF are not available and product cannot be destroyed in blast holes, the burning method may be used for packaged emulsion as detailed in Appendix H of



AS2187. Approval must be given from the Operations Manager prior to using this method.

6. REFERENCES

- **HSNO Act, 1996**
- **HASIE Act, 1992**
- **Australian Standard 2187 Explosives Storage, Transport and Use**
- **Appendix H**
- **SSOP 6.02: Blasting**
- **SSOP 6.07: Managing Hazards**
- **SSOP 6.11: Delineation of Drill and Blast Pattern**
- **SSOP 6.12: General Firing Procedure**

Staff Training Record

6.09 Operations Misfires Procedure

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I acknowledge that I have read the Procedure and that I understand and will comply with the requirements encompassed by this procedure.



Staff Member

NAME	
POSITION	
SIGNED	
DATE	

Supervisor Signature

NAME	
POSITION	
SIGNED	
DATE	

Operations

6.13 General Blasting Procedure



DOCUMENT NUMBER	6.13 - GENERAL BLASTING PROCEDURE
REVISION	1.2
APPROVED BY	CHRIS PILMER
POSITION	GENERAL MANAGER

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1. PURPOSE

To provide a safe and standard operating procedure for firing a blast at all Quarry sites

2. SCOPE

This applies to blasting operations on ALL Quarry sites that are handled by RedBull Powder Company, and covers:

- Notification requirements
- Blast isolation and safe initiation points
- Blast guard requirements
- Firing procedure
- Post firing procedure

3. HEALTH AND SAFETY

3.1. PPE

The following PPE required during this operation is:-

- Hard Hat (at all Sites)
- Hi-Vis Clothing / Overalls
- Safety Boots (must be laced up)/steel capped gumboots
- Gloves (as required)
- Safety Glasses
- Hearing Protection (as required)

3.2. Significant Hazards

Hazards identified for this operation are:-

- Electrical Storms – less than 8 kms away
- People entering the blast area at or before firing time
- Flyrock
- Post blast fumes
- Misfires
- People entering the blast area after the shot is fired but no all clear given

3.3. Prestart Checks

- Light Vehicle
- MMU
- Blasting Equipment

3.4. Risk Assessment

3.5. Take 5 or JHASite Procedures

- Site specific blasting procedures to be followed if they supersede the requirements contained here.

4. RESPONSIBILITIES

4.1. Shotfirer Responsibility

- The Shotfirer is solely responsible for the control of the site during the firing period.
- The Shotfirer is responsible for ensuring the blast has fired, any stand down period and post blast inspection to check for all clear.

4.2. Blast Guard Responsibility

- The blast guards are responsible for ensuring that the assigned area is kept clear of personnel and no vehicles, moveable plant or people enter the blast area unless directed by the Shotfirer

4.3. Blast Controller Responsibility

- In some cases a blast controller is used by the site. In these instances specific site procedures are to be followed.
- In this instance the blast controller is responsible for ensuring that all blast guards are in position and the blast area is secure. Once this has been established the blast Controller hands over to the Shotfirer to fire the blast.

5. PROCEDURES

5.1. Prior

- The Shotfirer must confirm with the Quarry Manager / Site Supervisor :
- Blast controller identified (if applicable)
- The scheduled time of the blast in line with the Resource Consents and
- Quarry / Site procedures
 - The number of personnel available as Blast Guards and the area to be secured
 - The post / position of the Blast Guards
 - Ensure all trades on site have been made aware of the blast and moved to a safe position
 - The Shotfirer is to ensure all monitors / video recording devices are in place (as required) and applicable notifications made.
 - Site specific procedures followed as required (radio calls, blast controllers)
- The Shotfirer must ensure the blast is loaded as per any site parameters and MICs prior to firing.
- All monitors must be in place and applicable notifications made.
- A safe blasting distance must be calculated based on the safe distance calculation using scaled depth of burial principals with a safety factor of two for RedBull personnel and 4 times for non RedBull staff, and all personnel must be moved to beyond this position
- A safe firing position must be identified with the Shotfirer not in front of the blast and having appropriate cover (machinery / geology). Or from outside the safe blasting distance exclusion zone.



- All blasts are to be fired with either a Remote Firing Device (RFD) or a blasting cable and exploder. The use of **Cap and Fuse** is **NOT PERMITTED** under everyday use. If cap and fuse is required, approval must be obtained from management and appropriate controls put in place.

5.2. During

- About 5 minutes before Blast, Shotfirer will confirm time of blast with all Blast Guards
- 5 minute (5 short bursts) blast warning sirens are to be sounded (Via the RT if applicable) or other site specific warning sirens
- Blast Guards are then contacted individually to secure the area and confirm once secure (RT / Phone or Visual)
- Upon confirmation from all Blast Guards, the Shotfirer will call for “Radio Silence” to all over the RT, informing the impending blast and its location (if applicable)
- 30 seconds before blast, the Shotfirer will sound 1 long siren burst (about 15 seconds) over the RT if applicable
- 10 seconds before blast, Shotfirer to announce verbally (over RT if applicable) that blast is to be fired.
- The shot is then fired by the Shotfirer.

Note:-

- Where a blast is to be fired alone by a shotfirer, a Remote Firing Device (RFD) should be used and all access points blocked to prevent access to the blast location. Where possible, the blast location is to be visible to the shotfirer at the time of firing.

5.3. Post

- After the shot is fired, the Shotfirer must wait the appropriate stand down period then proceed to check the blast site and, if satisfied, will inform all over RT the “ALL CLEAR “ message and sound the All Clear Siren (2 sirens)
- If post blast fume is present the Shotfirer must wait for this to clear completely prior to inspecting the blast area
- If a misfire is suspected after firing and prior to inspection the SOP 6.09 Handling Misfires must be followed.
- The same applies if a misfire is discovered during the post blast inspection that could not be identified from the firing position.



6. REFERENCES

- **HSNO Act 1996**
- **HASIE Act 1992**
- **SSOP 6.02 – Handling Explosives**
- **SSOP 6.03 – Blast Hole Loading Procedure**
- **SSOP 6.09 – Misfire**
- **SSOP 6.10 – Delineation of Drill and Blast Pattern**



Staff Training Record

6.13 Operations General Blasting

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I acknowledge that I have read the Procedure and that I understand and will comply with the requirements encompassed by this procedure.

Staff Member

NAME	
POSITION	
SIGNED	
DATE	

Supervisor Signature

NAME	
POSITION	
SIGNED	
DATE	



REDBULL SAFE STANDARD OPERATING PROCEDURE

SLEEPING BLAST PATTERNS PROCEDURE PROCEDURE 6.14

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Version	1.1
Document Approved Date	22/6/16
Approved By	Chris Pilmer
Position	General Manager

1. PURPOSE

To provide a safe standard operating procedure for sleeping blasts

2. SCOPE

This applies to any circumstances leading to a shot needing to be slept (either due to the loading period (planned) or due to extenuating circumstances (unforeseen issues)). This applies to ALL blasting operations handled by RedBull Powder Company. A sleeping shot is defined as a shot that is loaded but not fired on the same day for whatever reason.

3. SAFETY

3.1 PPE

PPE required during this operation is:-

- Hard Hat
- Hi-Vis Clothings / Overalls
- Lace up Safety Boots (must be laced up)/steel capped gumboots
- Gloves (as required)
- Safety Glasses
- Hearing Protection (as required)

3.2 SIGNIFICANT HAZARDS

Hazards identified for this operation are:-

- Unintended initiation
- Personnel entering blast area during the sleeping period
- Impact on reputation
- Electrical Storms – less than 8 kms away

3.3 PRESTART CHECKS

- Light vehicle
- MMU

3.4 RISK ASSESSMENT

Take 5 or JHA

3.5 SITE PROCEDURES

- All sites that have procedures for sleeping blasts must be followed, unless superseded by this document

4. RESPONSIBILTIES

4.1 SHOTFIRER REPORTING TO MANAGEMENT

- If a blast needs to be slept RedBull Management must be informed as soon as practicable by the Shotfirer responsible for the blast

4.2 SHOTFIRER REPORTING TO CLIENT

- If a blast is to be slept for whatever reason, full liaison and communication must be made with the client. All details relating to the reason the blast will be slept, the risks involved, and the controls being implemented need to be discussed to the Client

4.3 SHOTFIRER RESPONSIBILITIES

- The Shotfirer is responsible for making the call to sleep a shot, and holds all associated responsibilities with undertaking the risk assessment, reporting the situation to the relevant people, and organising or overseeing implementing the required controls
- Ensure the sleep times are within the product shelf life for the expected sleeping period
- Must barricade the area (signage, cones, flashing lights) and ensure no access can be gained to the area
- Ensure security is arranged and that the blast area is overseen at all times during the sleeping period
- Must as soon as practicable and after ensuring the blast area is safe and secure you must notify your Area Supervisor

5. PROCEDURES

Sleeping explosives overnight or for extended periods of time (several days) can potentially pose the following safety and environmental issues;

- Degradation of the explosive product due to water in the holes
- Oil saturation affecting the performance of shock tube
- Hot or reactive ground affecting the explosive product or shock tube
- Damage to leads from animals
- Security of explosives
- Unauthorised entry of people or vehicles
- Premature detonation by people, vehicles, rock fall or electrical storms

5.1 RISK ASSESSMENT

In line with the issues identified above, consideration must be given to the following factors;

- The explosive product being used
 - With respect to the MSDS, the recommended sleeping duration and the potential for product degradation
- Any site specific information available relating to the geology / nature of the ground, identifying;
 - Any known faults or potential for ground failure
 - Ground water conditions and the likelihood of seepage into holes / hole collapse / product degradation
 - Likelihood of hot or reactive ground
 - A visual inspection or experience based assessment in the absence of any specific information
- The location of the shot
 - Environmental risks (animals and rock fall specifically)
 - Security risk (proximity to people and the risk of unauthorised access)
- Inclement weather conditions

5.2 CONTROLS REQUIRED

- Barricades (where appropriate), warning signs, and flashing lights (orange, spaced every 20m maximum around the blast)
- All loaded holes are to be stemmed off and primer leads adequately secured
- All TLD's and loose detonators are to be removed from the shot (if the shot is hooked up, the shot is to be disconnected and all TLD's removed and taken away)
- No cord, primers, detonators or TLD's are to be left on the shot; all product is to be returned to the magazine overnight

- Appropriate security must be arranged to ensure no unauthorised personnel may enter the blast area without the direct approval of the Shotfirer
- The Shotfirer or area Supervisor will assess the inclement weather conditions and any associated risk to the blast area. An appropriate evacuation plan must be implemented
- Blast loading, stemming hook up and firing procedures to be followed as required once the sleeping blast is made ready for firing.

6. REFERENCES

- HSNO
- SSOP 6.02 Handling Explosives
- SSOP 6.03 Blast Hole loading procedure
- SSOP 6.04 Blast hole stemming procedure
- SSOP 6.05 Blast hole hook up procedure
- SSOP 6.06 Lightning Procedure
- SSOP 6.12 / 6.13 Blasting Firing Procedures
-



REDBULL SAFE STANDARD OPERATING PROCEDURE

SLEEPING BLAST PATTERNS PROCEDURE

PROCEDURE 6.14

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Staff Training Record

I acknowledge that I have read the Safe Standard Operating Procedure and that I understand and will comply with the requirements encompassed by this procedure.

Date	Name	Position	Signature

Supervisor Signature

Date	Name	Position	Signature



JOB HAZARD ASSESSMENT (PART 1)

Workplace / Area:								Scope of Works:									
JHA Development Consultation Team								Reviewed By (RedBull): Name:						Date:			
				Position:				Signature:									
Name:				Signature:				Reviewed By (Client): Name:						Date:			
								Position:						Signature:			
Name:				Signature:				Who is responsible for Implementation, Monitor and Review of the JHA (Insert Below) :									
Name:				Signature:													
TYPE OF PERMIT/LICENCE REQUIRED: (please indicate by ticking the appropriate box below)																	
	Yes	No		Yes	No		Yes	No		Yes	No		Yes	No			
_____ Permit			Electrical Isolation			Scaffolding			Gas Test			Solid/Liquid Waste					
			Roof Access			High Voltage			Lifting			Scissor Ticket					
Hot Work			Excavation			Radiation			Explosives			Forklift Ticket.					
Isolation			Personnel Cage			Confined Space			High Pressure Water								
PPE AND/OR CONTROL MEASURES REQUIRED: (please indicate by ticking the appropriate box below)																	
	Yes	No		Yes	No		Yes	No		Yes	No		Yes	No			
Goggles			Dust Mask			Height Safety			Electrical Safety			Barricading/Signs					
Face Shield			Safety Harness			Fire Blanket/Spark containment			Specific Training / Induction			Emergency Plan					
Respirator			Gloves			Extinguisher			MSDS.'s			Manual Handling					
Details of Extra PPE Requirements: The above are additional to the Standard Site PPE requirements consisting of safety glasses, hard hat, safety vest, ear muffs and gloves.																	



Consequences						Likelihood or Probability				
People	Environment	Plant Property As	Time	Regulatory/ Cost	Reputation	A	B	C	D	E
						Almost Certain	Likely	Moderate	Unlikely	Rare
						(expected)	(will probably occur)	(might occur - has happened)	(could occur - known to happen)	(practically impossible)
No Incident or First Aid Injury	Negligible Impact	Low \$ Loss	Less than 1/2 Day	Fine < \$1K	Minimal Publicity	High 15	Medium 19	Low 22	Low 24	Low 25
		<\$1000								
Medical Treatment	Minor on-site impact	Medium \$ Loss	1/2 Day	Fine \$1K - \$10K	Some Local Media Coverage	High 10	High 14	Medium 18	Low 21	Low 23
		>\$1000 - <\$10K	1 Day							
Alternate Work or Lost Time Injury	Moderate on-site impact	High \$ Loss	>1 Day	Fine \$10K - \$50K	Media Coverage at State Level	Extreme 6	High 9	High 13	Medium 17	Medium 20
		>\$10K - <\$50K	<1 Week							
Serious or Permanent Injury	Minor offsite or Major onsite impact	Major \$ Loss	Week - <1	Fine > \$50K or Legal Proceedings	Adverse Publicity	Extreme 3	Extreme 5	Extreme 8	High 12	High 16
		>\$50K - <\$100K								
Fatality	Major off site impact	Huge \$ Loss > \$100K	>1 Month	Shutdown Due to Regulatory Breach	Extreme Adverse Publicity	Extreme 1	Extreme 2	Extreme 4	Extreme 7	High 11

Risk Ranking	Risk Description
Low 21 - 25	Tolerable. Monitor, manage and carryout activity accordance with identified controls.
Medium 17 - 20	Implement strict control measures reduce hazard to ALARP. Management must determine appropriate level of supervision required.
High 9 - 16	Implement strict control measures reduce hazard to ALARP. Activity must not commence without Project Manager or higher approval and appropriate supervision present.
Extreme 1 - 8	Intolerable. Activity must not commence. Eliminated hazard or introduce further controls to reduce to ALARP.



STEP NO.	JOB STEP List the steps required to perform the task in the sequence they are Carried out.	POTENTIAL HAZARD Against each step list the potential / risk hazards that could cause injury / damage when the task step is performed.	Risk Rank	REQUIRED HAZARD CONTROL For each hazard identified list the control measures required to eliminate or minimise the risk of injury.	Residual Risk	Person Responsible
1.	All workers to complete RedBull Site Company and Site induction and be tool boxed/inducted into this JHA.	Workers not understanding RedBull work activities or company requirements cause injury to themselves/others and/or damage to plant and equipment and/or damage to the reputation of RedBull.	H9	All workers to have completed RedBull Company and Site Induction training and be inducted/tool boxed into this JHA.	L21	







SAFE WORK METHOD STATEMENT (PART 3)

Personal Qualifications/Licenses/Tickets and Experience Required for the Activity:	Personnel, Duties and Responsibilities:	Training Required to Complete Work
	Daily inspection of work areas	
	All workers are to work in accordance with the JHA.	
Plant and Equipment to be used	Engineering Details/Certificates Approvals:	
	Maintenance Checks:	



Codes of Practice, Legislation and Regulation, and New Zealand Standards. Check the reference sources to verify that they are correct and current.	
Health and Safety at Work Act 2015	



(PART 4)

*Part 3.1, regulation 38, sub regulation 1, 2 & 3 of the Workplace Health & Safety Regulations 2012. Chapter3. General Risk and Workplace Management.
Review of control measures*

Monitoring methods such as the Red Bull Ltd, Task Observation Checklist shall be used to monitor this JHA for any failures in the steps or controls. If any failure in the steps or controls are found, all works shall cease, a specific Toolbox Consultation shall be called and a review of the JHA shall take place. Any amendments to the JHA shall be documented on the JHA Document Control Register, and reissued for approval, re-induction of the work crew to the changes to the JHA before reinstatement of works.

“A” Monitor

- Have the control measures been implemented as intended?
- Are the control measures adequate?
- Did the implementation of control measures create other hazards or risks?

“B” Review

- Has anything changed over time since the risk process was implemented?
- Is the control of risks still adequate?
- Was the risk management process conducted effectively?

“C” Corrective Action for identified failure

- * Toolbox Consultation
- * Re- Induct
- * Stop work for potential serious event

All Training and Consultation of this JHA and Reviews of this JHA shall be done during a Toolbox Consultation or a Prestart Work Meeting

Preview: Take 5

[Back](#)

* Mandatory field

Details

Administration details will display here

Score

Name of Person Completing this Take 5

Search...

Task to be undertaken

Can I be injured by being caught in, on or between anything and there is no SOP to follow?

- Yes - A JHA is required and needs to be approved by your line manager and HSQE before works can proceed
- No, I am working to an SOP and these risks have been controlled so i can proceed

Can I strain or over exert myself and there is no SOP to follow?

- Yes - A JHA Is Required and needs to be approved by your line manager and HSQE before works can proceed
- No, I am working to an SOP and these risks have been controlled so i can proceed

Can I fall onto, into or from anything and there is no SOP to follow?

- Yes - A JHA Is Required and needs to be approved by your line manager and HSQE before works can proceed
- No, I am working to an SOP and these risks have been controlled so i can proceed

Can I slip or trip on anything and there is no SOP to follow?

- Yes - A JHA Is Required and needs to be approved by your line manager and HSQE before works can proceed
- No, I am working to an SOP and these risks have been controlled so i can proceed

Can I be struck by a moving object and there is no SOP to follow?

- Yes - A JHA Is Required and needs to be approved by your line manager and HSQE before works can proceed
- No, I am working to an SOP and these risks have been controlled so i can proceed

Can I come in contact with or expose to something that may harm me? (heat, gas, electricity, hazardous substances or stored energy)

- Yes - A JHA and maybe PTW Is Required and needs to be approved by your line manager and HSQE before works can proceed
- No, I am working to an SOP and these risks have been controlled so i can proceed

Does anything need to be isolated or tested by dead and there is no SOP to follow?

Yes - A JHA and maybe PTW Is Required and needs to be approved by your line manager and HSQE before works can proceed

No, I am working to an SOP and these risks have been controlled so i can proceed

Can something fall on me or or can I cause something to fall onto someone else and there is no SOP to follow?

Yes - A JHA Is Required and needs to be approved by your line manager and HSQE before works can proceed

No, I am working to an SOP and these risks have been controlled so i can proceed

Can I be injured by nearby activities or can my activities injure anyone else nearby and there is no SOP to follow?

Yes - A JHA Is Required and needs to be approved by your line manager and HSQE before works can proceed

No, I am working to an SOP and these risks have been controlled so i can proceed

Could there be any uncontrolled movement, like ground movement or machinery movement and there is no SOP to follow?

Yes - A JHA Is Required and needs to be approved by your line manager and HSQE before works can proceed

No, I am working to an SOP and these risks have been controlled so i can proceed

Can I spill or pollute something and there is no SOP to follow?

Yes - A JHA Is Required and needs to be approved by your line manager and HSQE before works can proceed

No, I am working to an SOP and these risks have been controlled so i can proceed

Can weather conditions, work environment or poor lighting affect job safety and there is no SOP to follow??

Yes - Contact Your Line Manager Before Proceeding

No, I am working to an SOP and these risks have been controlled so i can proceed

Do I need a confined space entry, working at height, isolation, hazardous substance or hot work permit?

Yes - A JHA and a PTW Is required and this needs to be approved by your line manager and HSQE before works can proceed

No, I am working to an SOP and these risks have been controlled so i can proceed

Will I be working be on, under or near a high wall or crest?

Yes - A JHA and maybe a PTW Is Required and needs to be approved by your line manager and HSQE before works can proceed

No, I am working to an SOP and these risks have been controlled so i can proceed

Will I be working within 2 metres of the edge?

Yes - A JHA and PTW Is Required and this needs to be approved by your line manager and HSQE before works can proceed

No, I am working to an SOP and these risks have been controlled so i can proceed

Are there any other hazards present and there is no SOP in place to follow?

Yes - A JHA Is Required and needs to be approved by your line manager and HSQE before works can proceed

No, I am working to an SOP and these risks have been controlled so i can proceed

Is the task a change to a current process , standard operating procedure or design?

Yes - A JHA Is Required and needs to be approved by your line manager and HSQE before works can proceed

No, I am working to an SOP and these risks have been controlled so i can proceed

WARNING

If you have ticked "YES" to any of the above, you MUST NOT PROCEED with the work until a JHA has been put in place (+/- PTW) and approved by a line manager with the delegated Authority To Sign Off On The Level Of Risk

Additional

Attachment details will display here



Appendix 6. Safe Blasting Distance Calculation
 (Based on expected generic site parameters)

Hole diameter (mm)	89				
Explosives Density (g/cc)	1.15				
Blast hole angle	10				
Charge mass/m (kg/m)	9.0				
Burden (m)	3				
Stemming Height (m)	2.8				
G (m/s ²)	9.81				
K (constant)	27				
		Safety 1	Safety 2	Safety 3	Safety 4
Face Burst		74	149	223	297
Cratering		89	178	267	356
Rifling		30	61	91	122
		Minimum	Site plant	Site personnel	Non site personnel



Red Bull Powder Company Gollans Bay Quarry - Blast Firing Procedures

Day of Blast

1. Confirmation with Site Representative at pre blast meeting of blast window and availability of nominated blast guards.

Approximately 15 minutes before blast

2. *Blast Guards* make their way to their positions and confirm with shotfirer over radio once they are in position. Sweeping run made by blast guards to ensure area is clear on way to position.

Approximately 5 minutes before the blast:

3. *Shotfirer* confirms time of blast. If blast needs to be suspended use clear and concise information. Investigate cause, and once resolved start procedure
4. 5 minute warning siren, **5 Short Bursts**, sounded by *Shotfirer* over radio
5. If blast time confirmed as planned, *Shotfirer* contacts *Blast Guards* individually to confirm access points are blocked and secure (refer to radio calls)
6. *Blast Guards* confirm area is secure
7. Blast is prepared for firing (Armed)
8. Call over radio requesting radio silence and informing of blast location

Immediately before blast:

9. 30 Second warning siren, **1 long burst**, sounded by *Shotfirer* over radio
10. 10 seconds prior to firing *Shotfirer* gives message that blast is to be fired over the RT, and fires the blast

After the blast is fired:

11. After checking the blast site, *Shotfirer* gives all clear by contacting *Blast Guards* and sounding the all clear (**two short sirens bursts** over the radio)
12. *Shotfirer* contacts all Blast Guards to stand down



Red Bull Powder Company Gollans Bay Quarry - Blast Radio Calls

Blast Guards to positions.

All radio communication to be carried out on dedicated channel (TBC)

1. **Shotfirer:** “5 minute warning sirens being sounded” (5 short, over radio)
2. **Shotfirer:** “Blast Guard 1 (Name TBC), are you in position and secure.”
3. **Blast Guard 1:** “Blast Guard 1 (Name TBC), I am in position and it is secure.”
4. Repeat as required for additional blast guards

Note: if at any stage a Blast Guard finds the area is not secure the Shotfirer must be notified immediately.

Call over the RT “Shotfirer stop, there is a breach at position X, the area is no longer secure”

The breach must be investigated and resolved prior to resuming the procedure. Once the area is secure;

5. **Shotfirer:** “Attention all personnel, the blast exclusion zone is secure, Red Bull is Firing a blast in, please maintain radio Silence until the ALL CLEAR is given.”
6. **Shotfirer:** “Sounding 30 second sirens.” (3 short, over radio).
7. **Shotfirer:** “Red Bull firing a Blast in in 10 seconds.”

Blast is Fired

8. **Shotfirer:** “Blast in has been fired, Blast Guards please hold your positions and wait for the all clear.”

Blast clearance inspection made

9. **Shotfirer:** “Blast in is ALL CLEAR, sounding all clear sirens.” (2 Short, over radio)
10. **Shotfirer:** “Blast in is ALL CLEAR, Blast Guards thank you for your help you can stand down.”





Red Bull Powder Company Gollans Bay Quarry Blast Guard Instructions

Blast Controller:

Shotfirer:

Radio Channel:

Blast Guard Number:

Blast Guard Name:

Location:

Instructions

1. No less than 15 minutes prior to the blast make contact with shotfirer and confirm location.
2. No less than 5 minutes prior to the blast take your position and advise any site personnel in the area that blasting will take place.
3. Block the access at the 5 minute siren. Do not let anyone into the blast exclusion zone.

If not secure at any stage

"Blast controller, this is blast guard (number and name), blast area has been breached"

Blast controller will contact Blast Guard:

"Blast Guard (number and name), are you in position and secure"

Blast Guard, if secure:

"Blast controller, this is blast guard (number and name), I am in position and it is secure."

Note: If blast area breached, Blast controller to identify issue and procedure does not proceed until the area is secure.

4. Maintain your position and keep access blocked until the blast all clear has been given. Acknowledge the all clear via radio call in blast Guard order (1,2 ,3 etc)



Date:

Time:

Blast Guard Check List Gollans Bay Quarry
Blast Controller:
Shotfirer:
Blast Guard 1:
Blast Guard 2:
Blast Guard 3:
Blast Guard 4:



Date:

Time:

Blast Guard Check List Gollans Bay Quarry
Blast Controller:
Shotfirer:
Blast Guard 1:
Blast Guard 2:
Blast Guard 3:
Blast Guard 4:



Muck Pile Excavation and Handling Explosives Awareness - Identification and Notification

What to look out for: **MUCK PILE NOTICEABLY HARDER TO DIG THAN THE REST OF THE SHOT**
EXPLOSIVES DISCOVERED OR SUSPECTED (see images below of explosives products to be aware of)

Action required: **STOP EXCAVATING THE MUCK PILE IMMEDIATELY, NOTIFY YOUR SUPERVISOR, ISOLATE AND MAKE AREA SAFE**

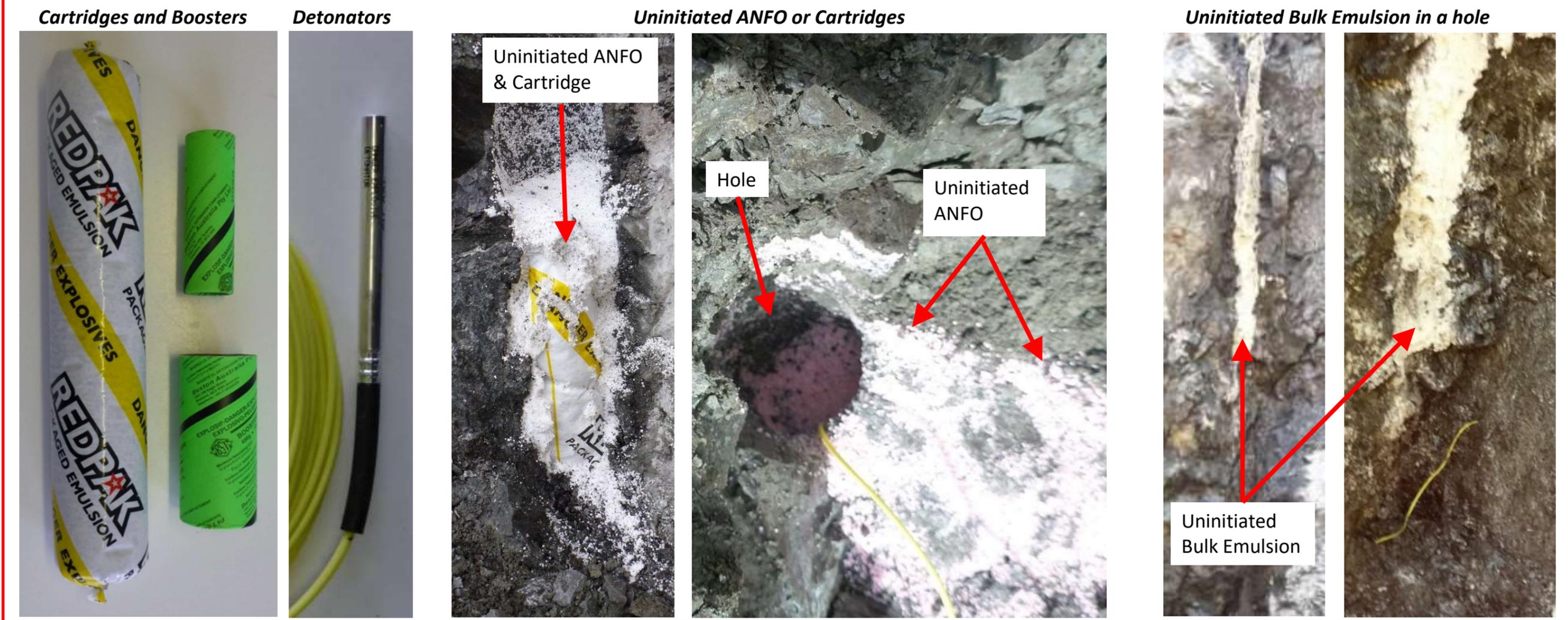
If you discover any explosives on site in or around the excavations, or the ground is harder to excavate within the blasted muck pile, contact your supervisor who will notify a contact person below

Contact person: RedBull Shotfirer RedBull Project Manager Site Representative Site Representative

Name:

Contact Number:

Explosives Products to be Aware of when Excavating and Processing Blasted Material





according to Regulation (EC) No 1907/2006 (REACH)

NX01010300_EN
IND 406 362

Print date: 2. 4. 2012
Revision date: 20. 1. 2016

Version: 5.0
Page 1/15

SECTION 1: IDENTIFICATION OF THE SUBSTANCE / MIXTURE AND OF THE COMPANY / UNDERTAKING

1.1 Product identifier:

Product name: Non-electric detonator.

Registration number of the substance: Not allocated. Product is classified as mixture in the package.

Other names of product: Surface 0,16/NN delay elemented cap, Surface 0,20/NN delay elemented cap, Surface 0,45/NN delay elemented cap, Surface Delay elemented cap delay time, MS 25/50 elemented cap (MS SHOCKSTAR elemented cap), LP SHOCKSTAR elemented cap (500, 1000 ms), QRC III elemented cap, MS Connector elemented cap delay time 17 to 200 ms, INDETSHOCK MS 25/50, SHOCKSTAR MS, INDETSHOCK MS 25/50 – 1, SHOCKSTAR MS-1, INDETSHOCK TS/SHOCKSTAR TS (25-1000 ms), INDETSHOCK TS-1/SHOCKSTAR TS-1 (25-1000 ms), INDETSHOCK/SHOCKSTAR Dual Delay (25-1000 ms), INDETSHOCK/SHOCKSTAR Dual Delay (350, 475, 500, 800 ms), INDETSHOCK/SHOCKSTAR Dual Delay - 1 (25-1000 ms), INDETSHOCK/SHOCKSTAR Dual Delay – 1 (350, 475, 500, 800 ms), INDETSHOCK/SHOCKSTAR SURFACE, INDETSHOCK/SHOCKSTAR SURFACE – Bunch-verbinderblock, INDETSHOCK/SHOCKSTAR Bunch Connector, SHOCKSTAR DC RELAY, SHOCKSTAR PD

1.2 Relevant identified uses of the substance or mixture and uses advise against:

Relevant identified uses of the mixture: Borehole detonators for initiation of industrial explosives.

Uses advise against: Restricted to professional users.

1.3 Details of the supplier of the safety data sheet:

Manufacturer:

AUSTIN DETONATOR s.r.o.

Jasenice 712

755 01 Vsetín

Czech Republic

Tel.: 00420-571-404-001

Fax: 00420-571-404-002

www.austin.cz

E-mail of the person responsible for the safety sheet: msds@austin.cz



NON-ELECTRIC DETONATOR

Print date: 2. 4. 2012
Revision date: 20. 1. 2016
Version: 5.0

Distributor:

Red Bull Powder Company

Street: 6 Walls Road, Penrose

Postal code: 1061

City: Auckland

Country: New Zealand

Telephone number: +64 (9) 525 1181

Fax no.: +64 (9) 525 1182

1.4 Emergency telephone number: non-stop service:

Toxicological Information Centre

Clinic of occupational disease

Na Bojišti 1, 128 08 Prague 2

Non-stop service: +420 224 919 293 or +420 224 915 402

www.tis-cz.cz; tis@vfn.cz

If necessary, call a toxicological center of the country.

SECTION 2: HAZARDS IDENTIFICATION

2.1 Classification of the mixture:

The mixture is classified as hazardous in accordance with *Regulation (EC) No. 1272/2008*.

- **Expl. 1.1 H201**
- **Carc. 2 H351**
- **Repr. 1A H360Df**
- **STOT RE 2 H373**
- **Aquatic Acute 1 H400**
- **Aquatic Chronic 2 H411**

Full wordings of abbreviations and hazard statements are listed in Section 2 and 16.

2.2 Label elements:

Marking in accordance with EC regulation No. 1272/2008:

Explosives, as referred to in section 2.1 of Regulation (EC) No. 1272/2008, placed on the market with a view to obtaining an explosive or pyrotechnic effect shall be labelled and packaged in accordance with the requirements for explosives only.



NON-ELECTRIC DETONATOR

Print date: 2. 4. 2012
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Marking of the mixture in accordance with classification:

Pictograms:



Signal word: Danger

Hazard statements:

- H201** Explosive, mass explosion hazard.
- H351** Suspected of causing cancer.
- H360Df** May damage the unborn child. Suspected of damaging fertility.
- H373** May cause damage to organs through prolonged or repeated exposure.
- H400** Very toxic to aquatic life.
- H411** Toxic to aquatic life with long lasting effects.

Precautionary statements:

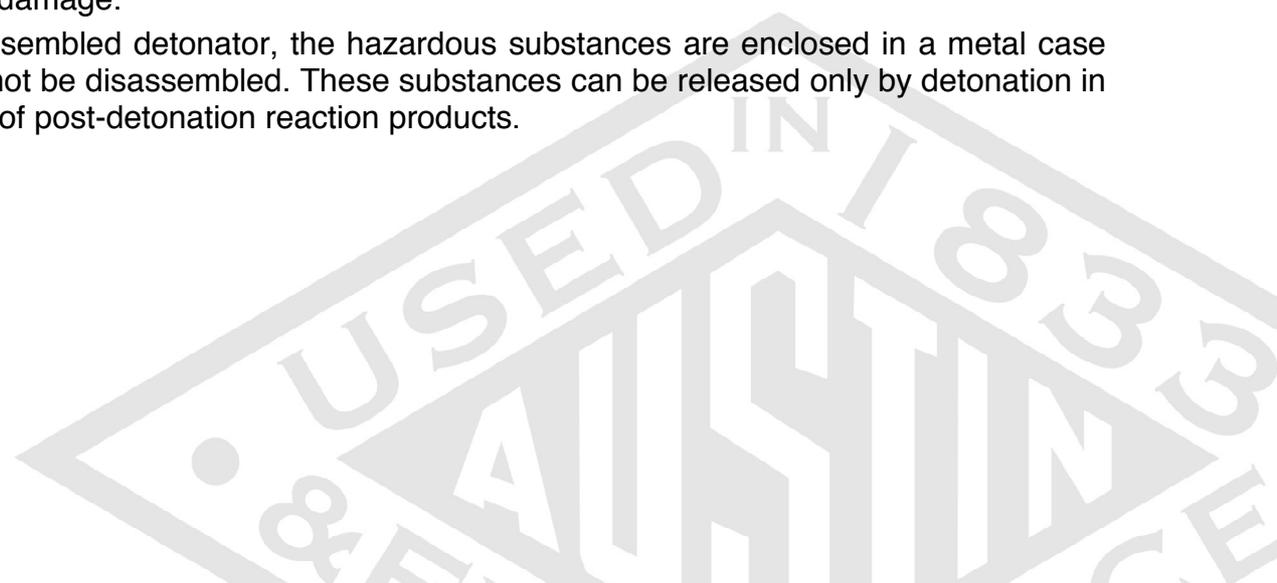
- P201** Obtain special instructions before use.
- P210** Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
- P250** Do not subject to grinding, shock and friction.
- P308 + P313** If exposed or concerned: Get medical advice/attention.
- P370 + P380** In case of fire: Evacuate area.
- P372** Explosion risk in case of fire.
- P401** Store in dry and well ventilated areas, in temperatures -30 °C to +40 °C.
- P501** Disposal of contents/container must be in accordance with corresponding local regulations for disposal of packages and explosives.

2.3 Other hazards:

The mixture doesn't meet the criteria for classification as PBT or vPvB substances and mixtures.

Physicochemical effect: Risk of explosion, an uncontrolled explosion may cause great physical damage.

In the assembled detonator, the hazardous substances are enclosed in a metal case that cannot be disassembled. These substances can be released only by detonation in the form of post-detonation reaction products.





NON-ELECTRIC DETONATOR

Print date: 2. 4. 2012
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SECTION 3: COMPOSITION / INFORMATION ON INGREDIENTS

3.2 Mixtures:

Nonelectric assembled detonator contains also chemicals that are not classified as hazardous, and various other components, such as plastic tube, plug and other plastic components. These parts do not contain SVHC substances.

The mixture contains the following hazardous chemicals:

Name of substance	Registration Number	EC CAS INDEX number	CLASSIFICATION		Concentration (%)
			1272/2008/ES (CLP)		
			Hazard Category /M-factor/	Hazard statement Code	
NON-ELECTRIC DETONATOR					
Pentaerythritol tetranitrate, P.E.T.N.	-	201-084-3	Unst. Expl.	H200 a)	2.0 – 20.0
		78-11-5			
		603-035-00-5			
Lead tetroxide	01-2119517589-27-0002	215-235-6	Repr. 1A Carc. 2 Acute Tox. 4 (*) Acute Tox. 4 (*) STOT RE 2 (*) Aquatic Acute 1 /M=10/ Aquatic Chronic 1 /M=1/ <i>Note A</i>	H360Df H351 H302 H332 H373 (**) H400 H410 b)	1.8 – 11.9
		1314-41-6			
		082-001-00-6			
Lead azide	01-2119475503-38-0000	236-542-1	Unst. Expl. Repr. 1A Acute Tox. 4 (*) Acute Tox. 4 (*) STOT RE 2 (*) Aquatic Acute 1 Aquatic Chronic 1	H200 H360Df H332 H302 H373 (**) H400 H410 a)	0.4 – 6.4
		13424-46-9			
		082-003-00-7			
* Zirconium powder (pyrophoric)	-	231-176-9	Water-react. 1 Pyr. Sol. 1 <i>Note T</i>	H260 H250 a)	≤ 0.6
		7440-67-7			
		040-001-00-3			

Notes:

a) Classification of substance according to the Annex VI of Regulation (EC) No. 1272/2008 of the European Parliament and the Council listed in the safety data sheet.

b) Classification of substance according to the current Safety Data Sheet.



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* The mixture is introduced in the market as a solid substance. The mixture is not in contact with air or water. The classification Water-react. 1 H260 a Pyr. Sol. 1 H250 is not relevant for this mixture.

Note A: Without prejudice to Article 17(2), the name of the substance must appear on the label in the form of one of the designations given in Part 3. In Part 3, use is sometimes made of a general description such as ‘... compounds’ or ‘... salts’. In this case, the supplier is required to state on the label the correct name, due account being taken of section 1.1.1.4 of Regulation (EC) No. 1272/2008 of the European Parliament and the Council.

Note T: This substance may be marketed in a form which does not have the physical hazards as indicated by the classification in the entry in Part 3. If the results of the relevant method or methods in accordance with Part 2 of Annex I of this Regulation show that the specific form of substance marketed do not exhibit this physical property or these physical hazards, the substance shall be classified in accordance with the result or results of this test or these tests. Relevant information, including reference to the relevant test method(s) shall be included in the safety data sheet.

(*) For certain hazard classes, including acute toxicity and STOT repeated exposure; the classification according to the criteria in Directive 67/548/EEC does not correspond directly to the classification in a hazard class and category under this Regulation. In these cases the classification in this Annex shall be considered as a minimum classification. This classification shall be applied if none of the following conditions are fulfilled:

– the manufacturer or importer has access to data or other information as specified in Part 1 of Annex I that lead to classification in a more severe category compared to the minimum classification. Classification in the more severe category must then be applied;

– the minimum classification can be further refined based on the translation table in Annex VII when the physical state of the substance used in the acute inhalation toxicity test is known to the manufacturer or importer. The classification as obtained from Annex VII shall then substitute the minimum classification indicated in this Annex if it differs from it.

(**) For certain hazard classes, e.g. STOT, the route of exposure should be indicated in the hazard statement only if it is conclusively proven that no other route of exposure can cause the hazard in accordance to the criteria in Annex I. Under Directive 67/548/EEC the route of exposure is indicated for classifications with R48 when there was data justifying the classification for this route of exposure. The classification under 67/548/EEC indicating the route of exposure has been translated into the corresponding class and category according to this Regulation, but with a general hazard statement not specifying the route of exposure as the necessary information is not available.

Specific concentration limits		
	Hazard Category	Limit
Lead tetroxide	Repr. 2 H361f	c > 2,5 %
	STOT RE 2 H373	c > 0,5 %

Full wordings of abbreviations and hazard statements are stated in section 2 and 16.

SECTION 4: FIRST AID MEASURES

4.1 Description of first aid measures:

General instruction:

In the assembled detonator, the mixture is enclosed in a metal case that cannot be disassembled. If used in accordance with section 1.2, the exposition is not possible. The exposition can occur only in case of detonation in the form of post-detonation reaction products. Detonation may cause burns and injuries. In case of any suspicion, seek medical advice.



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Inhalation:

Interrupt the exposition, move the exposed person to the fresh air. Keep the person warm and at rest. If the symptoms of respiratory system irritation (e.g. heavy breathing) persist, look for the medical help.

Skin contact:

In case of detonation, there is a risk of burns, general injuries and injuries caused by splinters. Seek medical advice.

Eye contact:

In case of detonation, there is a risk of general injuries and injuries caused by splinters. Seek medical advice.

Ingestion:

Rinse mouth, seek medical advice.

4.2 Most important symptoms and effects, both acute and delayed:

Inhalation: In case of inhalation of post-detonation reaction products, an irritation of respiratory system and a headache may occur.

Skin contact: Injuries, burns.

Eye contact: Injuries, burns.

Ingestion: If swallowed, seek medical advice.

4.3 Indication of any immediate medical attention and special treatment needed:

No special means are stated.

If any health troubles appear or in case of doubt, please inform the doctor and provide the information from this safety sheet.

SECTION 5: FIRE-FIGHTING MEASURES

5.1 Extinguishing media:

Suitable agents: Fire in the product cannot be extinguished with any fire-fighting equipment as it is explosive material.

Unsuitable extinguishing agents: Not stated.

5.2 Special hazards arising from the substance or mixture:

If a building containing the product is on fire, a high risk of explosion is involved. Perform an urgent evacuation of the building and its surroundings. Notify the Integrated Rescue System. Don't inhale the gasses of the fire because they contain heavy metals (lead). The combustion residues and contaminated extinguishing liquids must be disposed of according to valid regulations.

5.3 Advice for fire-fighters:

During the fire of the product, keep the safe distance, use suitable breathing protection (isolation device), or self-contained breathing apparatus.

SECTION 6: ACCIDENTAL RELEASE MEASURES

The measures to be taken in case of accidental leakage (e.g. traffic accident) depend on the scale of the accident and an expert opinion of a specialist.



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6.1 Personal precautions, protective equipment and emergency procedures:

Warn away the trespassers. Remove possible sources of initiation and thermal agitation (open fire, electric sparks etc.). In case of risk of an explosion, evacuate the buildings and the surrounding area. Use appropriate means suitable for work to prevent contact with skin and eyes. Follow the direction in section 7 and 8.

6.2 Environmental precautions:

Do not allow the mixture to enter into sewer, water system (underground water, surface water) or soil.

6.3 Methods and material for containment and cleaning-up:

Pick up the spilled product mechanically using spark-free tools. Collect the product in approved and properly labelled containers. Disposal of damaged product may be performed only by an authorized person. Disposal of the contaminated material must be in accordance with section 13.

6.4 Reference to other sections: See Section 8 and 13 of this safety data sheet.

SECTION 7: HANDLING AND STORAGE

7.1 Precautions for safe handling:

Handle the products with increased care. Keep away from heat/sparks/open flame and hot surfaces. Protect from electrostatic discharge. No smoking.

7.2 Conditions for safe storage, including any incompatibilities:

Store in dry and well ventilated areas in temperatures from -30 °C to +40 °C. Keep the package closed tightly. Storage room must be locked. Do not store together with drugs, foodstuffs, drinks and forage. Do not store together with other explosives.

7.3 Specific end use: Borehole detonators for initiation of industrial explosives.

SECTION 8: EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1 Control parameters:

Time-Weighted Average and Threshold Limit Value - Short-Term Exposure Limit valid in various countries:

Name of substance	Country	EINECS	CAS	TWA	TLV-STEL	Note
				mg/m ³	mg/m ³	
Lead compounds as Pb (except alkyl compounds)	Czech Republic USA	-	-	0,05	0,2	P*
	United Kingdom Australia	-	-	0,15	-	-
	New Zealand South Africa	-	-	0,1	-	-

P*- The exposure level is determined by lead poisoning blood test.



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DNELs and PNECs:

Substance	Indicator	Medium	Value	
Lead tetroxide	PNEC	fresh water	6,5 µg.l ⁻¹	1)
	PNEC	marine water	3,4 µg.l ⁻¹	1)
	PNEC	microorganisms	100 µg.l ⁻¹	1)
	PNEC	freshwater sediment	174 mg.kg ⁻¹	1)
	PNEC	marine sediment	164 mg.kg ⁻¹	1)
	PNEC	soil	147 mg.kg ⁻¹	1)

1) Data according to the MSDS

For other chemical substances values are not currently available.

8.2 Exposure controls:

8.2.1 Appropriate engineering controls:

Follow the usual basic precautions for handling explosives. Avoid inhaling of gases after the detonation.

8.2.2 Individual protection measures, such as personal protective equipment:

Not necessary, if the product is used in accordance with section 1.2.

Eye/face protection: Use protective glasses if needed.

Protection of skin (whole body): Don't eat, drink and smoke during work. Use clothes suitable for work that do not accumulate the static charge (cotton).

Hands protection: Wash your hands by warm water and soap after work and treat your skin by suitable reparation means.

Respiratory protection: After detonation use the dust filter.

Thermal hazards: Not stated.

8.2.3 Environmental exposure controls: Not necessary, if the product is used in accordance with section 1.2.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties:

Appearance:	All components of the mixture are solid substances.
Odour:	None
Odour threshold:	Not available.
pH:	Not available.
Melting point/freezing point:	142 °C (PETN)
Initial boiling point and bowling range:	Not available.
Flash point:	Not available.
Evaporation rate:	Not available.
Flammability (solid, gas):	The mixture is flammable.

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Upper/lower flammability or explosive limits:	Not available.
Vapour pressure:	Not available.
Vapour density:	Not available.
Relative density (20 °C):	Not available.
Solubility:	Insoluble in water.
Partition coefficient: n-octanol/water	Not available.
Auto-ignition temperature:	190 °C (PETN)
Decomposition temperature:	Not available.
Viscosity:	Not available.
Explosive properties:	Velocity of detonation: 8400 m/s (PETN)
Oxidising properties:	Not available.

9.2 Other information:

Fat solubility (20 °C)	Insoluble
------------------------	-----------

SECTION 10: STABILITY AND REACTIVITY

10.1 Reactivity: The product is stable if used according to subsection 1.2 and if stored according to subsection 7.2.

10.2 Chemical stability: The product is stable if used according to subsection 1.2 and if stored according to subsection 7.2.

10.3 Possibility of hazardous reactions: May detonate if heated to temperature above 100 °C. May malfunction upon long-term exposure of Al-shell to acidic environment.

10.4 Conditions to avoid: May detonate with impact or friction. May detonate if exposed to open fire, radiant heat, high frequency or electrostatic energy.

10.5 Incompatible materials: Acids and alkalis.

10.6 Hazardous decomposition products: Detonation gasses containing lead, NO_x.

SECTION 11: TOXICOLOGICAL INFORMATION**11.1 Information on toxicological effects:****Mixtures:**

Acute Toxicity Estimates calculated for the classification of the mixture according to EC Regulation no. 1272/2008 (ATE_{mix}):

ATE_{mix} – oral (mg.kg⁻¹): 2732

ATE_{mix} – inhalation, dust and mist (mg.l⁻¹): 8,2

Substances:

Lead azide (CAS 13424-46-9)

TDL₀, orally, sewer-rat, 14 weeks intermittently (mg.kg⁻¹): 3920¹⁾

1) Data according to the database TOMES/RTECS, Vol. 75



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2,2-Bis(Hydroxymethyl)Propane-1,3-Diol Tetra nitrate, P.E.T.N. (CAS 78-11-5)

LD₅₀, orally, sewer-rat (mg.kg⁻¹): 1660 ¹⁾

1) Data according to the database TOMES/RTECS, Vol. 75

Lead tetroxide (CAS 1314-41-6)

LD₅₀, orally, sewer-rat (mg.kg⁻¹): > 10 000 ¹⁾

1) Data according to the database TOMES/RTECS, Vol. 75

Mixtures:

a) Acute toxicity: Based on available data, the classification criteria are not met.

b) Skin corrosion/irritation: Based on available data, the classification criteria are not met.

c) Serious eye damage/irritation: Based on available data, the classification criteria are not met.

d) Respiratory or skin sensitisation: Based on available data, the classification criteria are not met.

e) Germ cell mutagenicity: Based on available data, the classification criteria are not met.

f) Carcinogenity: The mixture is classified as carcinogenic – *category 2*. Suspected of causing cancer.

g) Reproductive toxicity: The mixture is classified as toxic for reproduction - *category 1A*. May damage the unborn child. Suspected of damaging fertility.

h) STOT-single exposure: Based on available data, the classification criteria are not met.

i) STOT-repeated exposure: The mixture is classified as toxic - *category 2*. May cause damage to organs through prolonged or repeated exposure

j) Aspiration hazard: Based on available data, the classification criteria are not met

Other information: Lead and its compounds are partly excreted by kidneys, partly deposited inside body, especially bones. After long-term and high exposition, a chronic lead poisoning disease may develop, which is exhibited by failure of haemoglobin production, encephalopathy and also by paralysis of peripheral nerves. Lead and its compounds are known for their bioaccumulative effect and lead to irreversible health damage. Further lead and its compounds may damage unborn child and reproduction capability of humans. It is necessary to take this information into account in considering possibility of acquiring lead-poisoning disease caused by long term exposition (e.g. at work).



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SECTION 12: ECOLOGICAL INFORMATION

12.1 Toxicity:

Mixtures:

The mixture is classified as acute toxic - category 1 and chronic toxic - category 2 in terms of its effect on the aquatic environment. Very toxic to aquatic life. Toxic to aquatic life with long lasting effects.

Substances:

Lead tetroxide (CAS 1314-41-6)

LC ₅₀ , 96 hrs, fish (mg.l ⁻¹)	0,1 ¹⁾
EC ₅₀ , 48 hrs, daphnia (mg.l ⁻¹)	0,98 ¹⁾
IC ₅₀ , 72 hrs, algae (mg.l ⁻¹)	0,05 ¹⁾

1) Data according to the MSDS

12.2 Persistence and degradability: The data are not available.

12.3 Bioaccumulative potential:

2,2-Bis(Hydroxymethyl)Propane-1,3-Diol Tetra nitrate, P.E.T.N. (CAS 78-11-5)

Octanol/Water partition coefficient:	2,4 ¹⁾
Bioconcentration factor (BCF):	17 ¹⁾

1) Data according to the MSDS

12.4 Mobility in soil:

2,2-Bis(Hydroxymethyl)Propane-1,3-Diol Tetra nitrate, P.E.T.N. (CAS 78-11-5)

K_{oc} value: 650¹⁾ – low mobility in soil

1) Data according to the MSDS

12.5 Results of PBT and vPvB assessment: No information is available to classify the mixture as PBT and vPvB. The mixture does not contain substances classified as PBT and vPvB; therefore the mixture will most probably not be classified as PBT vPvB.

12.6 Other adverse effects: Not stated.

SECTION 13: DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods: Dispose in accordance with corresponding regulations. Disposal of defect or damaged product is performed in accordance with instruction from manufacturer or in accordance with local regulation. Disposal may be performed only by the authorized person.

For the classification of waste and its removal corresponding to the waste producer.

Recommended disposal procedure:

Empty packages are handed over to person/company authorized to recycle packages. Contaminated packages are disposed in accordance with corresponding local regulations for disposal of packages and explosives.



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SECTION 14: TRANSPORT INFORMATION

The product is a dangerous article in terms of international and national transport regulations.

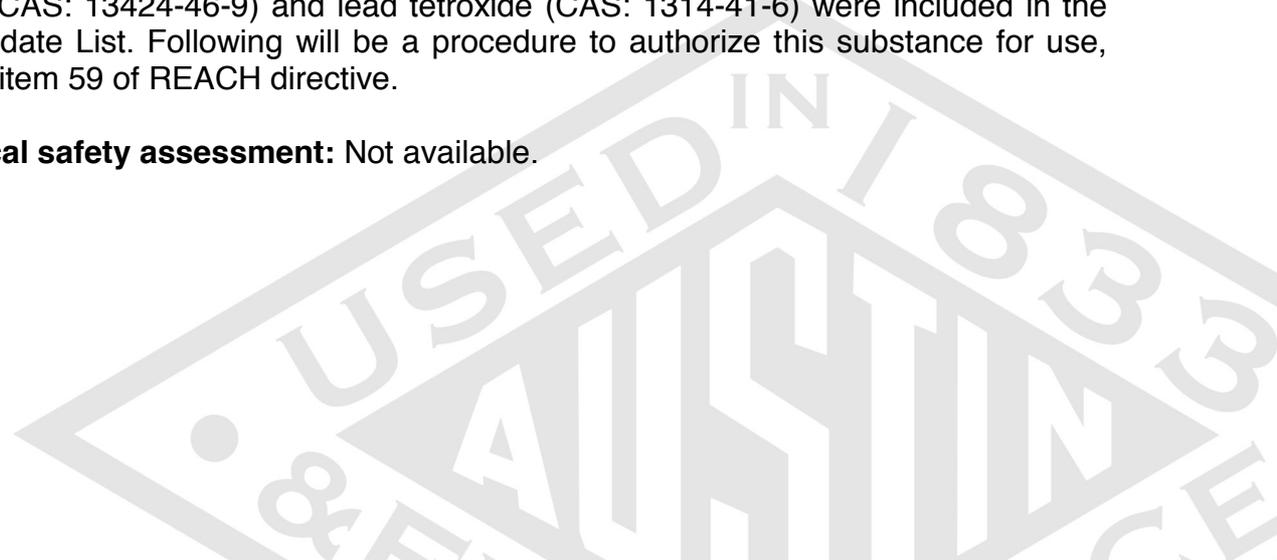
14.1	UN number	UN 0029, UN 0360, UN 0267, UN 0361, UN 0455, UN 0500
14.2	UN proper shipping name	DETONATORS, NON-ELECTRIC for blasting DETONATOR ASSEMBLIES, NON-ELECTRIC for blasting
14.3	Transport hazard class	1.1B, 1.4B, 1.4S
	Label	
14.4	Packing group	Not stated
14.5	Environmental hazards	Not stated
14.6	Special precautions for user	Transport the product only in vehicles with relevant approval for transport of dangerous goods Tunnel restriction code: B1000C (valid for 1.1B)
14.7	Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code	Not relevant

SECTION 15: REGULATORY INFORMATION

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture: According to chapter VII and VIII of directive 1907/2006 of the European Parliament and the Council the mixtures and substances contained in the mixture, do not need to be authorized.

Lead azide (CAS: 13424-46-9) and lead tetroxide (CAS: 1314-41-6) were included in the SVHC Candidate List. Following will be a procedure to authorize this substance for use, according to item 59 of REACH directive.

15.2 Chemical safety assessment: Not available.





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SECTION 16: OTHER INFORMATION

16.1 Full wording of abbreviations and hazard statements, listed in section 2 to 15:

Hazard statements

H200	Unstable explosives.
H250	Catches fire spontaneously if exposed to air.
H260	In contact with water releases flammable gases which may ignite spontaneously.
H302	Harmful if swallowed.
H332	Harmful if inhaled.
H361f	Suspected of damaging fertility.
H410	Very toxic to aquatic life with long lasting effects.

Abbreviations

PBT	Persistent, bioaccumulative and toxic substances
vPvB	Very persistent and very bioaccumulative substances
REACH	Registration, Evaluation, Authorization and Restriction of Chemicals
CLP	Regulation (EC) No 1272/2008 of the European Parliament and of the Council
Unst. Expl.	Unstable explosive
Expl. 1.1	Explosive, division 1.1
Repr. 1A	Reproductive toxicity, category 1A
Carc. 2	Carcinogenicity, category 2
Acute Tox. 4	Acute toxicity, category 4
STOT RE 2	Specific target organ toxicity — repeated exposure, category 2
Aquatic Acute 1	Acute aquatic toxicity, category 1
Aquatic Chronic 1	Chronic aquatic toxicity, category 1
Aquatic Chronic 2	Chronic aquatic toxicity, category 2
Water-react. 1	Substance or mixture which in contact with Water emits flammable gas, category 1
Pyr. Sol. 1	Pyrophoric solid, category 1
TWA	Time-Weighted Average
TLV-STEL	Threshold Limit Value - Short-Term Exposure Limit
DNEL	Derived No Effect Level
PNEC	Predicted No Effect Concentration
LD ₅₀	Median lethal dose
LC ₅₀	Median lethal concentration
EC ₅₀	Half maximal effective concentration



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<i>IC₅₀</i>	Half maximal inhibitory concentration
<i>TDL₀</i>	Lowest toxic dose
<i>BOD₅</i>	Biochemical oxygen demand
<i>COD</i>	Chemical oxygen demand
<i>K_{oc}</i>	Soil Organic Carbon-Water Partitioning Coefficient
<i>MARPOL</i>	International Convention for the Prevention of Pollution From Ships
<i>IBC</i>	International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk

16.2 Other information

- a) Instructions for training:** Training for handling and use of explosives and detonators.
- b) Advised limitations of use:** Restricted to professional users.
- c) Important data sources:** MSDS of substances manufacturers, expert databases.
- d) Purpose of safety sheet:** The aim of the safety data sheet is to enable users to take precautions relating to health and safety at work and environmental protection.
- e) The procedure for classifying the mixture according to EC Regulation no. 1272/2008:** The conventional method



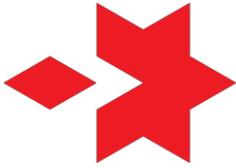


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	Reason for change	Date	Responsible person
Version 2.0	<u>Adding relevant information about the substance in section 15; new information on substances in the field of toxicology and ecology; modified document structure, completed the classification of substances in the mixture, and the total information updates.</u>	31. 1. 2013	Ing. Horák
Version 3.0	Addition to the overall substance classification.	30. 8. 2013	Ing. Horák
Version 4.0	<u>The reclassification of lead tetroxide - addition to the overall mixture classification.</u>	21. 2. 2014	Ing. Horák
Version 5.0	<u>Document revised according to Annex II of Commission Regulation (EU) no. 830/2015.</u>	20. 1. 2016	Ing. Horák





SAFETY DATA SHEET
DAVEYTRONIC ELECTRONIC DETONATOR

- Hazard statement	H201: explosive: mass explosion hazard
- Precautionary statement	P210: keep away from heat / sparks / open flames / hot surfaces – no smoking P250: do not subject to grinding / shock / friction P372: explosion risk in case of fire P401: store at a temperature between -40 and 70 °C P501: dispose of contents / container according to the rules relating to the explosives
2.3 OTHER HAZARDS	Not applicable: the pyrotechnic material is not accessible in normal use
3.0 COMPOSITION / INFORMATION ON INGREDIENTS	
3.1 SUBSTANCES	Metal casing enclosing: <ul style="list-style-type: none">- Primary explosive (0.2g) Lead Azide- Secondary explosive (0.8g) PETN- And a priming cap coated with pyrotechnic paste A plastic plug is crimped on the open end of the casing used for passing the electrical wires through. Pyrotechnical substance mass equivalent TNT: 1g equivalent TNT per detonator Substances are not directly in contact with users. In case of accidental contact with one of these components, please contact Davey Bickford Australia immediately for further instructions regarding correct handling procedures.
3.2 MIXTURES	Not applicable
4.0 FIRST AID MEASURES	
4.1 DESCRIPTION OF FIRST AID MEASURES:	Protect yourself, notify emergency responders and take the victim to safety
4.2 MOST IMPORTANT SYMPTOMS AND EFFECTS, BOTH ACUTE AND DELAYED	Not Applicable
4.3 INDICATION OF ANY IMMEDIATE MEDICAL ATTENTION AND SPECIAL TREATMENT NEEDED	For injuries due to splinters, provide first aid then request medical advice if necessary. For explosions nearby, check hearing. Treat symptoms in all cases.

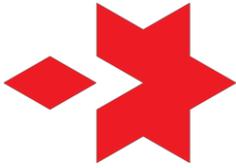
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4.4 CONTACT WITH EYES:	Not Applicable
4.5 INGESTION:	Not Applicable
4.6 OTHER INFORMATION:	Components are contained in a metallic shell. Contact Davey Bickford Australia for correct disposal procedures. DO NOT DISPOSE OF IN GENERAL REFUSE
5.0 FIRE FIGHTING MEASURES	
5.1 EXTINGUISHING MEDIA:	None
5.2 SPECIAL HAZARDS ARISING FROM THE SUBSTANCE OR MIXTURE:	Set up safety perimeter Do not personally intervene to stop a pyrotechnics fire. Whenever possible, measures should be taken to prevent the fire from spreading. After the fire has been extinguished, the site where it took place may only be entered after ascertaining that the entire area has cooled completely.
5.3 ADVICE FOR FIREFIGHTERS:	When intervening, wear special fire prevention equipment (respiratory device, helmet, etc). WARNING: the risk of explosion may remain latent even after the fire has been extinguished, depending on the condition of the products.
5.4 OTHER INFORMATION:	In case of fire in close proximity to the products, use extinguishers and all available fire extinguishing sources (ie; all water, foam and the like) In case of fire in storage facility or in transit, evacuate all personnel to preordained muster points or to safety perimeter. Notify authorities, secure site of fire, block all access to all nonessential personnel and await emergency services. DO NOT ATTEMPT TO EXTINGUISH THE FIRE
6.0 ACCIDENTAL RELEASE MEASURES	
The disposal of damaged or deteriorated electronic detonators must be carried out in accordance with all Federal and State Regulations. No smoking. Do not dispose of these products in a trashcan or public waste disposal area. Destructive disposal of pyrotechnic products by blast or incineration must be done by trained and authorised personnel in a safe area. The procedures, instructions and stipulations for the destructive disposal of pyrotechnic products must be defined based on safety studies specifically determining maximum loading in terms of environmental and personnel protection. Explosive materials must not be mixed with priming devices when they are later destroyed.	

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<p>6.1 PERSONAL PRECAUTIONS, PROTECTIVE EQUIPMENT AND EMERGENCY PROCEDURES:</p>	<p>Pyrotechnic materials spilled accidentally must be collected by authorised personnel, so that they can be disposed of and if necessary, destroyed (see waste handling, section 13).</p> <p>Avoid any impact, friction, or anything that may lead to a spark or electrostatic discharge.</p> <p>Keep away from incompatible chemicals.</p> <p>If there is broken packaging around pyrotechnic items, transfer the items into a wood or cardboard container, taking care to avoid damaging them (impact, spark, heat, etc).</p>
<p>6.2 ENVIRONMENTAL PRECAUTIONS:</p>	<p>Not Applicable</p>
<p>6.3 COLLECTION METHOD:</p>	<p>Never handle damaged detonators. Undamaged detonators can be repacked in packaging similar to original boxes.</p> <p>Never use damaged products or partially damaged products (that have been shocked or submitted to excessive temperatures, etc.)</p>
<p>6.4 OTHER INFORMATION:</p>	<p>In case of potentially or visibly damaged products, contact Davey Bickford Australia immediately to obtain the necessary handling procedures.</p>
<p>7.0 HANDLING AND STORAGE</p>	
<p>7.1 PRECAUTIONS FOR SAFE HANDLING:</p>	<p>Handle with care, avoiding impacts, friction and exposure to heat, naked lights, electromagnetic radiation (including mobile phones), electrostatic charges, etc.</p> <p>Any use not covered in the technical instructions or by untrained personnel is prohibited.</p> <p>Do not use damaged or partly damaged products (impacted by shock, high temperature).</p> <p>No smoking.</p> <p>Keep out of reach of children.</p> <p>The testing of electronic detonators must be carried out with approved equipment and by authorised and trained personnel (the maximum test current must be less than 10mAmp)</p>
<p>7.2 CONDITIONS FOR SAFE STORAGE, INCLUDING ANY INCOMPATIBILITIES:</p>	<p>Storage temperature: -40°C +70°C</p> <p>Protect from moisture.</p> <p>Adhere to all handling and storage of dangerous goods regulations. Do not store with other dangerous goods not being at Class 1, or with non-compatible goods at Class 1.</p>
<p>7.3 SPECIFIC END USE(S):</p>	<p>Not applicable</p>

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7.4 OTHER INFORMATION:	Other Safety Information can be found on the following websites: www.isee.org www.ime.org
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8.0 EXPOSURE CONTROL / PERSONAL PROTECTION

8.1 CONTROL PARAMETERS:	Not Applicable
8.2 EXPOSURE CONTROLS	<ul style="list-style-type: none">- Respiratory protection; Do not inhale the smoke after a fire has started- Hand protection: wearing gloves recommended- Eye protection: wearing safety goggles recommended- Hearing protection: close to an explosion, wearing hearing protection appropriate for the distance recommended

9.0 PHYSICAL AND CHEMICAL PROPERTIES

9.1 CHEMICAL COMPOUND:	LMNR, Lead Styphnate, Zinc, Lead Azide, PETN
9.2 CHARACTERISTICS:	Detonation hazard at a temperature of 120°C / 248°F and above
9.3 HAZARDS:	Unpacked – detonation Packed – UN proper shipping name: Detonator, Electric UN No: 0456 Hazard Class 1.4S
9.4 OTHER INFORMATION:	Object made to detonate

10.0 STABILITY AND REACTIVITY

10.1 REACTIVITY:	Not applicable
10.2 CHEMICAL STABILITY:	Stable within the storage temperatures recommended in section 7 and within the item's usage limitation (expiration date)
10.3 POSSIBILITY OF HAZARDOUS REACTIONS	Not Applicable
10.4 CONDITIONS TO AVOID:	Avoid any exposure to high temperatures, to impact, friction and electrostatic discharges or stray currents.
10.5 INCOMPATIBLE MATERIALS:	Acids or alkalis. Dangerous goods outside Class 1 and all non-compatible materials at Class 1.
10.6 HAZARDOUS DECOMPOSITION PRODUCTS:	Fumes contain lead. Possible release of oxides of carbon and nitrogen.

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SAFETY DATA SHEET
DAVEYTRONIC ELECTRONIC DETONATOR

11.0 TOXICOLOGICAL INFORMATION

11.1 INFORMATION ON TOXICOLOGICAL EFFECTS: No hazards identified for the item.

12.0 ECOLOGICAL INFORMATION

12.1 TOXICITY: No hazards identified for the item.

12.2 PERSISTENCE AND DEGRADABILITY: No hazards identified for the item.

12.3 BIOACCUMULATIVE POTENTIAL: No hazards identified for the item.

12.4 MOBILITY IN SOIL No hazards identified for the item.

12.5 RESULT OF PBT VPVB ASSESSMENTS: No hazards identified for the item.

12.6 OTHER ADVERSE EFFECTS: No hazards identified for the item.

13.0 DISPOSAL CONSIDERATIONS

13.1 WASTE TREATMENT METHODS:

Do not place in waste bins, drains, or landfill.

Processing and destruction require specific procedures and must be covered in a special study that takes into account the product's condition and treatment of the waste after destruction. This operation must be carried out by trained, authorised personnel.

All materials contaminated by pyrotechnic materials from the item should also be considered as pyrotechnic waste.

For further information, contact a Davey Bickford Australia representative.

13.2 APPROPRIATE METHOD OF DISPOSAL - PACKAGING: To be made on site per state and federal regulation, by authorised staff.

14.0 TRANSPORT INFORMATION

14.1 UN NUMBER: 0456

14.2 UN PROPER SHIPPING NAME: **Electronic mine Detonators** (for blasting)

14.3 TRANSPORT HAZARD CLASS(ES): 1.4S

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SAFETY DATA SHEET
DAVEYTRONIC ELECTRONIC DETONATOR

14.4 PACKAGING GROUP:	Not applicable
14.5 ENVIRONMENTAL HAZARDS:	No applicable
14.6 SPECIAL PRECAUTIONS FOR USER:	
- ADR specifics (Road)	None
- IATA specifics (Air)	Description: detonators, electronic for blasting
- IMDG specifics (Sea)	None
14.7 TRANSPORT IN BULK ACCORDING TO ANNEX II OF MARPOL 73/78 AND THE IBC CODE	Not applicable
15.0 REGULATORY INFORMATION	
For all countries, regulations and laws covering the handling, transport, storage, usage, and destruction of explosives must be complied with, and also those governing the protection of workers, health and the environment.	
16.0 OTHER DATA	
16.1 EMERGENCY RESPONSE INFORMATION DURING TRANSPORT:	For any specific requirement, please contact Davey Bickford Australia. Please see 1.3 & 1.4

General Information

This information sheet does not under any circumstances exempt users of the item from referring to official texts for information concerning their obligations. This sheet contains information based in the state of our knowledge of the item concerned at the time of writing 19/09/2016. This sheet should not be considered exhaustive and refers only to normal use of the product.

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SAFETY DATA SHEET

MIGHTY ATOM, MEGAPRIME, MIGHTYPRIME®

1. IDENTIFICATION OF THE MATERIAL AND SUPPLIER

1.1 Product identifier

Product name: MIGHTY ATOM, MEGAPRIME, MIGHTYPRIME®
Synonym(s): JOHNEK MAGAPRIME • JOHNEK MEGAPRIME • MIGHTY ATOM • MIGHTYPRIME® 100

1.2 Uses and uses advised against

Use(s): INITIATING EXPLOSIVE CHARGE

1.3 Details of the supplier of the product

Supplier name: JOHNSON HI-TECH (AUSTRALIA) PTY LTD
Address: Suite 1, 103 Great Eastern Hwy, Rivervale, WA, 6103, AUSTRALIA
Telephone: +61 8 6250 8200
Fax: +61 8 9473 2379
Email: info@johnex.com.au
Website: www.johnex.com.au

1.4 Emergency telephone number(s)

Emergency: 1800 014 100

SDS Date: 04 Apr 2017

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

CLASSIFIED AS HAZARDOUS ACCORDING TO AUSTRALIAN WHS REGULATIONS

GHS classification(s): Explosives: Division 1.1
 Acute Toxicity: Oral: Category 3
 Acute Toxicity: Skin: Category 3
 Acute Toxicity: Inhalation: Category 3
 Specific Target Organ Systemic Toxicity (Repeated Exposure): Category 2
 Aquatic Toxicity (Chronic): Category 2

2.2 Label elements

Signal word: DANGER

Pictogram(s):



Hazard statement(s)

H201 Explosive; mass explosion hazard.
 H301 Toxic if swallowed.
 H311 Toxic in contact with skin.
 H331 Toxic if inhaled.
 H373 May cause damage to organs through prolonged or repeated exposure.
 H411 Toxic to aquatic life with long lasting effects.

Prevention statement(s)

P210 Keep away from heat/sparks/open flames/hot surfaces. No smoking.
 P240 Ground/bond container and receiving equipment.
 P250 Do not subject to grinding/shock/friction/rough handling.
 P260 Do not breathe dust/fume/gas/mist/vapours/spray.
 P264 Wash thoroughly after handling.
 P270 Do not eat, drink or smoke when using this product.
 P271 Use only outdoors or in a well-ventilated area.
 P273 Avoid release to the environment.
 P280 Wear protective gloves/protective clothing/eye protection/face protection.

Response statement(s)

P301 + P310 IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.
 P302 + P352 IF ON SKIN: Wash with plenty of soap and water.
 P304 + P340 IF INHALED: Remove to fresh air and keep at rest in a position comfortable for breathing.
 P311 Call a POISON CENTER or doctor/physician.
 P314 Get medical advice/attention if you feel unwell.
 P321 Specific treatment is advised - see first aid instructions.
 P330 Rinse mouth.
 P361 Remove/Take off immediately all contaminated clothing.
 P363 Wash contaminated clothing before reuse.
 P370 + P380 In case of fire: Evacuate area.
 P372 Explosion risk in case of fire.
 P373 DO NOT fight fire when fire reaches explosives.
 P391 Collect spillage.

Storage statement(s)

P401 Store in accordance with relevant site and storage provisions.
 P403 + P233 Store in a well-ventilated place. Keep container tightly closed.
 P405 Store locked up.

Disposal statement(s)

P501 Dispose of contents/container in accordance with relevant regulations.

2.3 Other hazards

No information provided.

3. COMPOSITION/ INFORMATION ON INGREDIENTS

3.1 Substances / Mixtures

Ingredient	CAS Number	EC Number	Content
CYCLOTRIMETHYLENE TRINITRAMINE (RDX)	121-82-4	204-500-1	<65%
PENTAERYTHRITOL TETRANITRATE (PETN)	78-11-5	201-084-3	55 to 65%

TRINITROTOLUENE (TNT)	118-96-7	204-289-6	35 to 45%
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4. FIRST AID MEASURES

4.1 Description of first aid measures

Eye	If in eyes, hold eyelids apart and flush continuously with running water. Continue flushing until advised to stop by a Poisons Information Centre, a doctor, or for at least 15 minutes.
Inhalation	If inhaled, remove from contaminated area. To protect rescuer, use an Air-line respirator where an inhalation risk exists. Apply artificial respiration if not breathing.
Skin	If skin or hair contact occurs, remove contaminated clothing and flush skin and hair with running water. Continue flushing with water until advised to stop by a Poisons Information Centre or a doctor.
Ingestion	For advice, contact a Poison Information Centre on 13 11 26 (Australia Wide) or a doctor (at once).
First aid facilities	Eye wash facilities and safety shower should be available.

4.2 Most important symptoms and effects, both acute and delayed

See Section 11 for more detailed information on health effects and symptoms.

4.3 Immediate medical attention and special treatment needed

Treat symptomatically.

5. FIRE FIGHTING MEASURES

5.1 Extinguishing media

DO NOT attempt to extinguish burning explosives. Evacuate area immediately. Notify trained emergency response personnel.

5.2 Special hazards arising from the substance or mixture

EXPLOSIVE. Will explode under specific conditions. May evolve toxic gases (carbon/ nitrogen oxides, hydrocarbons) when heated to decomposition. Eliminate all ignition sources including cigarettes, open flames, spark producing switches/tools, heaters, naked lights, pilot lights, etc when handling. CAUTION: Will explode if exposed to heat or with heavy impact.

5.3 Advice for firefighters

Evacuate area and contact emergency services. Toxic gases may be evolved in a fire situation. Remain upwind and notify those downwind of hazard. Do not attempt to fight fire. Use waterfog to cool intact containers and nearby storage areas. May explode from heat, pressure, friction or shock.

5.4 Hazchem code

E Evacuation of people in and around the immediate vicinity of the incident should be considered.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Wear Personal Protective Equipment (PPE) as detailed in section 8 of the SDS. Clear area of all unprotected personnel.

6.2 Environmental precautions

Prevent product from entering drains and waterways.

6.3 Methods of cleaning up

Contain spillage, then collect and place in suitable containers for disposal. Eliminate all sources of ignition.

6.4 Reference to other sections

See Sections 8 and 13 for exposure controls and disposal.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Before use carefully read the product label. Use of safe work practices are recommended to avoid eye or skin contact and inhalation. Observe good personal hygiene, including washing hands before eating. Prohibit eating, drinking and smoking in contaminated areas.

7.2 Conditions for safe storage, including any incompatibilities

Store in clean, well ventilated and dry magazine licensed for Class 1 Explosives. Segregate from all incompatible substances and foodstuffs. Ensure magazines are adequately labelled and protected from physical damage/shock or friction.

7.3 Specific end use(s)

No information provided.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1 Control parameters

Exposure standards

Ingredient	Reference	TWA		STEL	
		ppm	mg/m ³	ppm	mg/m ³
2,4,6-Trinitrotoluene (TNT)	SWA (AUS)	--	0.5	--	--
Cyclonite	SWA (AUS)	--	1.5	--	--

Biological limits

No biological limit values have been entered for this product.

8.2 Exposure controls

Engineering controls Avoid inhalation. Use in well ventilated areas. Where an inhalation risk exists, mechanical explosion proof extraction ventilation is recommended. Maintain dust levels below the recommended exposure standard.

PPE

Eye / Face	Wear safety glasses.
Hands	Wear PVC or rubber gloves.
Body	Wear coveralls.
Respiratory	Not required under normal conditions of use.



9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Appearance	YELLOW-BUFF CAST CRYSTALLINE SOLID
Odour	ODOURLESS
Flammability	EXPLOSIVE
Flash point	NOT RELEVANT
Boiling point	NOT AVAILABLE
Melting point	DECOMPOSES
Evaporation rate	NOT AVAILABLE
pH	NOT AVAILABLE
Vapour density	NOT AVAILABLE
Specific gravity	1.65
Solubility (water)	SLIGHTLY SOLUBLE
Vapour pressure	NOT AVAILABLE
Upper explosion limit	NOT AVAILABLE
Lower explosion limit	NOT AVAILABLE
Partition coefficient	NOT AVAILABLE
Autoignition temperature	NOT AVAILABLE
Decomposition temperature	> 150°C
Viscosity	NOT AVAILABLE
Explosive properties	EXPLOSIVE; mass explosion hazard
Oxidising properties	NOT AVAILABLE
Odour threshold	NOT AVAILABLE

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9.2 Other information

% Volatiles 0 %

10. STABILITY AND REACTIVITY

10.1 Reactivity

Carefully review all information provided in sections 10.2 to 10.6.

10.2 Chemical stability

Stable under recommended conditions of storage.

10.3 Possibility of hazardous reactions

Polymerization will not occur.

10.4 Conditions to avoid

Avoid shock, friction, heavy impact, heat, sparks, open flames and other ignition sources.

10.5 Incompatible materials

May detonate if heated strongly or exposed to severe shock. Incompatible (explosively) with acids (e.g. nitric acid), metal powders, combustible materials, alkalis (e.g. sodium hydroxide), oxidising agents (e.g. hypochlorites), chloride salts, sulphur, urea, nitrites and reducing agents.

10.6 Hazardous decomposition products

May evolve toxic gases (carbon/nitrogen oxides, hydrocarbons) when heated to decomposition.

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity

Information available for the product: Toxic if swallowed, in contact with skin, and/or if inhaled.

Information available for the ingredient(s):

Ingredient	Oral Toxicity (LD50)	Dermal Toxicity (LD50)	Inhalation Toxicity (LC50)
CYCLOTRIMETHYLENE TRINITRAMINE (RDX)	59 mg/kg (mouse)	-	-
PENTAERYTHRITOL TETRANITRATE (PETN)	1660 mg/kg (rat)	-	-
TRINITROTOLUENE (TNT)	660 mg/kg (mouse)	-	-

Skin	Not classified as a skin irritant. Due to product form, exposure can only occur during detonation. Serious damage may result from explosive fragments.
Eye	Not classified as an eye irritant. Due to product form, exposure can only occur during detonation. Serious damage may result from explosive fragments.
Sensitisation	Not classified as causing skin or respiratory sensitisation.
Mutagenicity	Not classified as a mutagen.
Carcinogenicity	Not classified as a carcinogen.
Reproductive	Not classified as a reproductive toxin.
STOT – single exposure	Not classified as causing organ damage from single exposure. However, serious damage may result from explosive fragments.
STOT – repeated exposure	Contains Trinitrotoluene (TNT) which may cause damage to organs (liver, blood, bone marrow, eye, kidney and nervous system) through prolonged or repeated exposure. However, exposure to contents is unlikely.

Aspiration

This product does not present an aspiration hazard.

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxic to aquatic life with long lasting effects.

12.2 Persistence and degradability

No information provided.

12.3 Bioaccumulative potential

No information provided.

12.4 Mobility in soil

No information provided.

12.5 Other adverse effects

Trinitrotoluene (TNT) will undergo photochemical degradation, however it is toxic to bacteria which might biochemically degrade it. TNT is toxic to fish above 1.5 ppm. TNT and pentaerythritol tetranitrate (PETN) are not expected to bioconcentrate. PETN may degrade by hydrolysis.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Waste disposal Waste must be disposed of in accordance with AS2187.2 as well as state regulatory and environmental legislation. Small quantities of damaged or deteriorated material may be destroyed by inclusion in a blast hole containing good explosives (by licensed personnel). Detonators should not be inserted into defective explosives. For large quantities, contact the manufacturer/supplier for additional information.

Legislation Dispose of in accordance with relevant local legislation.

14. TRANSPORT INFORMATION

CLASSIFIED AS A DANGEROUS GOOD BY THE CRITERIA OF THE ADG CODE



	LAND TRANSPORT (ADG)	SEA TRANSPORT (IMDG / IMO)	AIR TRANSPORT (IATA / ICAO)
14.1 UN Number	0042	0042	None Allocated
14.2 Proper Shipping Name	BOOSTERS without detonator	BOOSTERS without detonator	None Allocated
14.3 Transport Hazard Class	1.1D	1.1D	None Allocated
14.4 Packing Group	None Allocated	None Allocated	None Allocated

14.5 Environmental hazards

No information provided

14.6 Special precautions for user

Hazchem code E

EMS F-B, S-X

Other information

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AIR TRANSPORT PROHIBITED under the International Air Transport Association (IATA) Dangerous Goods Regulations for transport by air in passenger aircraft and cargo aircraft.

15. REGULATORY INFORMATION

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

Poison schedule	A poison schedule number has not been allocated to this product using the criteria in the Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP).
Classifications	Safework Australia criteria is based on the Globally Harmonised System (GHS) of Classification and Labelling of Chemicals. The classifications and phrases listed below are based on the Approved Criteria for Classifying Hazardous Substances [NOHSC: 1008(2004)].
Hazard codes	E Explosive N Dangerous for the environment T Toxic Xn Harmful
Risk phrases	R3 Extreme risk of explosion by shock, friction, fire or other sources of ignition. R23/24/25 Toxic by inhalation, in contact with skin and if swallowed. R33 Danger of cumulative effects. R51/53 Toxic to aquatic organisms, may cause long term adverse effects in the aquatic environment.
Safety phrases	S35 This material and its container must be disposed of in a safe way. S45 In case of accident or if you feel unwell seek medical advice immediately (show the label where possible). S61 Avoid release to the environment. Refer to special instructions/safety data sheets.
Inventory listing(s)	AUSTRALIA: AICS (Australian Inventory of Chemical Substances) All components are listed on AICS, or are exempt.

16. OTHER INFORMATION

Additional information

EXPLOSIVES & BLASTING AGENTS: Refer to Local State and Federal legislation that specifically relates to the use of Explosives. Users of products described in this ChemAlert Report are advised to ensure familiarity and compliance with the appropriate legal requirements (e.g. Regulations) prior to the use of this product. Where any further information is required, users may contact their local authority in Explosives and Dangerous Goods.

EXPLOSIONS: Fires involving explosives or explosive mixtures may undergo further explosions and rapid propagation. Police and emergency personnel should be notified immediately. Evacuate individuals to a safe sheltered area at least 800 metres away. If possible remove vehicles and further heat and ignition sources from the area. Do not return to areas until at least one hour after fire and explosions have ceased.

EXPLOSIVES - DETONATION: If explosives are detonated on stony ground or in an area where debris is likely to become missiles, damage can be expected within 400 metres when three kilograms of explosives are detonated. For this reason it is recommended that explosives should be detonated in sand or earth that is free from stones.

EXPLOSIVES - BURNING SAFETY: Note: Disposal in a blast with fresh explosives may be preferable to burning.

- Make a sawdust (or newspaper) trail 450mm wide and ~20mm deep in the direction of the wind. The trail should be 2m longer than necessary.
- Place the cartridges on the sawdust (or paper), they may be touching, but not piled on top of each other

- Individual trails should be no closer than 2m and should not contain more than 12kgs of explosives.
- Trails should be side by side, not in a line. No more than 4 should be set up at one time.
- Remove explosives not being burnt, to at least 300m away, unless the material can be stored behind something substantial.
- Thoroughly wet the trail with kerosene or diesel (never petrol or any other highly flammable liquid). Use at least 2L of fuel per 10m of trail.
- Light the trail from a long rolled paper wick, place down wind and contact the 2m of trail which is not covered by explosives. The flame should blow away from the unburned explosives otherwise preheating and detonation may occur.
- Use a plastic igniter if available instead of paper. Coil one end into the sawdust or under the paper and light the other end from a minimum distance of 7m away from the trail.
- Move away at least 300m. Do not return for a period of at least 30mins after burning has finished.
- If the fire goes out, do not approach for at least 15mins. Do not add kerosene or diesel oil unless certain that the flame is completely extinguished.
- Bury the residue as it is poisonous to livestock.

PERSONAL PROTECTIVE EQUIPMENT GUIDELINES:

The recommendation for protective equipment contained within this report is provided as a guide only. Factors such as method of application, working environment, quantity used, product concentration and the availability of engineering controls should be considered before final selection of personal protective equipment is made.

HEALTH EFFECTS FROM EXPOSURE:

It should be noted that the effects from exposure to this product will depend on several factors including: frequency and duration of use; quantity used; effectiveness of control measures; protective equipment used and method of application. Given that it is impractical to prepare a report which would encompass all possible scenarios, it is anticipated that users will assess the risks and apply control methods where appropriate.

Abbreviations

ACGIH	American Conference of Governmental Industrial Hygienists
CAS #	Chemical Abstract Service number - used to uniquely identify chemical compounds
CNS	Central Nervous System
EC No.	EC No - European Community Number
EMS	Emergency Schedules (Emergency Procedures for Ships Carrying Dangerous Goods)
GHS	Globally Harmonized System
GTEPG	Group Text Emergency Procedure Guide
IARC	International Agency for Research on Cancer
LC50	Lethal Concentration, 50% / Median Lethal Concentration
LD50	Lethal Dose, 50% / Median Lethal Dose
mg/m ³	Milligrams per Cubic Metre
OEL	Occupational Exposure Limit
pH	relates to hydrogen ion concentration using a scale of 0 (high acidic) to 14 (highly alkaline).
ppm	Parts Per Million
STEL	Short-Term Exposure Limit
STOT-RE	Specific target organ toxicity (repeated exposure)
STOT-SE	Specific target organ toxicity (single exposure)
SUSMP	Standard for the Uniform Scheduling of Medicines and Poisons
SWA	Safe Work Australia
TLV	Threshold Limit Value
TWA	Time Weighted Average

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Conforms: GHS (rev 4) (2011)

The Hazardous Substances and New Organisms (HSNO) Act 1996 and Amendments - New Zealand
Date of issue/ Date of revision : 11.05.2017
Date of previous issue : 00.00.0000
Version : 1.0



SAFETY DATA SHEET

UltrAN 80 Tropical

Section 1. Identification

Product name : UltrAN 80 Tropical
Other means of identification : Ammonium nitrate 5-7-1M/Ammonium nitrate Porous Prills
Product type : Solid
Product code : PA120P

Uses

Area of application : Industrial applications

Manufacturer/Distributor

Name : Red Bull Powder Company

Address

Street : 6 Walls Road, Penrose
Postal code : 1061
City : Auckland
Country : New Zealand

Telephone number : +64 (9) 525 1181
Fax no. : +64 (9) 525 1182

Supplier

Supplier's details : Yara AB
Industrial

Address

Street : Östra Varvsgatan
Number : 4
Postal code : 211 75
City : MALMÖ
Country : Sweden

P.O. Box Address

P.O. Box : 4505
Postal code : 203 20
City : MALMÖ
Country : Sweden

Telephone number : +46 101396000
Fax no. : +46 101396001
e-mail address of person responsible for this SDS : kundtjanst.industrial@yara.com
Emergency telephone number (with hours of operation) : +46856642573 /44 1235 239670 (Carechem) (24 h)

National advisory body/Poison Center

Name : New Zealand National Poisons Centre
Telephone number : 0800 POISON = 0800 764 766 (NZ only) / +64 3 479 7248 (outside NZ)
Hours of operation : 24h

Section 2. Hazards identification

Classification and labelling have been performed following the guidelines and recommendation of GHS and the intended use.

HSNO Classification : 5.1.1 - OXIDIZING SUBSTANCES - Category C
 6.1 - ACUTE TOXICITY (oral) - Category E
 6.4 - EYE IRRITATION - Category A (Irritant)
 9.1 - AQUATIC ECOTOXICITY - Category D

GHS label elements

Hazard pictograms : 

Signal word : Warning

Hazard statements : H272 May intensify fire; oxidizer.
 H303 May be harmful if swallowed.
 H319 Causes serious eye irritation.
 H413 May cause long lasting harmful effects to aquatic life.

Precautionary statements

Prevention : P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
 P221-a Take any precaution to avoid mixing with combustibles.

Response : P280-a Wear eye protection.
 P305 IF IN EYES:
 P351 Rinse cautiously with water for several minutes.
 P338 Remove contact lenses, if present and easy to do. Continue rinsing.
 P337 If eye irritation persists:
 P313-a Get medical attention.
 P370 In case of fire:
 P378-b Use flooding quantities of water to extinguish.

Other hazards which do not result in classification : Product forms slippery surface when combined with water.

Section 3. Composition/information on ingredients

Substance/mixture : Mixture

Ingredient name	CAS number	% (w/w)
ammonium nitrate	6484-52-2	>= 90 - < 100

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

- Eye contact** : Rinse with plenty of running water. Check for and remove any contact lenses. Get medical attention.
- Inhalation** : If inhaled, remove to fresh air. In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours. Get medical attention if you feel unwell.
- Skin contact** : Get medical attention if irritation develops. Wash with soap and water.
- Ingestion** : Wash out mouth with water. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Get medical attention if adverse health effects persist or are severe.

Most important symptoms/effects, acute and delayed

Potential acute health effects

- Eye contact** : Causes serious eye irritation.
- Inhalation** : Exposure to decomposition products may cause a health hazard. Serious effects may be delayed following exposure.
- Skin contact** : No known significant effects or critical hazards.
- Ingestion** : May be harmful if swallowed.

Over-exposure signs/symptoms

- Eye contact** : Adverse symptoms may include the following:
pain or irritation
watering
redness
- Inhalation** : No specific data.
- Skin contact** : No specific data.
- Ingestion** : Adverse symptoms may include the following:
stomach pains

Indication of immediate medical attention and special treatment needed, if necessary

- Notes to physician** : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled. In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.
- Specific treatments** : Not available.
- Protection of first-aiders** : No action shall be taken involving any personal risk or without

suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

See toxicological information (section 11)

Section 5. Firefighting measures

Extinguishing media

- Suitable extinguishing media** : Use flooding quantities of water for extinction.
- Unsuitable extinguishing media** : Do NOT use chemical extinguisher or foam or attempt to smother the fire with steam or sand.
- Specific hazards arising from the chemical** : Oxidizing material. May intensify fire. This material is harmful to aquatic life. Fire water contaminated with this material must be contained and prevented from being discharged to any waterway, sewer or drain.
- Hazardous thermal decomposition products** : Decomposition products may include the following materials: nitrogen oxides
Avoid breathing dusts, vapors or fumes from burning materials.
In case of inhalation of decomposition products in a fire, symptoms may be delayed.
- Hazchem code** : Not available.
- Special protective actions for fire-fighters** : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.
- Special protective equipment for fire-fighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.
- Remark** : None.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

- Personal precautions, protective equipment and emergency procedures** : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment (see Section 8).

- Environmental precautions** : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air). Water polluting material. May be harmful to the environment if released in large quantities.

Methods and material for containment and cleaning up

- Small spill** : Move containers from spill area. Vacuum or sweep up material and place in a designated, labeled waste container. Use spark-proof tools and explosion-proof equipment. Dispose of via a licensed waste disposal contractor. Avoid dust generation. Using a vacuum with HEPA filter will reduce dust

- Large spill**
- : dispersal. Place spilled material in a designated, labeled waste container.
 - : Move containers from spill area. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Vacuum or sweep up material and place in a designated, labeled waste container. Use spark-proof tools and explosion-proof equipment. Dispose of via a licensed waste disposal contractor. Note: see section 1 for emergency contact information and section 13 for waste disposal. Avoid dust generation. Do not dry sweep. Vacuum dust with equipment fitted with a HEPA filter and place in a closed, labeled waste container.

Section 7. Handling and storage

Precautions for safe handling

- Precautions for safe handling**
- : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. Do not ingest. Avoid contact with eyes, skin and clothing. Avoid release to the environment. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Keep away from combustible materials. Empty containers retain product residue and can be hazardous. Do not reuse container. See also Section 8 for additional information on hygiene measures.

- Conditions for safe storage, including any incompatibilities**
- : Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see section 10) and food and drink. Separate from reducing agents and combustible materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination. Keep away from: organic materials, oil and grease.

Section 8. Exposure controls/personal protection

Control parameters

- Occupational exposure limits**
- : None.
- Appropriate engineering controls**
- : No special ventilation requirements. Good general ventilation should be sufficient to control worker exposure to airborne contaminants. If this product contains ingredients with exposure limits, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure below any recommended or statutory limits.
- Environmental exposure controls**
- : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to

acceptable levels.

Individual protection measures

- Hygiene measures** : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Wash contaminated clothing before reusing. A washing facility or water for eye and skin cleaning purposes should be present.
- Eye/face protection** : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. chemical splash goggles. Recommended: Tightly-fitting goggles CEN: EN166
- Skin protection**
- Hand protection** : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.
> 8 hours (breakthrough time): Protective gloves should be worn under normal conditions of use.
- Body protection** : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
- Respiratory protection** : Use a properly fitted, particulate filter respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.
Recommended: In case of inadequate ventilation wear respiratory protection. Filter P2 (EN 143)
- Personal protective equipment (Pictograms)** :



Section 9. Physical and chemical properties

Appearance

- Physical state** : Solid
- Color** : White.
- Odor** : Odorless.
- Odor threshold** : Not determined.
- pH** : > 4.5 [Conc.: 100 g/l]
- Melting/freezing point** : 169.6 °C
Decomposition temperature: > 210 °C
- Boiling/condensation point** : Not determined.
- Sublimation temperature** : Not determined.
- Flash point** : Not determined.
- Evaporation rate** : Not determined.
- Flammability (solid, gas)** : Non-flammable.
- Lower and upper explosive (flammable) limits** : **Lower:** Not determined.
Upper: Not determined.
- Vapor pressure** : Not determined.

Bulk density	: 650 - 1,050 kg/m ³
Density	: 0.65 - 1.05 g/cm ³ @ 20 °C (20 °C)
Relative density	: Not determined.
Solubility	: cold water
Solubility in water	: > 100 g/l @ 20 °C (20 °C)
Partition coefficient: n-octanol/water	: < 1
Auto-ignition temperature	: Not determined.
Decomposition temperature	: > 210 °C (> 210 °C)
Viscosity	: Dynamic: Not determined. : Kinematic: Not determined.
Explosive properties	: None.
Oxidizing properties	: Oxidizer

Section 10. Stability and reactivity

Chemical stability	: The product is stable.
Possibility of hazardous reactions	: Hazardous reactions or instability may occur under certain conditions of storage or use. Conditions may include the following: contact with combustible materials Reactions may include the following: risk of causing or intensifying fire
Conditions to avoid	: Avoid contamination by any source including metals, dust and organic materials.
Incompatible materials	: Reactive or incompatible with the following materials: alkalis combustible materials reducing materials organic materials acids
Hazardous decomposition products	: Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product / ingredient name	Result	Species	Dose	Exposure	References
ammonium nitrate					
	LD50 Oral	Rat	2,950 mg/kg OECD 401	Not applicable.	IUCLID 5
	LD50 Dermal	Rat	> 5,000 mg/kg OECD 402	Not applicable.	IUCLID 5

Conclusion/Summary : No known significant effects or critical hazards.

Irritation/Corrosion

Product / ingredient name	Result	Species	Score	Exposure	Observation	References
ammonium nitrate	Eyes - Irritant OECD 405	Rabbit	Not applicable.		Not applicable.	IUCLID 5

Conclusion/Summary

- Skin** : No known significant effects or critical hazards.
- Eyes** : Causes serious eye irritation.
- Respiratory** : No known significant effects or critical hazards.

Sensitization

Conclusion/Summary

- Skin** : No known significant effects or critical hazards.
- Respiratory** : No known significant effects or critical hazards.

Mutagenicity

- Conclusion/Summary** : No known significant effects or critical hazards.

Carcinogenicity

- Conclusion/Summary** : No known significant effects or critical hazards.

Reproductive toxicity

Product / ingredient name	Maternal toxicity	Fertility	Development toxin	Species	Dose	Exposure	References
ammonium nitrate	Not applicable.	Negative	Negative	Rat	Oral: > 1500 mg/kg bw/day OECD 422	28 days	IUCLID 5

- Conclusion/Summary** : No known significant effects or critical hazards.

Teratogenicity

- Conclusion/Summary** : No known significant effects or critical hazards.

Specific target organ toxicity (single exposure)

No known significant effects or critical hazards.

Specific target organ toxicity (repeated exposure)

Aspiration hazard

No known significant effects or critical hazards.

- Information on likely routes of exposure** : Not available.

Potential acute health effects

- Eye contact** : Causes serious eye irritation.
- Inhalation** : Exposure to decomposition products may cause a health hazard. Serious effects may be delayed following exposure.
- Skin contact** : No known significant effects or critical hazards.
- Ingestion** : May be harmful if swallowed.

Symptoms related to the physical, chemical and toxicological characteristics

- Eye contact** : Adverse symptoms may include the following:
pain or irritation
watering
redness
- Inhalation** : No specific data.
- Skin contact** : No specific data.
- Ingestion** : Adverse symptoms may include the following:
stomach pains

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Short term exposure

- Potential immediate effects** : Not available.
- Potential delayed effects** : Not available.

Long term exposure

- Potential immediate effects** : Not available.
- Potential delayed effects** : Not available.

Potential chronic health effects

Product / ingredient name	Result	Species	Dose	Exposure	References
ammonium nitrate	NOAEL Oral	Rat	256 mg/kg OECD 422	28days	IUCLID 5
ammonium nitrate	No-observable-effect-concentration Dusts and mists Inhalation	Rat	> 185 mg/kg OECD 412	2weeks 5 hours per day	IUCLID 5

- Conclusion/Summary** : No known significant effects or critical hazards.
- General** : No known significant effects or critical hazards.
- Carcinogenicity** : No known significant effects or critical hazards.
- Mutagenicity** : No known significant effects or critical hazards.
- Teratogenicity** : No known significant effects or critical hazards.
- Developmental effects** : No known significant effects or critical hazards.
- Fertility effects** : No known significant effects or critical hazards.

Over-exposure signs/symptoms

- Eye contact** : Adverse symptoms may include the following:
pain or irritation
watering

redness

- Inhalation** : No specific data.
- Skin contact** : No specific data.
- Ingestion** : Adverse symptoms may include the following:
stomach pains

Numerical measures of toxicity

Acute toxicity estimates

Route	ATE value
Oral	2,957.1 mg/kg

Section 12. Ecological information

Toxicity

Product / ingredient name	Result	Species	Exposure	References
ammonium nitrate				
	Acute LC50 447 mg/l Fresh water	Fish	48 h	IUCLID 5
	Acute EC50 490 mg/l Fresh water	Daphnia	48 h	IUCLID 5
	Acute EC50 1,700 mg/l Salt water	Algae	10 d	IUCLID 5

Conclusion/Summary : No known significant effects or critical hazards.

Persistence/degradability

Conclusion/Summary : No known significant effects or critical hazards.

Bioaccumulative potential

Product / ingredient name	LogPow	BCF	Potential
AMM.NITR.POROUS PRILLS 34.5 MG	< 1	Not applicable.	low

Conclusion/Summary : No known significant effects or critical hazards.

Mobility in soil

- Soil/water partition coefficient (KOC)** : Not available.
- Mobility** : Not available.
- Other adverse effects** : No known significant effects or critical hazards.

Section 13. Disposal considerations

Product

- Methods of disposal** : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable

products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Empty the bag by shaking to remove as much as possible of its contents. Empty bags may be disposed of as non-hazardous material or returned for recycling.

Section 14. Transport information

Regulation: UN Class	
14.1 UN number	1942
14.2 UN proper shipping name	AMMONIUM NITRATE
14.3 Transport hazard class(es)	5.1 
14.4 Packing group	III
14.5 Environmental hazards	No.
Additional information	
<u>Environmental hazards</u>	: No.

Regulation: IMDG	
14.1 UN number	1942
14.2 UN proper shipping name	AMMONIUM NITRATE
14.3 Transport hazard class(es)	5.1 
14.4 Packing group	III
14.5 Environmental hazards	No.
Additional information	
<u>Marine pollutant</u>	:
<u>IMDG Code Segregation group</u>	: SG02
<u>Emergency schedules (EmS)</u>	: F-H, S-Q

Regulation: IATA	
14.1 UN number	1942
14.2 UN proper shipping name	AMMONIUM NITRATE
14.3 Transport hazard class(es)	5.1

	
14.4 Packing group	III
14.5 Environmental hazards	No.
Additional information	
<u>Marine pollutant</u>	: No.

14.6 Special precautions for user : Transport within user's premises: Ensure that persons transporting the product know what to do in the event of an accident or spillage.

IMSBC

Bulk cargo shipping name : AMMONIUM NITRATE UN 1942
Class : Class 5.1: Oxidizing material.
Group : B
Marpol V : Non-HME

Transport in bulk according to Annex II of MARPOL and the IBC Code : Not applicable.

Section 15. Regulatory information

HSNO Approval Number : HSR002631
HSNO Group Standard : Class 5.1.1 Oxidising Substances
HSNO Classification : 5.1.1 - OXIDIZING SUBSTANCES - Category C6.1 - ACUTE TOXICITY: oral - Category E6.4 - EYE IRRITATION - Category A (Irritant)9.1 - AQUATIC ECOTOXICITY - Category D

Country information : **SCHEDULE 1** (CONDITIONS OF GROUP STANDARD) of the Oxidising [5.1.1] **Substances** Group Standard 2006
Any location at which a substance is manufactured or stored in quantities that exceed those set out in Table 2 must comply with the relevant conditions for HSNO 5.1.1 substances as set out in the document entitled Site and Storage Conditions for Class 5.1.1 Oxidising Substances and Class 5.2 Organic Peroxides published by the Authority, July 2006.

Inventory list

Korea inventory: All components are listed or exempted.

EC INVENTORY (EINECS/ELINCS): All components are listed or exempted.

Section 16. Other information

Key to abbreviations : ADN/ADNR = European Provisions concerning the International Carriage of Dangerous Goods by Inland Waterway
ADR = The European Agreement concerning the International Carriage of Dangerous Goods by Road
ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
bw = Body weight

GHS = Globally Harmonized System of Classification and Labelling of Chemicals
 IATA = International Air Transport Association
 IBC = Intermediate Bulk Container
 IMDG = International Maritime Dangerous Goods
 LogPow = logarithm of the octanol/water partition coefficient
 MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
 NOHSC = National Occupational Health and Safety Commission
 RID = The Regulations concerning the International Carriage of Dangerous Goods by Rail
 SUSDP = Standard for the Uniform Scheduling of Drugs and Poisons
 UN = United Nations

Procedure used to derive the classification

Classification	Justification
5.1.1 - OXIDIZING SUBSTANCES - Category C	Expert judgment.
6.1 - ACUTE TOXICITY (oral) - Category E	Calculation method
6.4 - EYE IRRITATION - Category A (Irritant)	Calculation method
9.1 - AQUATIC ECOTOXICITY - Category D	Calculation method

References :

- EU REACH IUCLID5 CSR.
- National Institute for Occupational Safety and Health, U.S. Dept. of Health, Education, and Welfare, Reports and Memoranda Registry of Toxic Effects of Chemical Substances.
- Sphera Solutions Inc., 4777 Levy Street, St Laurent, Quebec HAR 2P9, Canada.

History

Date of printing : 11.05.2017
Date of issue/Date of revision : 11.05.2017
Date of previous issue : 00.00.0000
Version : 1.0
Prepared by : Yara Chemical Compliance (YCC).

|| Indicates information that has changed from previously issued version.

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein. Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

Safety Data Sheet



Ammonium Nitrate Emulsion

RedBull Powder Company Ltd

Chemwatch: 61-6527

Version No: 2.1.1.1

Safety Data Sheet according to HSNO Regulations

Chemwatch Hazard Alert Code: 2

Issue Date: 17/12/2015

Print Date: 21/12/2015

Initial Date: **Not Available**

S.GHS.NZL.EN

SECTION 1 IDENTIFICATION OF THE SUBSTANCE / MIXTURE AND OF THE COMPANY / UNDERTAKING

Product Identifier

Product name	Ammonium Nitrate Emulsion
Synonyms	Emulsion Matrix / ANE
Proper shipping name	AMMONIUM NITRATE EMULSION or SUSPENSION or GEL, intermediate for blasting explosives
Other means of identification	Not Available

Relevant identified uses of the substance or mixture and uses advised against

Relevant identified uses	Precursor material for Commercial Blasting Operations in Mines, Quarries or Construction.
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Details of the supplier of the safety data sheet

Registered company name	RedBull Powder Company Ltd
Address	6 Walls Rd, Penrose, Auckland, 1061 New Zealand
Telephone	+64 9 525 1181
Fax	+64 9 525 1182
Website	www.redbullpowder.co.nz
Email	info@redbullpowder.co.nz

Emergency telephone number

Association / Organisation	RedBull Powder Company
Emergency telephone numbers	+64 9 525 1181 (Mon-Fri 8am to 5pm)
Other emergency telephone numbers	Dial 111 for 24 Hour Emergency Information

SECTION 2 HAZARDS IDENTIFICATION

Continued...

Classification of the substance or mixture

Considered a Hazardous Substance according to the criteria of the New Zealand Hazardous Substances New Organisms legislation. Classified as Dangerous Goods for transport purposes.

GHS Classification [1]	Oxidizing Solid Category 3, Acute Toxicity (Oral) Category 5, Eye Irritation Category 2A, Acute Aquatic Hazard Category 2, Chronic Aquatic Hazard Category 4
Legend:	1. Classified by Chemwatch; 2. Classification drawn from CCID EPA NZ ; 3. Classification drawn from EC Directive 1272/2008 - Annex VI
Determined by Chemwatch using GHS/HSNO criteria	5.1.1C, 6.1E(oral), 6.4A, 9.1D

Label elements

GHS label elements	
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SIGNAL WORD	WARNING
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Hazard statement(s)

H272	May intensify fire; oxidizer
H303	May be harmful if swallowed
H319	Causes serious eye irritation

Precautionary statement(s) Prevention

P101	If medical advice is needed, have product container or label at hand.
P102	Keep out of reach of children.
P103	Read label before use.
P210	Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P221	Take any precaution to avoid mixing with combustibles/organic material.
P220	Keep/Store away from clothing/organic material/combustible materials.
P280	Wear protective gloves/protective clothing/eye protection/face protection.

Precautionary statement(s) Response

P312	Call a POISON CENTER or doctor/physician if you feel unwell.
P370+P378	In case of fire: Use water jets for extinction.
P305+P351+P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P337+P313	If eye irritation persists: Get medical advice/attention.

Precautionary statement(s) Storage

Not Applicable

Precautionary statement(s) Disposal

P501	Dispose of contents/container in accordance with local regulations.
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SECTION 3 COMPOSITION / INFORMATION ON INGREDIENTS

Substances

See section below for composition of Mixtures

Mixtures

Ammonium Nitrate Emulsion

CAS No	%[weight]	Name
6484-52-2	>65	<u>ammonium nitrate</u>
68334-30-5	0-10	<u>diesel</u>
7732-18-5	10-25	<u>water</u>

SECTION 4 FIRST AID MEASURES

NZ Poisons Centre 0800 POISON (0800 764 766) | NZ Emergency Services: 111

Description of first aid measures

Eye Contact	<p>If this product comes in contact with the eyes:</p> <ul style="list-style-type: none"> ▸ Wash out immediately with fresh running water. ▸ Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids. ▸ Seek medical attention without delay; if pain persists or recurs seek medical attention. ▸ Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.
Skin Contact	<p>If skin contact occurs:</p> <ul style="list-style-type: none"> ▸ Immediately remove all contaminated clothing, including footwear. ▸ Flush skin and hair with running water (and soap if available). ▸ Seek medical attention in event of irritation.
Inhalation	<ul style="list-style-type: none"> ▸ If fumes, aerosols or combustion products are inhaled remove from contaminated area. ▸ Other measures are usually unnecessary.
Ingestion	<ul style="list-style-type: none"> ▸ If swallowed do NOT induce vomiting. ▸ If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration. ▸ Observe the patient carefully. ▸ Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious. ▸ Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink. ▸ Seek medical advice.

Indication of any immediate medical attention and special treatment needed

Treat symptomatically.

The toxicity of nitrates and nitrites result from their vasodilating properties and their propensity to form methaemoglobin.

- Most produce a peak effect within 30 minutes.
- Clinical signs of cyanosis appear before other symptoms because of the dark pigmentation of methaemoglobin.
- Initial attention should be directed towards improving oxygen delivery, with assisted ventilation, if necessary. Hyperbaric oxygen has not demonstrated conclusive benefits.
- Institute cardiac monitoring, especially in patients with coronary artery or pulmonary disease.
- Hypotension should respond to Trendelenburg's position and intravenous fluids; otherwise dopamine may be needed.
- Naloxone, glucose and thiamine should be given if a multiple ingestion is suspected.
- Decontaminate using Ipecac Syrup for alert patients or lavage for obtunded patients who present within 2-4 hours of ingestion.
- Symptomatic patients with methaemoglobin levels over 30% should receive methylene blue. (Cyanosis alone, is not an indication for treatment). The usual dose is 1-2 mg/kg of a 1% solution (10 mg/ml) IV over 5 minutes; repeat, using the same dose if symptoms of hypoxia fail to subside within 1 hour.

[Ellenhorn and Barceloux: Medical Toxicology]

BIOLOGICAL EXPOSURE INDEX - BEI

These represent the determinants observed in specimens collected from a healthy worker who has been exposed at the Exposure Standard (ES or TLV):

Determinant	Index	Sampling Time	Comments
1. Methaemoglobin in blood	1.5% of haemoglobin	During or end of shift	B,NS,SQ

B: Background levels occur in specimens collected from subjects **NOT** exposed

NS: Non-specific determinant; also observed after exposure to other materials

SQ: Semi-quantitative determinant - Interpretation may be ambiguous; should be used as a screening test or confirmatory test.

SECTION 5 FIREFIGHTING MEASURES

Continued...

Extinguishing media**FOR SMALL FIRE:**

- USE FLOODING QUANTITIES OF WATER.
- **DO NOT use dry chemical, CO₂, foam or halogenated-type extinguishers.**

FOR LARGE FIRE

- Flood fire area with water from a protected position

Special hazards arising from the substrate or mixture

Fire Incompatibility	<ul style="list-style-type: none"> ▸ Avoid storage with reducing agents. ▸ Avoid any contamination of this material as it is very reactive and any contamination is potentially hazardous
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Advice for firefighters

Fire Fighting	<ul style="list-style-type: none"> ▸ Alert Fire Brigade and tell them location and nature of hazard. ▸ May be violently or explosively reactive. ▸ Wear breathing apparatus plus protective gloves. ▸ Prevent, by any means available, spillage from entering drains or water course. ▸ Fight fire from a safe distance, with adequate cover.
Fire/Explosion Hazard	<ul style="list-style-type: none"> ▸ Will not burn but increases intensity of fire. ▸ Heating may cause expansion or decomposition leading to violent rupture of containers. ▸ Heat affected containers remain hazardous. ▸ Contact with combustibles such as wood, paper, oil or finely divided metal may produce spontaneous combustion or violent decomposition. ▸ May emit irritating, poisonous or corrosive fumes. <p>Decomposition may produce toxic fumes of; nitrogen oxides (NO_x)</p>

SECTION 6 ACCIDENTAL RELEASE MEASURES**Personal precautions, protective equipment and emergency procedures**

Minor Spills	<ul style="list-style-type: none"> ▸ Clean up all spills immediately. ▸ No smoking, naked lights, ignition sources. ▸ Avoid all contact with any organic matter including fuel, solvents, sawdust, paper or cloth and other incompatible materials, as ignition may result. ▸ Avoid breathing dust or vapours and all contact with skin and eyes. ▸ Control personal contact with the substance, by using protective equipment.
Major Spills	<ul style="list-style-type: none"> ▸ Clear area of personnel and move upwind. ▸ Alert Fire Brigade and tell them location and nature of hazard. ▸ May be violently or explosively reactive. ▸ Wear full body protective clothing with breathing apparatus. ▸ Prevent, by any means available, spillage from entering drains or water course.

Personal Protective Equipment advice is contained in Section 8 of the SDS.

SECTION 7 HANDLING AND STORAGE**Precautions for safe handling**

Safe handling	<ul style="list-style-type: none"> ▸ Avoid personal contact and inhalation of dust, mist or vapours. ▸ Provide adequate ventilation. ▸ Always wear protective equipment and wash off any spillage from clothing. ▸ Keep material away from light, heat, flammables or combustibles. ▸ Keep cool, dry and away from incompatible materials. ▸ Electrostatic discharge may be generated during pumping - this may result in fire. ▸ Ensure electrical continuity by bonding and grounding (earthing) all equipment. ▸ Restrict line velocity during pumping in order to avoid generation of electrostatic discharge (<=1 m/sec until fill pipe submerged to twice its diameter, then <= 7 m/sec). ▸ Avoid splash filling. ▸ Do NOT use compressed air for filling discharging or handling operations.
Other information	<ul style="list-style-type: none"> ▸ Store in original containers. ▸ Keep containers securely sealed as supplied. ▸ Store in a cool, well ventilated area.

Ammonium Nitrate Emulsion

- Keep dry.
 - Store under cover and away from sunlight.
- In addition, Goods of Class 5.1, packing group II should be:
- stored in piles so that
 - the height of the pile does not exceed 1 metre
 - the maximum quantity in a pile or building does not exceed 1000 tonnes unless the area is provided with automatic fire extinguishers
 - the maximum height of a pile does not exceed 3 metres where the room is provided with automatic fire extinguishers or 2 meters if not.
 - the minimum distance between piles is not less than 2 metres where the room is provided with automatic fire extinguishers or 3 meters if not.
 - the minimum distance to walls is not less than 1 metre.

Conditions for safe storage, including any incompatibilities

Suitable container	<ul style="list-style-type: none"> ▸ DO NOT repack. Use containers supplied by manufacturer only. Bulk storage in tanks or MMUs.
Storage incompatibility	Ammonium nitrate: <ul style="list-style-type: none"> ▸ is a strong oxidiser ▸ reacts violently and/ or forms explosive mixtures with hot water, reducing agents, combustible materials, flammable liquids, organic materials, ammonium dichromate, barium chloride, barium nitrate, charcoal, cyanoguanidine, oils, phosphorus, potassium chromate, potassium dichromate, potassium nitrate, potassium permanganate, sodium chloride, finely divided metals ▸ forms explosive and/ or heat- and shock- sensitive compounds with acetic acid, alkali metals (potassium, sodium etc.), ammonia, nitric acid, sodium hypochlorite, sulfur, urea ▸ may explode violently when heated and contained or confined <p>NOTE:- Explosive detonations can occur when material is mixed with organic material, oils or charcoals and when heated or subjected to shock.</p> <ul style="list-style-type: none"> ▸ Avoid any contamination of this material as it is very reactive and any contamination is potentially hazardous ▸ Avoid storage with reducing agents.

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

Control parameters

OCCUPATIONAL EXPOSURE LIMITS (OEL)

INGREDIENT DATA

Not Available

EMERGENCY LIMITS

Ingredient	Material name	TEEL-1	TEEL-2	TEEL-3
ammonium nitrate	Ammonium nitrate	6.7 mg/m ³	73 mg/m ³	440 mg/m ³
diesel	Diesel fuels	100 mg/m ³	100 mg/m ³	1500 mg/m ³
diesel	Diesel fuel marine; (Fuel oil No.2)	100 mg/m ³	100 mg/m ³	2400 mg/m ³

Ingredient	Original IDLH	Revised IDLH
ammonium nitrate	Not Available	Not Available
diesel	Not Available	Not Available
water	Not Available	Not Available

Exposure controls

Appropriate engineering controls	<p>Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection.</p> <p>The basic types of engineering controls are:</p> <p>Process controls which involve changing the way a job activity or process is done to reduce the risk.</p> <p>Enclosure and/or isolation of emission source which keeps a selected hazard "physically" away from the worker and ventilation that strategically "adds" and "removes" air in the work environment. Ventilation can remove or dilute an air contaminant if designed properly.</p>
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Continued...

Ammonium Nitrate Emulsion

Personal protection	
Eye and face protection	<ul style="list-style-type: none"> ▶ Chemical goggles. ▶ Full face shield may be required for supplementary but never for primary protection of eyes. ▶ Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lenses or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience.
Skin protection	See Hand protection below
Hands/feet protection	<ul style="list-style-type: none"> ▶ Wear chemical protective gloves, e.g. PVC. ▶ Wear safety footwear or safety gumboots, e.g. Rubber ▶ DO NOT wear cotton or cotton-backed gloves. ▶ DO NOT wear leather gloves. ▶ Promptly hose all spills off leather shoes or boots or ensure that such footwear is protected with PVC over-shoes.
Body protection	See Other protection below
Other protection	<ul style="list-style-type: none"> ▶ Overalls. ▶ PVC Apron. ▶ PVC protective suit may be required if exposure severe. ▶ Eyewash unit. ▶ Ensure there is ready access to a safety shower. Some plastic personal protective equipment (PPE) (e.g. gloves, aprons, overshoes) are not recommended as they may produce static electricity. For large scale or continuous use wear tight-weave non-static clothing (no metallic fasteners, cuffs or pockets). Non sparking safety or conductive footwear should be considered. Conductive footwear describes a boot or shoe with a sole made from a conductive compound chemically bound to the bottom components, for permanent control to electrically ground the foot and shall dissipate static electricity from the body to reduce the possibility of ignition of volatile compounds. Electrical resistance must range between 0 to 500,000 ohms.
Thermal hazards	Not Available

Respiratory protection

Type A-P Filter of sufficient capacity. (AS/NZS 1716 & 1715, EN 143:2000 & 149:2001, ANSI Z88 or national equivalent)

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES**Information on basic physical and chemical properties**

Appearance	Yellow / golden gel with a mild odour; does not mix with water.		
Physical state	Gel	Relative density (Water = 1)	1.35-1.45
Odour	Not Available	Partition coefficient n-octanol / water	Not Available
Odour threshold	Not Available	Auto-ignition temperature (°C)	Not Available
pH (as supplied)	Not Available	Decomposition temperature	210
Melting point / freezing point (°C)	Not Available	Viscosity (cSt)	Not Available
Initial boiling point and boiling range (°C)	Not Available	Molecular weight (g/mol)	Not Applicable
Flash point (°C)	Not Available	Taste	Not Available
Evaporation rate	Not Available	Explosive properties	Not Available

Continued...

Ammonium Nitrate Emulsion

Flammability	Not Available	Oxidising properties	Not Available
Upper Explosive Limit (%)	Not Available	Surface Tension (dyn/cm or mN/m)	Not Available
Lower Explosive Limit (%)	Not Available	Volatile Component (%vol)	Not Available
Vapour pressure (kPa)	Not Available	Gas group	Not Available
Solubility in water (g/L)	Immiscible	pH as a solution (1%)	Not Available
Vapour density (Air = 1)	Not Available	VOC g/L	Not Available

SECTION 10 STABILITY AND REACTIVITY

Reactivity	See section 7
Chemical stability	<ul style="list-style-type: none"> ▸ Unstable in the presence of incompatible materials. ▸ Product is considered stable under normal handling conditions. ▸ Prolonged exposure to heat. ▸ Hazardous polymerisation will not occur.
Possibility of hazardous reactions	See section 7
Conditions to avoid	See section 7
Incompatible materials	See section 7
Hazardous decomposition products	See section 5

SECTION 11 TOXICOLOGICAL INFORMATION

Information on toxicological effects

Inhaled	<p>The material is not thought to produce either adverse health effects or irritation of the respiratory tract following inhalation (as classified by EC Directives using animal models). Nevertheless, adverse systemic effects have been produced following exposure of animals by at least one other route and good hygiene practice requires that exposure be kept to a minimum and that suitable control measures be used in an occupational setting.</p> <p>Not normally a hazard due to non-volatile nature of product</p>
Ingestion	<p>The principal concern with exposure to inorganic nitrate is its biological reduction to reactive and toxic nitrite. Nitrate itself is relatively harmless. Where bacteria are present and the environment is anaerobic, nitrate can be reduced to nitrite. The main site for this reaction is mouth and stomach, but nitrite formation in the lower intestine and in the bladder (urinary infection) may also be of some toxicological importance.</p> <p>Adults have tolerated large doses of nitrate as sodium and ammonium salt (> 100 mg NO₃-/kg) in some cases repeated for several days for medical or experimental purposes with only minor effects in some subjects (light methaemoglobinaemia, diarrhoea, vomiting).</p> <p>The substance and/or its metabolites may bind to haemoglobin inhibiting normal uptake of oxygen. This condition, known as "methaemoglobinemia", is a form of oxygen starvation (anoxia).</p> <p>Symptoms include cyanosis (a bluish discolouration skin and mucous membranes) and breathing difficulties. Symptoms may not be evident until several hours after exposure.</p> <p>At about 15% concentration of blood methaemoglobin there is observable cyanosis of the lips, nose and earlobes.</p> <p>Swallowing large doses of ammonium nitrate may cause dilation of blood vessels by direct smooth muscle relaxation and methaemoglobinaemia. Symptoms include dizziness, abdominal pain, vomiting, bloody diarrhoea, weakness, convulsions and collapse. Other effects of exposure include headache, warm flushed skin, nausea, vomiting, diuresis and fatigue. Both tachycardia and bradycardia, atrial fibrillation, cardiac ischaemia, frequent ventricular premature beats and bigeminy have been reported. Severe poisonings have produced hypotension, decreased peripheral vascular resistance, cardiovascular collapse, convulsions and coma</p>

Ammonium Nitrate Emulsion

Skin Contact	<p>Skin contact with the material may damage the health of the individual; systemic effects may result following absorption.</p> <p>Open cuts, abraded or irritated skin should not be exposed to this material</p> <p>Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.</p>
Eye	This material can cause eye irritation and damage in some persons.
Chronic	<p>There has been concern that this material can cause cancer or mutations, but there is not enough data to make an assessment.</p> <p>Chronic exposure to ammonium nitrate may produce low blood pressure and fatigue. Swallowing 6-12 grams per day in the long term has produced inflammation of the stomach, acidity of the blood, excessive urine output and nitrite toxicity, manifested by methaemoglobin the blood or dilation of blood vessels.</p>

Ammonium Nitrate Emulsion	TOXICITY	IRRITATION
	Not Available	Not Available
ammonium nitrate	TOXICITY	IRRITATION
	dermal (rat) LD50: >5000 mg/kg ^[1]	Nil reported
	Oral (rat) LD50: 2217 mg/kgd ^[2]	
diesel	TOXICITY	IRRITATION
	Dermal (rabbit) LD50: >4200 mg/kg ^[1]	Skin (rabbit): 500 uL/24h SEVERE
	Oral (rat) LD50: 7560 mg/kg ^[1]	
water	TOXICITY	IRRITATION
	Oral (rat) LD50: >90000 mg/kg ^[2]	Not Available
Legend:	1. Value obtained from Europe ECHA Registered Substances - Acute toxicity 2. * Value obtained from manufacturer's SDS. Unless otherwise specified data extracted from RTECS - Register of Toxic Effect of chemical Substances	

DIESEL	<p>The material may cause severe skin irritation after prolonged or repeated exposure and may produce on contact skin redness, swelling, the production of vesicles, scaling and thickening of the skin. Repeated exposures may produce severe ulceration.</p> <p>Kerosene may produce varying ranges of skin irritation, and a reversible eye irritation (if eyes are washed). Skin may be cracked or flaky and/or leathery, with crusts and/or hair loss. It may worsen skin cancers. There may also be loss of weight, discharge from the nose, excessive tiredness, and wheezing. The individual may be pale.</p> <p>The substance is classified by IARC as Group 3: NOT classifiable as to its carcinogenicity to humans. Evidence of carcinogenicity may be inadequate or limited in animal testing.</p>
WATER	No significant acute toxicological data identified in literature search.

Acute Toxicity	✓	Carcinogenicity	⊖
Skin Irritation/Corrosion	⊖	Reproductivity	⊖
Serious Eye Damage/Irritation	✓	STOT - Single Exposure	⊖
Respiratory or Skin sensitisation	⊖	STOT - Repeated Exposure	⊖
Mutagenicity	⊖	Aspiration Hazard	⊖

Legend: ✗ – Data available but does not fill the criteria for classification
✓ – Data required to make classification available
⊖ – Data Not Available to make classification

SECTION 12 ECOLOGICAL INFORMATION

Continued...

Ammonium Nitrate Emulsion

Toxicity

Ingredient	Endpoint	Test Duration (hr)	Species	Value	Source
ammonium nitrate	NOEC	20	Fish	0.003mg/L	4
ammonium nitrate	EC50	48	Crustacea	490mg/L	2
ammonium nitrate	EC50	96	Crustacea	39mg/L	2
diesel	NOEC	3072	Fish	=1mg/L	1
water	EC50	384	Crustacea	199.179mg/L	3
water	EC50	96	Algae or other aquatic plants	8768.874mg/L	3
water	LC50	96	Fish	897.520mg/L	3

Legend:

Extracted from 1. IUCLID Toxicity Data 2. Europe ECHA Registered Substances - Ecotoxicological Information - Aquatic Toxicity 3. EPIWIN Suite V3.12 - Aquatic Toxicity Data (Estimated) 4. US EPA, Ecotox database - Aquatic Toxicity Data 5. ECETOC Aquatic Hazard Assessment Data 6. NITE (Japan) - Bioconcentration Data 7. METI (Japan) - Bioconcentration Data 8. Vendor Data

Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Do NOT allow product to come in contact with surface waters or to intertidal areas below the mean high water mark. Do not contaminate water when cleaning equipment or disposing of equipment wash-waters.

Wastes resulting from use of the product must be disposed of on site or at approved waste sites.

For ammonium nitrate

Fertility of Daphnia magna decreased at 50 g/l.

Post embryonic growth of crustacea was impaired at >10mg/l.

(Aspergillus niger) 40 hr. LC50: 15mg/l (36 C)

[CROPCARE]

Ammonium nitrate is soluble in water and acts as a source of nutrition for many microorganisms. Spills may produce massive eutrophication in static waters effecting the local aquatic community.

Persistence and degradability

Ingredient	Persistence: Water/Soil	Persistence: Air
water	LOW	LOW

Bioaccumulative potential

Ingredient	Bioaccumulation
diesel	LOW (BCF = 159)
water	LOW (LogKOW = -1.38)

Mobility in soil

Ingredient	Mobility
water	LOW (KOC = 14.3)

SECTION 13 DISPOSAL CONSIDERATIONS

Waste treatment methods

Product / Packaging disposal	<p>For ammonium nitrate:</p> <p>Add slowly to large amount of water, mix in slight excess of soda ash and neutralise with 6M hydrochloric acid before washing to sewer with large excess of water. Bury residue in an authorised landfill.</p> <ul style="list-style-type: none"> ▶ DO NOT allow wash water from cleaning or process equipment to enter drains. ▶ It may be necessary to collect all wash water for treatment before disposal. ▶ In all cases disposal to sewer may be subject to local laws and regulations and these should be considered first. ▶ Where in doubt contact the responsible authority. ▶ Recycle wherever possible. Special hazard may exist - specialist advice may be required. ▶ Consult manufacturer for recycling options. ▶ Consult State Land Waste Management Authority for disposal. ▶ Bury or incinerate residue at an approved site.
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Continued...

Ensure that the disposal of material is carried out in accordance with Hazardous Substances (Disposal) Regulations 2001.

SECTION 14 TRANSPORT INFORMATION

Labels Required

	
Marine Pollutant	NO
HAZCHEM	1Y

Land transport (UN)

UN number	3375
Packing group	II
UN proper shipping name	AMMONIUM NITRATE EMULSION or SUSPENSION or GEL, intermediate for blasting explosives
Environmental hazard	No relevant data
Transport hazard class(es)	Class : 5.1 Subrisk : Not Applicable
Special precautions for user	Special provisions : 309 Limited quantity : 0

Air transport (ICAO-IATA / DGR): NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS

Sea transport (IMDG-Code / GGVSee)

UN number	3375
Packing group	II
UN proper shipping name	AMMONIUM NITRATE EMULSION or SUSPENSION or GEL intermediate for blasting explosives
Environmental hazard	Not Applicable
Transport hazard class(es)	IMDG Class : 5.1 IMDG Subrisk : Not Applicable
Special precautions for user	EMS Number : F-H, S-Q Special provisions : 309 Limited Quantities : 0

Transport in bulk according to Annex II of MARPOL and the IBC code

Source	Ingredient	Pollution Category
IMO MARPOL 73/78 (Annex II) - List of Noxious Liquid Substances Carried in Bulk	ammonium nitrate	Z

SECTION 15 REGULATORY INFORMATION

Safety, health and environmental regulations / legislation specific for the substance or mixture

This substance is to be managed using the conditions specified in an applicable Group Standard

HSR Number	Group Standard
HSR002631	Oxidising [5.1.1] Substances Group Standard 2006

AMMONIUM NITRATE(6484-52-2) IS FOUND ON THE FOLLOWING REGULATORY LISTS

New Zealand Hazardous Substances and New Organisms (HSNO) Act - Classification of Chemicals	New Zealand Inventory of Chemicals (NZIoC)
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DIESEL(68334-30-5) IS FOUND ON THE FOLLOWING REGULATORY LISTS

New Zealand Inventory of Chemicals (NZIoC)

WATER(7732-18-5) IS FOUND ON THE FOLLOWING REGULATORY LISTS

New Zealand Inventory of Chemicals (NZIoC)

Location Test Certificate

Subject to Regulation 55 of the Hazardous Substances (Classes 1 to 5 Controls) Regulations, a location test certificate is required when quantity greater than or equal to those indicated below are present.

Hazard Class	Quantity beyond which controls apply for closed containers	Quantity beyond which controls apply when use occurring in open containers
Not Applicable	Not Applicable	Not Applicable

Approved Handler

Subject to Regulation 56 of the Hazardous Substances (Classes 1 to 5 Controls) Regulations and Regulation 9 of the Hazardous Substances (Classes 6, 8, and 9 Controls) Regulations, the substance must be under the personal control of an Approved Handler when present in a quantity greater than or equal to those indicated below.

Class of substance	Quantities
5.1.1C	1 000 kg or L

Refer Group Standards for further information

National Inventory	Status
Australia - AICS	Y
Canada - DSL	Y
Canada - NDSL	N (water; ammonium nitrate; diesel)
China - IECSC	Y
Europe - EINEC / ELINCS / NLP	Y
Japan - ENCS	N (water; diesel)
Korea - KECI	Y
New Zealand - NZIoC	Y
Philippines - PICCS	Y
USA - TSCA	Y
Legend:	Y = All ingredients are on the inventory N = Not determined or one or more ingredients are not on the inventory and are not exempt from listing(see specific ingredients in brackets)

SECTION 16 OTHER INFORMATION

Other information

Ingredients with multiple cas numbers

Name	CAS No
diesel	64742-81-0, 68334-30-5, 68476-30-2, 68512-90-3

Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent

Continued...

review by the Chemwatch Classification committee using available literature references.

A list of reference resources used to assist the committee may be found at:

www.chemwatch.net

The (M)SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

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TEL (+61 3) 9572 4700.

Safety Data Sheet



RedStar Bulk Emulsion

RedBull Powder Company Ltd

Chemwatch: 61-6531

Version No: 2.1.1.1

Safety Data Sheet according to HSNO Regulations

Chemwatch Hazard Alert Code: 2

Issue Date: 17/12/2015

Print Date: 21/12/2015

Initial Date: **Not Available**

S.GHS.NZL.EN

SECTION 1 IDENTIFICATION OF THE SUBSTANCE / MIXTURE AND OF THE COMPANY / UNDERTAKING

Product Identifier

Product name	RedStar Bulk Emulsion
Synonyms	Bulk
Proper shipping name	EXPLOSIVE, BLASTING, TYPE E†
Other means of identification	Not Available

Relevant identified uses of the substance or mixture and uses advised against

Relevant identified uses	Blasting Agent used for Commercial Blasting Operations in Mines, Quarries or Construction. Bulk product delivered into blast hole from delivery vehicle / MMU.
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Details of the supplier of the safety data sheet

Registered company name	RedBull Powder Company Ltd
Address	6 Walls Rd, Penrose, Auckland, 1061 New Zealand
Telephone	+64 9 525 1181
Fax	+64 9 525 1182
Website	w w w .redbullpowder.co.nz
Email	info@redbullpowder.co.nz

Emergency telephone number

Association / Organisation	RedBull Powder Company
Emergency telephone numbers	+64 9 525 1181 (Mon-Fri 8am to 5pm)
Other emergency telephone numbers	Dial 111 for 24 Hour Emergency Information

SECTION 2 HAZARDS IDENTIFICATION

Continued...

RedStar Bulk Emulsion

Classification of the substance or mixture

Considered a Hazardous Substance according to the criteria of the New Zealand Hazardous Substances New Organisms legislation. Classified as Dangerous Goods for transport purposes.

GHS Classification [1]	Explosive Division 1.1, Acute Toxicity (Oral) Category 5, Eye Irritation Category 2A, Acute Aquatic Hazard Category 2, Chronic Aquatic Hazard Category 4
Legend:	1. Classified by Chemwatch; 2. Classification drawn from CCID EPA NZ ; 3. Classification drawn from EC Directive 1272/2008 - Annex VI
Determined by Chemwatch using GHS/HSNO criteria	1.1D, 6.1E(oral), 6.4A, 9.1D

Label elements

GHS label elements	 
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SIGNAL WORD	DANGER
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Hazard statement(s)

H201	Explosive; mass explosion hazard
H303	May be harmful if swallowed
H319	Causes serious eye irritation

Precautionary statement(s) Prevention

P101	If medical advice is needed, have product container or label at hand.
P102	Keep out of reach of children.
P103	Read label before use.
P210	Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P230	Keep wetted with phlegmatizer.
P250	Do not subject to grinding/shock/sources of friction.
P280	Wear protective gloves/protective clothing/eye protection/face protection.
P240	Ground/bond container and receiving equipment.

Precautionary statement(s) Response

P312	Call a POISON CENTER or doctor/physician if you feel unwell.
P370+P380	In case of fire: Evacuate area.
P372	Explosion risk in case of fire.
P305+P351+P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P373	DO NOT fight fire when fire reaches explosives.
P337+P313	If eye irritation persists: Get medical advice/attention.

Precautionary statement(s) Storage

P401	Store according to local regulations for explosives.
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Precautionary statement(s) Disposal

P501	Dispose of contents/container in accordance with local regulations.
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SECTION 3 COMPOSITION / INFORMATION ON INGREDIENTS

Substances

See section below for composition of Mixtures

Mixtures

CAS No	%[weight]	Name
6484-52-2	>70	<u>ammonium nitrate</u>
68334-30-5	<10	<u>diesel</u>
7732-18-5	10-15	<u>water</u>

SECTION 4 FIRST AID MEASURES

NZ Poisons Centre 0800 POISON (0800 764 766) | NZ Emergency Services: 111

Description of first aid measures

Eye Contact	<p>If this product comes in contact with the eyes:</p> <ul style="list-style-type: none"> ▸ Wash out immediately with fresh running water. ▸ Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids. ▸ Seek medical attention without delay; if pain persists or recurs seek medical attention. ▸ Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.
Skin Contact	<p>If skin contact occurs:</p> <ul style="list-style-type: none"> ▸ Immediately remove all contaminated clothing, including footwear. ▸ Flush skin and hair with running water (and soap if available). ▸ Seek medical attention in event of irritation.
Inhalation	<ul style="list-style-type: none"> ▸ If fumes, aerosols or combustion products are inhaled remove from contaminated area. ▸ Other measures are usually unnecessary.
Ingestion	<ul style="list-style-type: none"> ▸ If swallowed do NOT induce vomiting. ▸ If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration. ▸ Observe the patient carefully. ▸ Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious. ▸ Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink. ▸ Seek medical advice.

Indication of any immediate medical attention and special treatment needed

The toxicity of nitrates and nitrites result from their vasodilating properties and their propensity to form methaemoglobin.

- Most produce a peak effect within 30 minutes.
- Clinical signs of cyanosis appear before other symptoms because of the dark pigmentation of methaemoglobin.
- Initial attention should be directed towards improving oxygen delivery, with assisted ventilation, if necessary. Hyperbaric oxygen has not demonstrated conclusive benefits.
- Institute cardiac monitoring, especially in patients with coronary artery or pulmonary disease.
- Hypotension should respond to Trendelenburg's position and intravenous fluids; otherwise dopamine may be needed.
- Naloxone, glucose and thiamine should be given if a multiple ingestion is suspected.
- Decontaminate using Ipecac Syrup for alert patients or lavage for obtunded patients who present within 2-4 hours of ingestion.
- Symptomatic patients with methaemoglobin levels over 30% should receive methylene blue. (Cyanosis alone, is not an indication for treatment). The usual dose is 1-2 mg/kg of a 1% solution (10 mg/ml) IV over 5 minutes; repeat, using the same dose if symptoms of hypoxia fail to subside within 1 hour.

[Ellenhorn and Barceloux: Medical Toxicology]

BIOLOGICAL EXPOSURE INDEX - BEI

These represent the determinants observed in specimens collected from a healthy worker who has been exposed at the Exposure Standard (ES or TLV):

Determinant	Index	Sampling Time	Comments
1. Methaemoglobin in blood	1.5% of haemoglobin	During or end of shift	B,NS,SQ

B: Background levels occur in specimens collected from subjects **NOT** exposed

NS: Non-specific determinant; also observed after exposure to other materials

Continued...

SQ: Semi-quantitative determinant - Interpretation may be ambiguous; should be used as a screening test or confirmatory test.

Symptoms of vasodilation and reflex tachycardia may present following organic nitrate overdose; most organic nitrates are extensively metabolised by hydrolysis to inorganic nitrites. Organic nitrates and nitrites are readily absorbed through the skin, lungs, mucosa and gastro-intestinal tract.

SECTION 5 FIREFIGHTING MEASURES

Extinguishing media

- ▶ **WARNING:** Deliver water spray or fog from a safe distance only.

Special hazards arising from the substrate or mixture

Fire Incompatibility	None known.
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Advice for firefighters

Fire Fighting	<p>WARNING: EXPLOSIVE MATERIALS / ARTICLES PRESENT!</p> <ul style="list-style-type: none"> ▶ Evacuate all personnel and move upwind. ▶ Prevent re-entry. ▶ Alert Fire Brigade and tell them location and nature of hazard. ▶ May detonate and burning material may be propelled from fire. ▶ Wear full-body protective clothing with breathing apparatus. <p>For Division 1.1 Explosives Evacuation is required in case of Emergency. For quantities of up to:</p> <ul style="list-style-type: none"> ▶ 1000 kg, the evacuation distance is 400 metres ▶ 5000 kg, the evacuation distance is 600 metres ▶ 20000 kg, the evacuation distance is 800 metres ▶ 40000 kg, the evacuation distance is 1000 meters
Fire/Explosion Hazard	<ul style="list-style-type: none"> ▶ Will not burn but increases intensity of fire. ▶ Heating may cause expansion or decomposition leading to violent rupture of containers. ▶ Heat affected containers remain hazardous. ▶ Contact with combustibles such as wood, paper, oil or finely divided metal may produce spontaneous combustion or violent decomposition. ▶ May emit irritating, poisonous or corrosive fumes. <p>Division 1.1 Substances, mixtures and articles which have a mass explosion hazard (a mass explosion is one which affects almost the entire quantity present virtually instantaneously). Explosives are defined as substances which are capable by chemical reaction of producing gas at such a temperature and pressure and at such speed as to cause damage to the surroundings. Pyrotechnic substances are included even when they do not evolve gases. Compatibility Group D explosives are secondary detonating explosive substances or black powder or articles containing a secondary detonating explosive substance, in each case without means of initiation and without a propelling charge, or articles containing a primary explosive substance and containing two or more effective protective features Decomposition may produce toxic fumes of; nitrogen oxides (NOx)</p>

SECTION 6 ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Minor Spills	<p>WARNING!: EXPLOSIVE. BLAST and/or PROJECTION and/or FIRE HAZARD</p> <ul style="list-style-type: none"> ▶ Clean up all spills immediately. ▶ Avoid inhalation of the material and avoid contact with eyes and skin. ▶ Wear impervious gloves and safety glasses. ▶ Remove all ignition sources.
Major Spills	<p>WARNING!: EXPLOSIVE.</p> <ul style="list-style-type: none"> ▶ Clear area of personnel and move upwind. ▶ Alert Fire Brigade and tell them location and nature of hazard. ▶ May be violently or explosively reactive. ▶ Wear full body protective clothing with breathing apparatus.

Personal Protective Equipment advice is contained in Section 8 of the SDS.

SECTION 7 HANDLING AND STORAGE

Precautions for safe handling

Safe handling	<ul style="list-style-type: none"> ▸ Avoid personal contact and inhalation of dust, mist or vapours. ▸ Provide adequate ventilation. ▸ Always wear protective equipment and wash off any spillage from clothing. ▸ Keep material away from light, heat, flammables or combustibles. ▸ Keep cool, dry and away from incompatible materials. ▸ Handle gently. Use good occupational work practice. ▸ Observe manufacturer's storage and handling recommendations contained within this SDS. ▸ Avoid all personal contact, including inhalation. ▸ Avoid smoking, naked lights, heat or ignition sources.
Other information	<ul style="list-style-type: none"> ▸ Store cases in a well ventilated magazine licenced for the appropriate Class, Division and Compatibility Group. ▸ Rotate stock to prevent ageing. Use on FIFO (first in-first out) basis. ▸ Observe manufacturer's storage and handling recommendations contained within this SDS. ▸ Store in a cool place in original containers.

Conditions for safe storage, including any incompatibilities

Suitable container	Blended from MMU.
Storage incompatibility	<p>Ammonium nitrate:</p> <ul style="list-style-type: none"> ▸ is a strong oxidiser ▸ reacts violently and/ or forms explosive mixtures with hot water, reducing agents, combustible materials, flammable liquids, organic materials, ammonium dichromate, barium chloride, barium nitrate, charcoal, cyanoguanidine, oils, phosphorus, potassium chromate, potassium dichromate, potassium nitrate, potassium permanganate, sodium chloride, finely divided metals ▸ forms explosive and/ or heat- and shock- sensitive compounds with acetic acid, alkali metals (potassium, sodium etc.), ammonia, nitric acid, sodium hypochlorite, sulfur, urea ▸ may explode violently when heated and contained or confined <p>NOTE:- Explosive detonations can occur when material is mixed with organic material, oils or charcoals and when heated or subjected to shock.</p> <ul style="list-style-type: none"> ▸ Inorganic peroxy compounds are potent oxidisers that pose fire or explosive hazards when in contact with ordinary combustible materials. ▸ Inorganic peroxides react with organic compounds to generate organic peroxide and hydroperoxide products that react violently with reducing agents. ▸ Inorganic oxidising agents can react with reducing agents to generate heat and products that may be gaseous (causing pressurization of closed containers). The products may themselves be capable of further reactions (such as combustion in the air). ▸ Organic compounds in general have some reducing power and can in principle react with compounds in this class. <p>for metal nitrates:</p> <ul style="list-style-type: none"> ▸ Segregate from heavy metals, phosphides, sodium acetate, lead nitrate, tartrates, trichloroethylene, ▸ Avoid shock and heat. ▸ Mixtures of metal nitrates with alkyl esters may explode due to the formation of unstable alkyl nitrates. ▸ Mixtures of a nitrate with phosphorous, tin(II) chloride and other reducing agents may react explosively. ▸ Mixtures containing nitrates and organic materials are potentially dangerous, especially if acidic materials or heavy metals are present. ▸ Fibrous organic material, jute, wood and similar cellulosic material can become highly combustible by nitrate impregnation ▸ Metal nitrates are incompatible with cyanides, thiocyanates, isothiocyanates and hypophosphites. ▸ Avoid contact with other explosives, pyrotechnics, solvents, adhesives, paints, cleaners and unauthorized metals, plastics, packing equipment and materials. ▸ Avoid contamination with acids, alkalis, reducing agents, amines and phosphorus. ▸ Avoid any contamination of this material as it is very reactive and any contamination is potentially hazardous ▸ Explosion hazard may follow contact with incompatible materials

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

Control parameters

OCCUPATIONAL EXPOSURE LIMITS (OEL)

INGREDIENT DATA

Not Available

EMERGENCY LIMITS

Ingredient	Material name	TEEL-1	TEEL-2	TEEL-3
ammonium nitrate	Ammonium nitrate	6.7 mg/m ³	73 mg/m ³	440 mg/m ³
diesel	Diesel fuels	100 mg/m ³	100 mg/m ³	1500 mg/m ³
diesel	Diesel fuel marine; (Fuel oil No.2)	100 mg/m ³	100 mg/m ³	2400 mg/m ³

Ingredient	Original IDLH	Revised IDLH
ammonium nitrate	Not Available	Not Available
diesel	Not Available	Not Available
water	Not Available	Not Available

Exposure controls

Appropriate engineering controls	<p>Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection.</p> <p>The basic types of engineering controls are:</p> <p>Process controls which involve changing the way a job activity or process is done to reduce the risk.</p> <p>Enclosure and/or isolation of emission source which keeps a selected hazard "physically" away from the worker and ventilation that strategically "adds" and "removes" air in the work environment. Ventilation can remove or dilute an air contaminant if designed properly.</p>
Personal protection	
Eye and face protection	<ul style="list-style-type: none"> ▶ Safety glasses with side shields. ▶ Chemical goggles. ▶ Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lenses or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience.
Skin protection	See Hand protection below
Hands/feet protection	<ul style="list-style-type: none"> ▶ Wear chemical protective gloves, e.g. PVC. ▶ Wear safety footwear or safety gumboots, e.g. Rubber <p>Non-sparking or conductive footwear essential. Conductive footwear describes a boot or shoe with a sole made from a conductive compound chemically bound to the bottom components, for permanent control to electrically ground the foot and shall dissipate static electricity from the body to reduce the possibility of ignition of volatile compounds. Electrical resistance must range between 0 to 500,000 ohms. Conductive shoes should be stored in lockers close to the room in which they are worn. Personnel who have been issued conductive footwear should not wear them from their place of work to their homes and return.</p>
Body protection	See Other protection below
Other protection	<p>For handling explosives or explosive compositions:</p> <ul style="list-style-type: none"> ▶ Wear close-fitting flame-protection treated clothing closed at the neck and sleeves. ▶ Cotton underwear, socks and conductive shoes are recommended to avoid human static discharge. <p>Manufacture may require:</p> <ul style="list-style-type: none"> ▶ Non-static flame retardant treated clothing ▶ Access to deluge Safety shower ▶ Barrier cream.
Thermal hazards	Not Available

Respiratory protection

Type A-P Filter of sufficient capacity. (AS/NZS 1716 & 1715, EN 143:2000 & 149:2001, ANSI Z88 or national equivalent)

RedStar Bulk Emulsion

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Appearance	Yellow / white gel with a mild odour; insoluble in water.		
Physical state	Gel	Relative density (Water = 1)	1.0-1.25
Odour	Not Available	Partition coefficient n-octanol / water	Not Available
Odour threshold	Not Available	Auto-ignition temperature (°C)	Not Available
pH (as supplied)	Not Applicable	Decomposition temperature	Not Available
Melting point / freezing point (°C)	Not Available	Viscosity (cSt)	Not Available
Initial boiling point and boiling range (°C)	Not Available	Molecular weight (g/mol)	Not Applicable
Flash point (°C)	Not Available	Taste	Not Available
Evaporation rate	Not Applicable	Explosive properties	Not Available
Flammability	Not Available	Oxidising properties	Not Available
Upper Explosive Limit (%)	Not Available	Surface Tension (dyn/cm or mN/m)	Not Available
Lower Explosive Limit (%)	Not Available	Volatile Component (%vol)	Not Available
Vapour pressure (kPa)	Not Available	Gas group	Not Available
Solubility in water (g/L)	Immiscible	pH as a solution (1%)	Not Applicable
Vapour density (Air = 1)	Not Applicable	VOC g/L	Not Available

SECTION 10 STABILITY AND REACTIVITY

Reactivity	See section 7
Chemical stability	<ul style="list-style-type: none"> ▸ Presence of shock and friction ▸ Presence of heat source and ignition source ▸ Product is considered stable under normal handling conditions. ▸ Stable under normal storage conditions. ▸ Hazardous polymerization will not occur. ▸ Avoid contact with other explosives, pyrotechnics, solvents, adhesives, paints, cleaners and unauthorized metals, plastics, packing equipment and materials. ▸ Avoid contamination with acids, alkalis, reducing agents, amines and phosphorus.
Possibility of hazardous reactions	See section 7
Conditions to avoid	See section 7
Incompatible materials	See section 7
Hazardous decomposition products	See section 5

RedStar Bulk Emulsion

SECTION 11 TOXICOLOGICAL INFORMATION

Information on toxicological effects

Inhaled	There is some evidence to suggest that the material can cause respiratory irritation in some persons. The body's response to such irritation can cause further lung damage.
Ingestion	<p>Accidental ingestion of the material may be damaging to the health of the individual.</p> <p>The principal concern with exposure to inorganic nitrate is its biological reduction to reactive and toxic nitrite. Nitrate itself is relatively harmless. Where bacteria are present and the environment is anaerobic, nitrate can be reduced to nitrite. The main site for this reaction is mouth and stomach, but nitrite formation in the lower intestine and in the bladder (urinary infection) may also be of some toxicological importance.</p> <p>Adults have tolerated large doses of nitrate as sodium and ammonium salt (> 100 mg NO₃-/kg) in some cases repeated for several days for medical or experimental purposes with only minor effects in some subjects (light methaemoglobinaemia, diarrhoea, vomiting).</p> <p>Swallowing large doses of ammonium nitrate may cause dilation of blood vessels by direct smooth muscle relaxation and methaemoglobinaemia. Symptoms include dizziness, abdominal pain, vomiting, bloody diarrhoea, weakness, convulsions and collapse. Other effects of exposure include headache, warm flushed skin, nausea, vomiting, diuresis and fatigue. Both tachycardia and bradycardia, atrial fibrillation, cardiac ischaemia, frequent ventricular premature beats and bigeminy have been reported. Severe poisonings have produced hypotension, decreased peripheral vascular resistance, cardiovascular collapse, convulsions and coma</p>
Skin Contact	<p>Skin contact is not thought to have harmful health effects (as classified under EC Directives); the material may still produce health damage following entry through wounds, lesions or abrasions.</p> <p>There is some evidence to suggest that this material can cause inflammation of the skin on contact in some persons.</p> <p>Open cuts, abraded or irritated skin should not be exposed to this material</p> <p>Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.</p>
Eye	This material can cause eye irritation and damage in some persons.
Chronic	<p>There has been concern that this material can cause cancer or mutations, but there is not enough data to make an assessment.</p> <p>Laboratory (in vitro) and animal studies show, exposure to the material may result in a possible risk of irreversible effects, with the possibility of producing mutation.</p> <p>Substance accumulation, in the human body, may occur and may cause some concern following repeated or long-term occupational exposure.</p> <p>Chronic exposure to ammonium nitrate may produce low blood pressure and fatigue. Swallowing 6-12 grams per day in the long term has produced inflammation of the stomach, acidity of the blood, excessive urine output and nitrite toxicity, manifested by methaemoglobin the blood or dilation of blood vessels.</p>

RedStar Bulk Emulsion	TOXICITY	IRRITATION
	Not Available	Not Available
ammonium nitrate	TOXICITY	IRRITATION
	dermal (rat) LD50: >5000 mg/kg ^[1] Oral (rat) LD50: 2217 mg/kg ^[2]	Nil reported
diesel	TOXICITY	IRRITATION
	Dermal (rabbit) LD50: >4200 mg/kg ^[1] Oral (rat) LD50: 7560 mg/kg ^[1]	Skin (rabbit): 500 uL/24h SEVERE
water	TOXICITY	IRRITATION
	Oral (rat) LD50: >90000 mg/kg ^[2]	Not Available

Legend: 1. Value obtained from Europe ECHA Registered Substances - Acute toxicity 2. * Value obtained from manufacturer's SDS. Unless otherwise specified data extracted from RTECS - Register of Toxic Effect of chemical Substances

RedStar Bulk Emulsion

DIESEL	The material may cause severe skin irritation after prolonged or repeated exposure and may produce on contact skin redness, swelling, the production of vesicles, scaling and thickening of the skin. Repeated exposures may produce severe ulceration. Kerosene may produce varying ranges of skin irritation, and a reversible eye irritation (if eyes are washed). Skin may be cracked or flaky and/or leathery, with crusts and/or hair loss. It may worsen skin cancers. There may also be loss of weight, discharge from the nose, excessive tiredness, and wheezing. The individual may be pale. The substance is classified by IARC as Group 3: NOT classifiable as to its carcinogenicity to humans. Evidence of carcinogenicity may be inadequate or limited in animal testing.
WATER	No significant acute toxicological data identified in literature search.

Acute Toxicity	✓	Carcinogenicity	⊖
Skin Irritation/Corrosion	⊖	Reproductivity	⊖
Serious Eye Damage/Irritation	✓	STOT - Single Exposure	⊖
Respiratory or Skin sensitisation	⊖	STOT - Repeated Exposure	⊖
Mutagenicity	⊖	Aspiration Hazard	⊖

Legend: ✗ – Data available but does not fill the criteria for classification
 ✓ – Data required to make classification available
 ⊖ – Data Not Available to make classification

SECTION 12 ECOLOGICAL INFORMATION

Toxicity

Ingredient	Endpoint	Test Duration (hr)	Species	Value	Source
ammonium nitrate	NOEC	20	Fish	0.003mg/L	4
ammonium nitrate	EC50	48	Crustacea	490mg/L	2
ammonium nitrate	EC50	96	Crustacea	39mg/L	2
diesel	NOEC	3072	Fish	=1mg/L	1
water	EC50	384	Crustacea	199.179mg/L	3
water	EC50	96	Algae or other aquatic plants	8768.874mg/L	3
water	LC50	96	Fish	897.520mg/L	3

Legend: *Extracted from 1. IUCLID Toxicity Data 2. Europe ECHA Registered Substances - Ecotoxicological Information - Aquatic Toxicity 3. EPIWIN Suite V3.12 - Aquatic Toxicity Data (Estimated) 4. US EPA, Ecotox database - Aquatic Toxicity Data 5. ECETOC Aquatic Hazard Assessment Data 6. NITE (Japan) - Bioconcentration Data 7. METI (Japan) - Bioconcentration Data 8. Vendor Data*

Harmful to aquatic organisms.
DO NOT discharge into sewer or waterways.

Persistence and degradability

Ingredient	Persistence: Water/Soil	Persistence: Air
water	LOW	LOW

Bioaccumulative potential

Ingredient	Bioaccumulation
diesel	LOW (BCF = 159)
water	LOW (LogKOW = -1.38)

Mobility in soil

Ingredient	Mobility
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RedStar Bulk Emulsion

water | LOW (KOC = 14.3)

SECTION 13 DISPOSAL CONSIDERATIONS

Waste treatment methods

Product / Packaging disposal	<p>For ammonium nitrate: Add slowly to large amount of water, mix in slight excess of soda ash and neutralise with 6M hydrochloric acid before washing to sewer with large excess of water. Bury residue in an authorised landfill.</p> <ul style="list-style-type: none"> ▸ Explosives which are surplus, deteriorated or considered unsafe for transport, storage or use shall be destroyed and the statutory authorities shall be notified. ▸ Explosives must not be thrown away, buried, discarded or placed with garbage. ▸ This material may be disposed of by burning or detonation but the operation must be performed under the control of a person competent in the destruction of explosives. <p>Disposal by detonation:</p> <ul style="list-style-type: none"> ▸ The explosives to be destroyed must be placed in direct contact with fresh priming charge in a hole which is at least 0.6 metre deep and then adequately stemmed. ▸ No detonators shall be inserted into defective explosives. ▸ DO NOT allow wash water from cleaning or process equipment to enter drains. ▸ It may be necessary to collect all wash water for treatment before disposal. ▸ In all cases disposal to sewer may be subject to local laws and regulations and these should be considered first. ▸ Where in doubt contact the responsible authority.
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Ensure that the disposal of material is carried out in accordance with Hazardous Substances (Disposal) Regulations 2001.

SECTION 14 TRANSPORT INFORMATION

Labels Required

	
Marine Pollutant	NO
HAZCHEM	1YE

Land transport (UN)

UN number	0241				
Packing group	Not Applicable				
UN proper shipping name	EXPLOSIVE, BLASTING, TYPE E†				
Environmental hazard	No relevant data				
Transport hazard class(es)	<table border="0"> <tr> <td>Class</td> <td>1.1D</td> </tr> <tr> <td>Subrisk</td> <td>Not Applicable</td> </tr> </table>	Class	1.1D	Subrisk	Not Applicable
Class	1.1D				
Subrisk	Not Applicable				
Special precautions for user	<table border="0"> <tr> <td>Special provisions</td> <td>Not Applicable</td> </tr> <tr> <td>Limited quantity</td> <td>0</td> </tr> </table>	Special provisions	Not Applicable	Limited quantity	0
Special provisions	Not Applicable				
Limited quantity	0				

Air transport (ICAO-IATA / DGR)

UN number	0241
Packing group	Not Applicable
UN proper shipping name	Explosive, blasting, type E †
Environmental hazard	No relevant data

Transport hazard class(es)	ICAO/IATA Class	1.1D
	ICAO / IATA Subrisk	Not Applicable
	ERG Code	1L
Special precautions for user	Special provisions	Not Applicable
	Cargo Only Packing Instructions	Forbidden
	Cargo Only Maximum Qty / Pack	Forbidden
	Passenger and Cargo Packing Instructions	Forbidden
	Passenger and Cargo Maximum Qty / Pack	Forbidden
	Passenger and Cargo Limited Quantity Packing Instructions	Forbidden
	Passenger and Cargo Limited Maximum Qty / Pack	Forbidden

Sea transport (IMDG-Code / GGVSee)

UN number	0241	
Packing group	Not Applicable	
UN proper shipping name	EXPLOSIVE, BLASTING, TYPE E	
Environmental hazard	Not Applicable	
Transport hazard class(es)	IMDG Class	1.1D
	IMDG Subrisk	Not Applicable
Special precautions for user	EMS Number	F-B, S-X
	Special provisions	Not Applicable
	Limited Quantities	0

Transport in bulk according to Annex II of MARPOL and the IBC code

Source	Ingredient	Pollution Category
IMO MARPOL 73/78 (Annex II) - List of Noxious Liquid Substances Carried in Bulk	ammonium nitrate	Z

SECTION 15 REGULATORY INFORMATION**Safety, health and environmental regulations / legislation specific for the substance or mixture**

This substance is to be managed using the conditions specified in an applicable Group Standard

HSR Number	Group Standard
HSR100175	Not Available

AMMONIUM NITRATE(6484-52-2) IS FOUND ON THE FOLLOWING REGULATORY LISTS

New Zealand Hazardous Substances and New Organisms (HSNO) Act - Classification of Chemicals	New Zealand Inventory of Chemicals (NZIoC)
---------------------------------------------------------------------------------------------	--------------------------------------------

DIESEL(68334-30-5) IS FOUND ON THE FOLLOWING REGULATORY LISTS

New Zealand Inventory of Chemicals (NZIoC)

WATER(7732-18-5) IS FOUND ON THE FOLLOWING REGULATORY LISTS

New Zealand Inventory of Chemicals (NZIoC)

Location Test Certificate

Subject to Regulation 55 of the Hazardous Substances (Classes 1 to 5 Controls) Regulations, a location test certificate is required

when quantity greater than or equal to those indicated below are present.

Hazard Class	Quantity beyond which controls apply for closed containers	Quantity beyond which controls apply when use occurring in open containers
1.1 (other than 1.1B or 1.1C), 1.2, and 1.5	50 kg	50 kg

Approved Handler

Subject to Regulation 56 of the Hazardous Substances (Classes 1 to 5 Controls) Regulations and Regulation 9 of the Hazardous Substances (Classes 6, 8, and 9 Controls) Regulations, the substance must be under the personal control of an Approved Handler when present in a quantity greater than or equal to those indicated below.

Class of substance	Quantities
All Class 1 (1.1, 1.2, 1.3, 1.4, 1.5, 1.6) except as provided in 'Hazardous Substances (Classes 1 to 5 Controls) Regulations 2001' subclauses (2) to (6)	Any quantity

Refer Group Standards for further information

National Inventory	Status
Australia - AICS	Y
Canada - DSL	Y
Canada - NDSL	N (water; ammonium nitrate; diesel)
China - IECSC	Y
Europe - EINEC / ELINCS / NLP	Y
Japan - ENCS	N (water; diesel)
Korea - KECI	Y
New Zealand - NZIoC	Y
Philippines - PICCS	Y
USA - TSCA	Y
Legend:	Y = All ingredients are on the inventory N = Not determined or one or more ingredients are not on the inventory and are not exempt from listing(see specific ingredients in brackets)

SECTION 16 OTHER INFORMATION

Other information

Ingredients with multiple cas numbers

Name	CAS No
diesel	64742-81-0, 68334-30-5, 68476-30-2, 68512-90-3

Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.

A list of reference resources used to assist the committee may be found at:

www.chemwatch.net

The (M)SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

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TEL (+61 3) 9572 4700.

Safety Data Sheet



ANFO

RedBull Powder Company Ltd

Chemwatch: 5193-36

Version No: 2.1.1.1

Safety Data Sheet according to HSNO Regulations

Chemwatch Hazard Alert Code: 2

Issue Date: 08/12/2015

Print Date: 21/12/2015

Initial Date: **Not Available**

S.GHS.NZL.EN

SECTION 1 IDENTIFICATION OF THE SUBSTANCE / MIXTURE AND OF THE COMPANY / UNDERTAKING

Product Identifier

Product name	ANFO
Synonyms	Not Available
Proper shipping name	EXPLOSIVE, BLASTING, TYPE B†
Other means of identification	Not Available

Relevant identified uses of the substance or mixture and uses advised against

Relevant identified uses	Explosive Blasting Agent.
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Details of the supplier of the safety data sheet

Registered company name	RedBull Powder Company Ltd
Address	6 Walls Rd, Penrose, Auckland, 1061 New Zealand
Telephone	+64 9 525 1181
Fax	+64 9 525 1182
Website	www.redbullpowder.co.nz
Email	info@redbullpowder.co.nz

Emergency telephone number

Association / Organisation	RedBull Powder Company
Emergency telephone numbers	+64 9 525 1181 (Mon-Fri 8am to 5pm)
Other emergency telephone numbers	Dial 111 for 24 Hour Emergency Information

SECTION 2 HAZARDS IDENTIFICATION

Continued...

Classification of the substance or mixture

Considered a Hazardous Substance according to the criteria of the New Zealand Hazardous Substances New Organisms legislation. Classified as Dangerous Goods for transport purposes.

GHS Classification [1]	Explosive Division 1.1, Acute Toxicity (Oral) Category 5, Eye Irritation Category 2A, Acute Aquatic Hazard Category 2, Chronic Aquatic Hazard Category 4
Legend:	1. Classified by Chemwatch; 2. Classification drawn from CCID EPA NZ ; 3. Classification drawn from EC Directive 1272/2008 - Annex VI
Determined by Chemwatch using GHS/HSNO criteria	1.1D, 6.1E(oral), 6.4A, 9.1D

Label elements

GHS label elements	 
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SIGNAL WORD	DANGER
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Hazard statement(s)

H201	Explosive; mass explosion hazard
H303	May be harmful if swallowed
H319	Causes serious eye irritation

Precautionary statement(s) Prevention

P101	If medical advice is needed, have product container or label at hand.
P102	Keep out of reach of children.
P103	Read label before use.
P210	Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P230	Keep wetted with phlegmatizer.
P250	Do not subject to grinding/shock/sources of friction.
P280	Wear protective gloves/protective clothing/eye protection/face protection.
P240	Ground/bond container and receiving equipment.

Precautionary statement(s) Response

P312	Call a POISON CENTER or doctor/physician if you feel unwell.
P370+P380	In case of fire: Evacuate area.
P372	Explosion risk in case of fire.
P305+P351+P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P373	DO NOT fight fire when fire reaches explosives.
P337+P313	If eye irritation persists: Get medical advice/attention.

Precautionary statement(s) Storage

P401	Store according to local regulations for explosives.
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Precautionary statement(s) Disposal

P501	Dispose of contents/container in accordance with local regulations.
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SECTION 3 COMPOSITION / INFORMATION ON INGREDIENTS

Substances

See section below for composition of Mixtures

Mixtures

CAS No	%[weight]	Name
6484-52-2	>90	<u>ammonium nitrate</u>
68334-30-5	<10	<u>diesel</u>

SECTION 4 FIRST AID MEASURES

NZ Poisons Centre 0800 POISON (0800 764 766) | NZ Emergency Services: 111

Description of first aid measures

Eye Contact	<p>If this product comes in contact with the eyes:</p> <ul style="list-style-type: none"> ▸ Wash out immediately with fresh running water. ▸ Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids. ▸ Seek medical attention without delay; if pain persists or recurs seek medical attention. ▸ Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.
Skin Contact	<p>If skin contact occurs:</p> <ul style="list-style-type: none"> ▸ Immediately remove all contaminated clothing, including footwear. ▸ Flush skin and hair with running water (and soap if available). ▸ Seek medical attention in event of irritation.
Inhalation	<ul style="list-style-type: none"> ▸ If fumes or combustion products are inhaled remove from contaminated area. ▸ Lay patient down. Keep warm and rested. ▸ Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures. ▸ Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary. ▸ Transport to hospital, or doctor.
Ingestion	<ul style="list-style-type: none"> ▸ If swallowed do NOT induce vomiting. ▸ If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration. ▸ Observe the patient carefully. ▸ Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious. ▸ Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink. ▸ Seek medical advice.

Indication of any immediate medical attention and special treatment needed

The toxicity of nitrates and nitrites result from their vasodilating properties and their propensity to form methaemoglobin.

- Most produce a peak effect within 30 minutes.
- Clinical signs of cyanosis appear before other symptoms because of the dark pigmentation of methaemoglobin.
- Initial attention should be directed towards improving oxygen delivery, with assisted ventilation, if necessary. Hyperbaric oxygen has not demonstrated conclusive benefits.
- Institute cardiac monitoring, especially in patients with coronary artery or pulmonary disease.
- Hypotension should respond to Trendelenburg's position and intravenous fluids; otherwise dopamine may be needed.
- Naloxone, glucose and thiamine should be given if a multiple ingestion is suspected.
- Decontaminate using Ipecac Syrup for alert patients or lavage for obtunded patients who present within 2-4 hours of ingestion.
- Symptomatic patients with methaemoglobin levels over 30% should receive methylene blue. (Cyanosis alone, is not an indication for treatment). The usual dose is 1-2 mg/kg of a 1% solution (10 mg/ml) IV over 5 minutes; repeat, using the same dose if symptoms of hypoxia fail to subside within 1 hour.

[Ellenhorn and Barceloux: Medical Toxicology]

BIOLOGICAL EXPOSURE INDEX - BEI

These represent the determinants observed in specimens collected from a healthy worker who has been exposed at the Exposure Standard (ES or TLV):

Determinant	Index	Sampling Time	Comments
1. Methaemoglobin in blood	1.5% of haemoglobin	During or end of shift	B,NS,SQ

Continued...

B: Background levels occur in specimens collected from subjects **NOT** exposed

NS: Non-specific determinant; also observed after exposure to other materials

SQ: Semi-quantitative determinant - Interpretation may be ambiguous; should be used as a screening test or confirmatory test.

Symptoms of vasodilation and reflex tachycardia may present following organic nitrate overdose; most organic nitrates are extensively metabolised by hydrolysis to inorganic nitrites. Organic nitrates and nitrites are readily absorbed through the skin, lungs, mucosa and gastro-intestinal tract.

SECTION 5 FIREFIGHTING MEASURES

Extinguishing media

- **WARNING:** Deliver water spray or fog from a safe distance only.

Special hazards arising from the substrate or mixture

Fire Incompatibility	None known.
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Advice for firefighters

Fire Fighting	<p>WARNING: EXPLOSIVE MATERIALS / ARTICLES PRESENT!</p> <ul style="list-style-type: none"> ▸ Evacuate all personnel and move upwind. ▸ Prevent re-entry. ▸ Alert Fire Brigade and tell them location and nature of hazard. ▸ May detonate and burning material may be propelled from fire. ▸ Wear full-body protective clothing with breathing apparatus. <p>For Division 1.1 Explosives Evacuation is required in case of Emergency. For quantities of up to:</p> <ul style="list-style-type: none"> ▸ 1000 kg, the evacuation distance is 400 metres ▸ 5000 kg, the evacuation distance is 600 metres ▸ 20000 kg, the evacuation distance is 800 metres ▸ 40000 kg, the evacuation distance is 1000 meters
Fire/Explosion Hazard	<ul style="list-style-type: none"> ▸ Will not burn but increases intensity of fire. ▸ Heating may cause expansion or decomposition leading to violent rupture of containers. ▸ Heat affected containers remain hazardous. ▸ Contact with combustibles such as wood, paper, oil or finely divided metal may produce spontaneous combustion or violent decomposition. ▸ May emit irritating, poisonous or corrosive fumes. <p>Division 1.1 Substances, mixtures and articles which have a mass explosion hazard (a mass explosion is one which affects almost the entire quantity present virtually instantaneously). Explosives are defined as substances which are capable by chemical reaction of producing gas at such a temperature and pressure and at such speed as to cause damage to the surroundings. Pyrotechnic substances are included even when they do not evolve gases. Compatibility Group D explosives are secondary detonating explosive substances or black powder or articles containing a secondary detonating explosive substance, in each case without means of initiation and without a propelling charge, or articles containing a primary explosive substance and containing two or more effective protective features Decomposition may produce toxic fumes of; nitrogen oxides (NOx)</p>

SECTION 6 ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Minor Spills	<p>WARNING!: EXPLOSIVE. BLAST and/or PROJECTION and/or FIRE HAZARD</p> <ul style="list-style-type: none"> ▸ Clean up all spills immediately. ▸ Avoid inhalation of the material and avoid contact with eyes and skin. ▸ Wear impervious gloves and safety glasses. ▸ Remove all ignition sources.
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Major Spills	<p>WARNING!: EXPLOSIVE.</p> <ul style="list-style-type: none"> ▸ Clear area of personnel and move upwind. ▸ Alert Fire Brigade and tell them location and nature of hazard. ▸ May be violently or explosively reactive. ▸ Wear full body protective clothing with breathing apparatus.
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Personal Protective Equipment advice is contained in Section 8 of the SDS.

SECTION 7 HANDLING AND STORAGE

Precautions for safe handling

Safe handling	<ul style="list-style-type: none"> ▸ Avoid personal contact and inhalation of dust, mist or vapours. ▸ Provide adequate ventilation. ▸ Always wear protective equipment and wash off any spillage from clothing. ▸ Keep material away from light, heat, flammables or combustibles. ▸ Keep cool, dry and away from incompatible materials. ▸ Handle gently. Use good occupational work practice. ▸ Observe manufacturer's storage and handling recommendations contained within this SDS. ▸ Avoid all personal contact, including inhalation. ▸ Avoid smoking, naked lights, heat or ignition sources. ▸ Electrostatic discharge may be generated during pumping - this may result in fire. ▸ Ensure electrical continuity by bonding and grounding (earthing) all equipment. ▸ Restrict line velocity during pumping in order to avoid generation of electrostatic discharge (≤ 1 m/sec until fill pipe submerged to twice its diameter, then ≤ 7 m/sec). ▸ Avoid splash filling. ▸ Do NOT use compressed air for filling discharging or handling operations.
Other information	<ul style="list-style-type: none"> ▸ Store cases in a well ventilated magazine licenced for the appropriate Class, Division and Compatibility Group. ▸ Rotate stock to prevent ageing. Use on FIFO (first in-first out) basis. ▸ Observe manufacturer's storage and handling recommendations contained within this SDS. ▸ Store in a cool place in original containers.

Conditions for safe storage, including any incompatibilities

Suitable container	20kg bags or bulk from Mobile Mixing Unit.
Storage incompatibility	<p>Ammonium nitrate:</p> <ul style="list-style-type: none"> ▸ is a strong oxidiser ▸ reacts violently and/ or forms explosive mixtures with hot water, reducing agents, combustible materials, flammable liquids, organic materials, ammonium dichromate, barium chloride, barium nitrate, charcoal, cyanoguanidine, oils, phosphorus, potassium chromate, potassium dichromate, potassium nitrate, potassium permanganate, sodium chloride, finely divided metals ▸ forms explosive and/ or heat- and shock- sensitive compounds with acetic acid, alkali metals (potassium, sodium etc.), ammonia, nitric acid, sodium hypochlorite, sulfur, urea ▸ may explode violently when heated and contained or confined <p>NOTE:- Explosive detonations can occur when material is mixed with organic material, oils or charcoals and when heated or subjected to shock.</p> <ul style="list-style-type: none"> ▸ Avoid contact with other explosives, pyrotechnics, solvents, adhesives, paints, cleaners and unauthorized metals, plastics, packing equipment and materials. ▸ Avoid contamination with acids, alkalis, reducing agents, amines and phosphorus. ▸ Avoid any contamination of this material as it is very reactive and any contamination is potentially hazardous ▸ Explosion hazard may follow contact with incompatible materials ▸ Avoid storage with reducing agents.

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

Control parameters

| OCCUPATIONAL EXPOSURE LIMITS (OEL)

| INGREDIENT DATA

Not Available

| EMERGENCY LIMITS

Continued...

ANFO

Ingredient	Material name	TEEL-1	TEEL-2	TEEL-3
ammonium nitrate	Ammonium nitrate	6.7 mg/m ³	73 mg/m ³	440 mg/m ³
diesel	Diesel fuels	100 mg/m ³	100 mg/m ³	1500 mg/m ³
diesel	Diesel fuel marine; (Fuel oil No.2)	100 mg/m ³	100 mg/m ³	2400 mg/m ³

Ingredient	Original IDLH	Revised IDLH
ammonium nitrate	Not Available	Not Available
diesel	Not Available	Not Available

Exposure controls

Appropriate engineering controls	<p>Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection.</p> <p>The basic types of engineering controls are:</p> <p>Process controls which involve changing the way a job activity or process is done to reduce the risk.</p> <p>Enclosure and/or isolation of emission source which keeps a selected hazard "physically" away from the worker and ventilation that strategically "adds" and "removes" air in the work environment. Ventilation can remove or dilute an air contaminant if designed properly.</p>
Personal protection	
Eye and face protection	<ul style="list-style-type: none"> ▸ Safety glasses with side shields. ▸ Chemical goggles. ▸ Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lenses or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience.
Skin protection	See Hand protection below
Hands/feet protection	<ul style="list-style-type: none"> ▸ Wear chemical protective gloves, e.g. PVC. ▸ Wear safety footwear or safety gumboots, e.g. Rubber <p>The selection of suitable gloves does not only depend on the material, but also on further marks of quality which vary from manufacturer to manufacturer. Where the chemical is a preparation of several substances, the resistance of the glove material can not be calculated in advance and has therefore to be checked prior to the application.</p> <p>The exact break through time for substances has to be obtained from the manufacturer of the protective gloves and has to be observed when making a final choice.</p> <p>Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include:</p> <ul style="list-style-type: none"> ▸ frequency and duration of contact, ▸ chemical resistance of glove material, ▸ glove thickness and ▸ dexterity <p>Select gloves tested to a relevant standard (e.g. Europe EN 374, US F739, AS/NZS 2161.1 or national equivalent).</p> <p>Non-sparking or conductive footwear essential. Conductive footwear describes a boot or shoe with a sole made from a conductive compound chemically bound to the bottom components, for permanent control to electrically ground the foot and shall dissipate static electricity from the body to reduce the possibility of ignition of volatile compounds. Electrical resistance must range between 0 to 500,000 ohms. Conductive shoes should be stored in lockers close to the room in which they are worn. Personnel who have been issued conductive footwear should not wear them from their place of work to their homes and return.</p>
Body protection	See Other protection below
Other protection	<p>For handling explosives or explosive compositions:</p> <ul style="list-style-type: none"> ▸ Wear close-fitting flame-protection treated clothing closed at the neck and sleeves. ▸ Cotton underwear, socks and conductive shoes are recommended to avoid human static discharge. <p>Manufacture may require:</p> <ul style="list-style-type: none"> ▸ Non-static flame retardant treated clothing ▸ Access to deluge Safety shower ▸ Barrier cream.
Thermal hazards	Not Available

Respiratory protection

Type A-P Filter of sufficient capacity. (AS/NZS 1716 & 1715, EN 143:2000 & 149:2001, ANSI Z88 or national equivalent)

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Appearance	1-4mm prills with pick or blue tinge; soluble in water.		
Physical state	Solid	Relative density (Water = 1)	0.8-0.9
Odour	Not Available	Partition coefficient n-octanol / water	Not Available
Odour threshold	Not Available	Auto-ignition temperature (°C)	215 (explodes)
pH (as supplied)	Not Applicable	Decomposition temperature	Not Available
Melting point / freezing point (°C)	Not Applicable	Viscosity (cSt)	Not Applicable
Initial boiling point and boiling range (°C)	Not Applicable	Molecular weight (g/mol)	Not Applicable
Flash point (°C)	Not Available	Taste	Not Available
Evaporation rate	Not Applicable	Explosive properties	Not Available
Flammability	Not Available	Oxidising properties	Not Available
Upper Explosive Limit (%)	Not Available	Surface Tension (dyn/cm or mN/m)	Not Applicable
Lower Explosive Limit (%)	Not Available	Volatile Component (%vol)	Not Available
Vapour pressure (kPa)	Not Applicable	Gas group	Not Available
Solubility in water (g/L)	Miscible	pH as a solution (1%)	Not Applicable
Vapour density (Air = 1)	Not Applicable	VOC g/L	Not Available

SECTION 10 STABILITY AND REACTIVITY

Reactivity	See section 7
Chemical stability	<ul style="list-style-type: none"> ▸ Presence of shock and friction ▸ Presence of heat source and ignition source ▸ Product is considered stable under normal handling conditions. ▸ Stable under normal storage conditions. ▸ Hazardous polymerization will not occur. ▸ Avoid contact with other explosives, pyrotechnics, solvents, adhesives, paints, cleaners and unauthorized metals, plastics, packing equipment and materials. ▸ Avoid contamination with acids, alkalis, reducing agents, amines and phosphorus.
Possibility of hazardous reactions	See section 7
Conditions to avoid	See section 7
Incompatible materials	See section 7

Hazardous decomposition products

See section 5

SECTION 11 TOXICOLOGICAL INFORMATION**Information on toxicological effects**

Inhaled	<p>Fumes from diesel combustion are extremely variable in composition, may contain particulates, unburnt components and may be extremely irritating.</p> <p>Vapour or mist may produce respiratory tract irritation. Human exposure may produce immediate cough, dyspnea, cyanosis and unconsciousness. A productive cough with sputum smelling of diesel fuel may persist for many days. Chest X-rays have shown diffuse shadowing most prominent at the base of the lungs; this resolved slowly with treatment.</p>
Ingestion	<p>The principal concern with exposure to inorganic nitrate is its biological reduction to reactive and toxic nitrite. Nitrate itself is relatively harmless. Where bacteria are present and the environment is anaerobic, nitrate can be reduced to nitrite. The main site for this reaction is mouth and stomach, but nitrite formation in the lower intestine and in the bladder (urinary infection) may also be of some toxicological importance.</p> <p>Adults have tolerated large doses of nitrate as sodium and ammonium salt (> 100 mg NO₃-/kg) in some cases repeated for several days for medical or experimental purposes with only minor effects in some subjects (light methaemoglobinaemia, diarrhoea, vomiting).</p> <p>The lethal oral dose of nitrite for adults has been variously reported to be between 0.7 and 6 g NO₂- (approximately 10 to 100 mg NO₂-/kg). Lower doses may apply for children (especially neonates), the elderly and people with certain enzyme deficiencies. The first symptoms of oral nitrite poisoning develop within 15 to 45 minutes</p> <p>In humans, inorganic nitrites produce smooth muscle relaxation, methaemoglobinaemia and cyanosis. The primary effect of nitrite intoxication in animals is methaemoglobinaemia whilst secondary effects include vasodilation, relaxation of smooth muscle and lowering of blood pressure. Other nitrite-induced toxic effects include abdominal pain, diarrhoea, atrophied intestinal villi and apoptotic cell death in the intestinal crypts. Nitrite may also cause sudden fall in blood pressure due to its vasodilating properties. Nitrite has vasodilating properties, probably through transformation into nitric oxide (NO) or a NO-containing molecule acting as a signal factor for smooth muscle relaxation.</p> <p>The substance and/or its metabolites may bind to haemoglobin inhibiting normal uptake of oxygen. This condition, known as "methaemoglobinemia", is a form of oxygen starvation (anoxia).</p> <p>Symptoms include cyanosis (a bluish discolouration skin and mucous membranes) and breathing difficulties. Symptoms may not be evident until several hours after exposure.</p> <p>At about 15% concentration of blood methaemoglobin there is observable cyanosis of the lips, nose and earlobes.</p>
Skin Contact	<p>Skin contact with the material may damage the health of the individual; systemic effects may result following absorption.</p> <p>When applied under a patch for 24 hours to rabbit skin, diesel produced extreme irritation, severe erythema and oedema with blistering and open sores. Topical application has produced acute renal failure and gastrointestinal syndromes in humans.</p> <p>Open cuts, abraded or irritated skin should not be exposed to this material</p>
Eye	This material can cause eye irritation and damage in some persons.
Chronic	<p>There has been concern that this material can cause cancer or mutations, but there is not enough data to make an assessment.</p> <p>Prolonged or repeated skin contact with diesel fuel may cause defatting and irritation of follicles with blocked sebaceous glands resulting in pimples and spots appearing on arms and legs. Hyperkeratosis has been described in engine drivers exposed occupationally to diesel fuels. Repeated application to rabbit skin produces mortalities (8 ml/kg). The primary cause of death was depression and anorexia which were induced by dermal irritation followed by infection; systemic intoxication did not appear to be a factor. Autopsy showed liver and kidney effects.</p> <p>Chronic exposure to ammonium nitrate may produce low blood pressure and fatigue. Swallowing 6-12 grams per day in the long term has produced inflammation of the stomach, acidity of the blood, excessive urine output and nitrite toxicity, manifested by methaemoglobin the blood or dilation of blood vessels.</p>

ANFO	TOXICITY	IRRITATION
	Not Available	Not Available
ammonium nitrate	TOXICITY	IRRITATION
	dermal (rat) LD50: >5000 mg/kg ^[1]	Nil reported

Continued...

ANFO

	Oral (rat) LD50: 2217 mg/kg ^[2]	
diesel	TOXICITY	IRRITATION
	Dermal (rabbit) LD50: >4200 mg/kg ^[1]	Skin (rabbit): 500 uL/24h SEVERE
	Oral (rat) LD50: 7560 mg/kg ^[1]	
Legend:	1. Value obtained from Europe ECHA Registered Substances - Acute toxicity 2. * Value obtained from manufacturer's SDS. Unless otherwise specified data extracted from RTECS - Register of Toxic Effect of chemical Substances	

DIESEL	<p>The material may cause severe skin irritation after prolonged or repeated exposure and may produce on contact skin redness, swelling, the production of vesicles, scaling and thickening of the skin. Repeated exposures may produce severe ulceration.</p> <p>Kerosene may produce varying ranges of skin irritation, and a reversible eye irritation (if eyes are washed). Skin may be cracked or flaky and/or leathery, with crusts and/or hair loss. It may worsen skin cancers. There may also be loss of weight, discharge from the nose, excessive tiredness, and wheezing. The individual may be pale.</p> <p>The substance is classified by IARC as Group 3: NOT classifiable as to its carcinogenicity to humans. Evidence of carcinogenicity may be inadequate or limited in animal testing.</p>
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Acute Toxicity	✓	Carcinogenicity	⊖
Skin Irritation/Corrosion	⊖	Reproductivity	⊖
Serious Eye Damage/Irritation	✓	STOT - Single Exposure	⊖
Respiratory or Skin sensitisation	⊖	STOT - Repeated Exposure	⊖
Mutagenicity	⊖	Aspiration Hazard	⊖

Legend: ✗ – Data available but does not fill the criteria for classification
 ✓ – Data required to make classification available
 ⊖ – Data Not Available to make classification

SECTION 12 ECOLOGICAL INFORMATION

Toxicity

Ingredient	Endpoint	Test Duration (hr)	Species	Value	Source
ammonium nitrate	NOEC	20	Fish	0.003mg/L	4
ammonium nitrate	EC50	48	Crustacea	490mg/L	2
ammonium nitrate	EC50	96	Crustacea	39mg/L	2
diesel	NOEC	3072	Fish	=1mg/L	1
Legend:	Extracted from 1. IUCLID Toxicity Data 2. Europe ECHA Registered Substances - Ecotoxicological Information - Aquatic Toxicity 3. EPIWIN Suite V3.12 - Aquatic Toxicity Data (Estimated) 4. US EPA, Ecotox database - Aquatic Toxicity Data 5. ECETOC Aquatic Hazard Assessment Data 6. NITE (Japan) - Bioconcentration Data 7. METI (Japan) - Bioconcentration Data 8. Vendor Data				

Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment. Do NOT allow product to come in contact with surface waters or to intertidal areas below the mean high water mark. Do not contaminate water when cleaning equipment or disposing of equipment wash-waters. Wastes resulting from use of the product must be disposed of on site or at approved waste sites.

For ammonium nitrate
 Fertility of Daphnia magna decreased at 50 g/l.
 Post embryonic growth of crustacea was impaired at >10mg/l.
 (Aspergillus niger) 40 hr. LC50: 15mg/l (36 C)
 [CROPCARE]

Ammonium nitrate is soluble in water and acts as a source of nutrition for many microorganisms. Spills may produce massive eutrophication in static waters effecting the local aquatic community.

Persistence and degradability

ANFO

Ingredient	Persistence: Water/Soil	Persistence: Air
	No Data available for all ingredients	No Data available for all ingredients

Bioaccumulative potential

Ingredient	Bioaccumulation
diesel	LOW (BCF = 159)

Mobility in soil

Ingredient	Mobility
	No Data available for all ingredients

SECTION 13 DISPOSAL CONSIDERATIONS**Waste treatment methods**

Product / Packaging disposal	<p>For ammonium nitrate: Add slowly to large amount of water, mix in slight excess of soda ash and neutralise with 6M hydrochloric acid before washing to sewer with large excess of water. Bury residue in an authorised landfill.</p> <ul style="list-style-type: none"> ▸ Explosives which are surplus, deteriorated or considered unsafe for transport, storage or use shall be destroyed and the statutory authorities shall be notified. ▸ Explosives must not be thrown away, buried, discarded or placed with garbage. ▸ This material may be disposed of by burning or detonation but the operation must be performed under the control of a person competent in the destruction of explosives. <p>Disposal by detonation:</p> <ul style="list-style-type: none"> ▸ The explosives to be destroyed must be placed in direct contact with fresh priming charge in a hole which is at least 0.6 metre deep and then adequately stemmed. ▸ No detonators shall be inserted into defective explosives. ▸ Recycle wherever possible or consult manufacturer for recycling options. ▸ Consult State Land Waste Management Authority for disposal. ▸ Bury residue in an authorised landfill. ▸ Recycle containers if possible, or dispose of in an authorised landfill. ▸ DO NOT allow wash water from cleaning or process equipment to enter drains. ▸ It may be necessary to collect all wash water for treatment before disposal. ▸ In all cases disposal to sewer may be subject to local laws and regulations and these should be considered first. ▸ Where in doubt contact the responsible authority.
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Ensure that the disposal of material is carried out in accordance with Hazardous Substances (Disposal) Regulations 2001.

SECTION 14 TRANSPORT INFORMATION**Labels Required**

	
Marine Pollutant	NO
HAZCHEM	1YE

Land transport (UN)

UN number	0082
Packing group	Not Applicable
UN proper shipping name	EXPLOSIVE, BLASTING, TYPE B†
Environmental hazard	No relevant data

Continued...

ANFO

Transport hazard class(es)	Class	1.1D
	Subrisk	Not Applicable
Special precautions for user	Special provisions	Not Applicable
	Limited quantity	0

Air transport (ICAO-IATA / DGR)

UN number	0082	
Packing group	Not Applicable	
UN proper shipping name	Explosive, blasting, type B †	
Environmental hazard	No relevant data	
Transport hazard class(es)	ICAO/IATA Class	1.1D
	ICAO / IATA Subrisk	Not Applicable
	ERG Code	1L
Special precautions for user	Special provisions	Not Applicable
	Cargo Only Packing Instructions	Forbidden
	Cargo Only Maximum Qty / Pack	Forbidden
	Passenger and Cargo Packing Instructions	Forbidden
	Passenger and Cargo Maximum Qty / Pack	Forbidden
	Passenger and Cargo Limited Quantity Packing Instructions	Forbidden
	Passenger and Cargo Limited Maximum Qty / Pack	Forbidden

Sea transport (IMDG-Code / GGVSee)

UN number	0082	
Packing group	Not Applicable	
UN proper shipping name	EXPLOSIVE, BLASTING, TYPE B	
Environmental hazard	Not Applicable	
Transport hazard class(es)	IMDG Class	1.1D
	IMDG Subrisk	Not Applicable
Special precautions for user	EMS Number	F-B, S-Y
	Special provisions	Not Applicable
	Limited Quantities	0

Transport in bulk according to Annex II of MARPOL and the IBC code

Source	Ingredient	Pollution Category
IMO MARPOL 73/78 (Annex II) - List of Noxious Liquid Substances Carried in Bulk	ammonium nitrate	Z

SECTION 15 REGULATORY INFORMATION

Safety, health and environmental regulations / legislation specific for the substance or mixture

This substance is to be managed using the conditions specified in an applicable Group Standard

Continued...

HSR Number	Group Standard
HSR100173	Not Available

AMMONIUM NITRATE(6484-52-2) IS FOUND ON THE FOLLOWING REGULATORY LISTS

New Zealand Hazardous Substances and New Organisms (HSNO) Act - Classification of Chemicals	New Zealand Inventory of Chemicals (NZIoC)
---------------------------------------------------------------------------------------------	--------------------------------------------

DIESEL(68334-30-5) IS FOUND ON THE FOLLOWING REGULATORY LISTS

New Zealand Inventory of Chemicals (NZIoC)

Location Test Certificate

Subject to Regulation 55 of the Hazardous Substances (Classes 1 to 5 Controls) Regulations, a location test certificate is required when quantity greater than or equal to those indicated below are present.

Hazard Class	Quantity beyond which controls apply for closed containers	Quantity beyond which controls apply when use occurring in open containers
1.1 (other than 1.1B or 1.1C), 1.2, and 1.5	50 kg	50 kg

Approved Handler

Subject to Regulation 56 of the Hazardous Substances (Classes 1 to 5 Controls) Regulations and Regulation 9 of the Hazardous Substances (Classes 6, 8, and 9 Controls) Regulations, the substance must be under the personal control of an Approved Handler when present in a quantity greater than or equal to those indicated below.

Class of substance	Quantities
All Class 1 (1.1, 1.2, 1.3, 1.4, 1.5, 1.6) except as provided in 'Hazardous Substances (Classes 1 to 5 Controls) Regulations 2001' subclauses (2) to (6)	Any quantity

Refer Group Standards for further information

National Inventory	Status
Australia - AICS	Y
Canada - DSL	Y
Canada - NDSL	N (ammonium nitrate; diesel)
China - IECSC	Y
Europe - EINEC / ELINCS / NLP	Y
Japan - ENCS	N (diesel)
Korea - KECI	Y
New Zealand - NZIoC	Y
Philippines - PICCS	Y
USA - TSCA	Y
Legend:	Y = All ingredients are on the inventory N = Not determined or one or more ingredients are not on the inventory and are not exempt from listing(see specific ingredients in brackets)

SECTION 16 OTHER INFORMATION

Other information

Ingredients with multiple cas numbers

Name	CAS No
diesel	64742-81-0, 68334-30-5, 68476-30-2, 68512-90-3

Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.

A list of reference resources used to assist the committee may be found at:

www.chemwatch.net

The (M)SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

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TEL (+61 3) 9572 4700.

Safety Data Sheet



Redpak Packaged Emulsion

RedBull Powder Company Ltd

Chemwatch: 5193-37

Version No: 2.1.1.1

Safety Data Sheet according to HSNO Regulations

Chemwatch Hazard Alert Code: 2

Issue Date: 07/12/2015

Print Date: 21/12/2015

Initial Date: **Not Available**

S.GHS.NZL.EN

SECTION 1 IDENTIFICATION OF THE SUBSTANCE / MIXTURE AND OF THE COMPANY / UNDERTAKING

Product Identifier

Product name	Redpak Packaged Emulsion
Synonyms	Packaged Emulsion
Proper shipping name	EXPLOSIVE, BLASTING, TYPE E†
Other means of identification	Not Available

Relevant identified uses of the substance or mixture and uses advised against

Relevant identified uses	Explosive Blasting Product for Commercial Blasting Operations in Mines, Quarries or Construction.
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Details of the supplier of the safety data sheet

Registered company name	RedBull Powder Company Ltd
Address	6 Walls Rd, Penrose, Auckland, 1061 New Zealand
Telephone	+64 9 525 1181
Fax	+64 9 525 1182
Website	www.redbullpowder.co.nz
Email	info@redbullpowder.co.nz

Emergency telephone number

Association / Organisation	RedBull Powder Company
Emergency telephone numbers	+64 9 525 1181 (Mon-Fri 8am to 5pm)
Other emergency telephone numbers	Dial 111 for 24 Hour Emergency Information

SECTION 2 HAZARDS IDENTIFICATION

Continued...

Redpak Packaged Emulsion

Classification of the substance or mixture

Considered a Hazardous Substance according to the criteria of the New Zealand Hazardous Substances New Organisms legislation. Classified as Dangerous Goods for transport purposes.

GHS Classification [1]	Explosive Division 1.1, Acute Toxicity (Oral) Category 5, Eye Irritation Category 2A, Chronic Aquatic Hazard Category 4
Legend:	1. Classified by Chemwatch; 2. Classification drawn from CCID EPA NZ ; 3. Classification drawn from EC Directive 1272/2008 - Annex VI
Determined by Chemwatch using GHS/HSNO criteria	1.1D, 6.1E(oral), 6.4A, 9.1D

Label elements

GHS label elements	 
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SIGNAL WORD	DANGER
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Hazard statement(s)

H201	Explosive; mass explosion hazard
H303	May be harmful if swallowed
H319	Causes serious eye irritation

Precautionary statement(s) Prevention

P101	If medical advice is needed, have product container or label at hand.
P102	Keep out of reach of children.
P103	Read label before use.
P210	Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P230	Keep wetted with phlegmatizer.
P250	Do not subject to grinding/shock/sources of friction.
P280	Wear protective gloves/protective clothing/eye protection/face protection.
P240	Ground/bond container and receiving equipment.

Precautionary statement(s) Response

P312	Call a POISON CENTER or doctor/physician if you feel unwell.
P370+P380	In case of fire: Evacuate area.
P372	Explosion risk in case of fire.
P305+P351+P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P373	DO NOT fight fire when fire reaches explosives.
P337+P313	If eye irritation persists: Get medical advice/attention.

Precautionary statement(s) Storage

P401	Store according to local regulations for explosives.
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Precautionary statement(s) Disposal

P501	Dispose of contents/container in accordance with local regulations.
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SECTION 3 COMPOSITION / INFORMATION ON INGREDIENTS

Substances

See section below for composition of Mixtures

Mixtures

CAS No	%[weight]	Name
6484-52-2	>65	<u>ammonium nitrate</u>
7631-99-4	0-10	<u>sodium nitrate</u>

SECTION 4 FIRST AID MEASURES

NZ Poisons Centre 0800 POISON (0800 764 766) | NZ Emergency Services: 111

Description of first aid measures

Eye Contact	<p>If this product comes in contact with the eyes:</p> <ul style="list-style-type: none"> ▸ Wash out immediately with fresh running water. ▸ Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids. ▸ Seek medical attention without delay; if pain persists or recurs seek medical attention. ▸ Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.
Skin Contact	<p>If skin contact occurs:</p> <ul style="list-style-type: none"> ▸ Immediately remove all contaminated clothing, including footwear. ▸ Flush skin and hair with running water (and soap if available). ▸ Seek medical attention in event of irritation.
Inhalation	<ul style="list-style-type: none"> ▸ If fumes, aerosols or combustion products are inhaled remove from contaminated area. ▸ Other measures are usually unnecessary.
Ingestion	<ul style="list-style-type: none"> ▸ If swallowed do NOT induce vomiting. ▸ If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration. ▸ Observe the patient carefully. ▸ Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious. ▸ Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink. ▸ Seek medical advice.

Indication of any immediate medical attention and special treatment needed

The toxicity of nitrates and nitrites result from their vasodilating properties and their propensity to form methaemoglobin.

- Most produce a peak effect within 30 minutes.
- Clinical signs of cyanosis appear before other symptoms because of the dark pigmentation of methaemoglobin.
- Initial attention should be directed towards improving oxygen delivery, with assisted ventilation, if necessary. Hyperbaric oxygen has not demonstrated conclusive benefits.
- Institute cardiac monitoring, especially in patients with coronary artery or pulmonary disease.
- Hypotension should respond to Trendelenburg's position and intravenous fluids; otherwise dopamine may be needed.
- Naloxone, glucose and thiamine should be given if a multiple ingestion is suspected.
- Decontaminate using Ipecac Syrup for alert patients or lavage for obtunded patients who present within 2-4 hours of ingestion.
- Symptomatic patients with methaemoglobin levels over 30% should receive methylene blue. (Cyanosis alone, is not an indication for treatment). The usual dose is 1-2 mg/kg of a 1% solution (10 mg/ml) IV over 5 minutes; repeat, using the same dose if symptoms of hypoxia fail to subside within 1 hour.

[Ellenhorn and Barceloux: Medical Toxicology]

BIOLOGICAL EXPOSURE INDEX - BEI

These represent the determinants observed in specimens collected from a healthy worker who has been exposed at the Exposure Standard (ES or TLV):

Determinant	Index	Sampling Time	Comments
1. Methaemoglobin in blood	1.5% of haemoglobin	During or end of shift	B,NS,SQ

B: Background levels occur in specimens collected from subjects **NOT** exposed

NS: Non-specific determinant;also observed after exposure to other materials

Continued...

SQ: Semi-quantitative determinant - Interpretation may be ambiguous; should be used as a screening test or confirmatory test.

Symptoms of vasodilation and reflex tachycardia may present following organic nitrate overdose; most organic nitrates are extensively metabolised by hydrolysis to inorganic nitrites. Organic nitrates and nitrites are readily absorbed through the skin, lungs, mucosa and gastro-intestinal tract.

SECTION 5 FIREFIGHTING MEASURES

Extinguishing media

- ▶ **WARNING:** Deliver water spray or fog from a safe distance only.

Special hazards arising from the substrate or mixture

Fire Incompatibility	None known.
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Advice for firefighters

Fire Fighting	<p>WARNING: EXPLOSIVE MATERIALS / ARTICLES PRESENT!</p> <ul style="list-style-type: none"> ▶ Evacuate all personnel and move upwind. ▶ Prevent re-entry. ▶ Alert Fire Brigade and tell them location and nature of hazard. ▶ May detonate and burning material may be propelled from fire. ▶ Wear full-body protective clothing with breathing apparatus. <p>For Division 1.1 Explosives Evacuation is required in case of Emergency. For quantities of up to:</p> <ul style="list-style-type: none"> ▶ 1000 kg, the evacuation distance is 400 metres ▶ 5000 kg, the evacuation distance is 600 metres ▶ 20000 kg, the evacuation distance is 800 metres ▶ 40000 kg, the evacuation distance is 1000 meters
Fire/Explosion Hazard	<ul style="list-style-type: none"> ▶ Will not burn but increases intensity of fire. ▶ Heating may cause expansion or decomposition leading to violent rupture of containers. ▶ Heat affected containers remain hazardous. ▶ Contact with combustibles such as wood, paper, oil or finely divided metal may produce spontaneous combustion or violent decomposition. ▶ May emit irritating, poisonous or corrosive fumes. <p>Division 1.1 Substances, mixtures and articles which have a mass explosion hazard (a mass explosion is one which affects almost the entire quantity present virtually instantaneously).</p> <p>Explosives are defined as substances which are capable by chemical reaction of producing gas at such a temperature and pressure and at such speed as to cause damage to the surroundings. Pyrotechnic substances are included even when they do not evolve gases.</p> <p>Compatibility Group D explosives are secondary detonating explosive substances or black powder or articles containing a secondary detonating explosive substance, in each case without means of initiation and without a propelling charge, or articles containing a primary explosive substance and containing two or more effective protective features</p> <p>Decomposition may produce toxic fumes of; nitrogen oxides (NOx)</p>

SECTION 6 ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Minor Spills	<p>WARNING!: EXPLOSIVE.</p> <p>BLAST and/or PROJECTION and/or FIRE HAZARD</p> <ul style="list-style-type: none"> ▶ Clean up all spills immediately. ▶ Avoid inhalation of the material and avoid contact with eyes and skin. ▶ Wear impervious gloves and safety glasses. ▶ Remove all ignition sources.
Major Spills	<p>WARNING!: EXPLOSIVE.</p> <ul style="list-style-type: none"> ▶ Clear area of personnel and move upwind. ▶ Alert Fire Brigade and tell them location and nature of hazard. ▶ May be violently or explosively reactive. ▶ Wear full body protective clothing with breathing apparatus.

Personal Protective Equipment advice is contained in Section 8 of the SDS.

SECTION 7 HANDLING AND STORAGE

Precautions for safe handling

Safe handling	<ul style="list-style-type: none"> ▸ Avoid personal contact and inhalation of dust, mist or vapours. ▸ Provide adequate ventilation. ▸ Always wear protective equipment and wash off any spillage from clothing. ▸ Keep material away from light, heat, flammables or combustibles. ▸ Keep cool, dry and away from incompatible materials. ▸ Handle gently. Use good occupational work practice. ▸ Observe manufacturer's storage and handling recommendations contained within this SDS. ▸ Avoid all personal contact, including inhalation. ▸ Avoid smoking, naked lights, heat or ignition sources.
Other information	<ul style="list-style-type: none"> ▸ Store cases in a well ventilated magazine licenced for the appropriate Class, Division and Compatibility Group. ▸ Rotate stock to prevent ageing. Use on FIFO (first in-first out) basis. ▸ Observe manufacturer's storage and handling recommendations contained within this SDS. ▸ Store in a cool place in original containers.

Conditions for safe storage, including any incompatibilities

Suitable container	Cartridges 0.10kg / 1.5kg with plastic film in packed fibre board boxes.
Storage incompatibility	<p>Ammonium nitrate:</p> <ul style="list-style-type: none"> ▸ is a strong oxidiser ▸ reacts violently and/ or forms explosive mixtures with hot water, reducing agents, combustible materials, flammable liquids, organic materials, ammonium dichromate, barium chloride, barium nitrate, charcoal, cyanoguanidine, oils, phosphorus, potassium chromate, potassium dichromate, potassium nitrate, potassium permanganate, sodium chloride, finely divided metals ▸ forms explosive and/ or heat- and shock- sensitive compounds with acetic acid, alkali metals (potassium, sodium etc.), ammonia, nitric acid, sodium hypochlorite, sulfur, urea ▸ may explode violently when heated and contained or confined <p>NOTE:- Explosive detonations can occur when material is mixed with organic material, oils or charcoals and when heated or subjected to shock.</p> <ul style="list-style-type: none"> ▸ Inorganic peroxy compounds are potent oxidisers that pose fire or explosive hazards when in contact with ordinary combustible materials. ▸ Inorganic peroxides react with organic compounds to generate organic peroxide and hydroperoxide products that react violently with reducing agents. ▸ Inorganic oxidising agents can react with reducing agents to generate heat and products that may be gaseous (causing pressurization of closed containers). The products may themselves be capable of further reactions (such as combustion in the air). ▸ Organic compounds in general have some reducing power and can in principle react with compounds in this class. ▸ Inorganic reducing agents react with oxidizing agents to generate heat and products that may be flammable, combustible, or otherwise reactive. Their reactions with oxidizing agents may be violent. ▸ Incidents involving interaction of active oxidants and reducing agents, either by design or accident, are usually very energetic and examples of so-called redox reactions. <p>for metal nitrates:</p> <ul style="list-style-type: none"> ▸ Segregate from heavy metals, phosphides, sodium acetate, lead nitrate, tartrates, trichloroethylene, ▸ Avoid shock and heat. ▸ Mixtures of metal nitrates with alkyl esters may explode due to the formation of unstable alkyl nitrates. ▸ Mixtures of a nitrate with phosphorous, tin(II) chloride and other reducing agents may react explosively. ▸ Mixtures containing nitrates and organic materials are potentially dangerous, especially if acidic materials or heavy metals are present. ▸ Fibrous organic material, jute, wood and similar cellulosic material can become highly combustible by nitrate impregnation ▸ Metal nitrates are incompatible with cyanides, thiocyanates, isothiocyanates and hypophosphites. ▸ Avoid contact with other explosives, pyrotechnics, solvents, adhesives, paints, cleaners and unauthorized metals, plastics, packing equipment and materials. ▸ Avoid contamination with acids, alkalis, reducing agents, amines and phosphorus. ▸ Avoid any contamination of this material as it is very reactive and any contamination is potentially hazardous ▸ Explosion hazard may follow contact with incompatible materials

Continued...

- Avoid storage with reducing agents.

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

Control parameters

OCCUPATIONAL EXPOSURE LIMITS (OEL)

INGREDIENT DATA

Not Available

EMERGENCY LIMITS

Ingredient	Material name	TEEL-1	TEEL-2	TEEL-3
ammonium nitrate	Ammonium nitrate	6.7 mg/m ³	73 mg/m ³	440 mg/m ³
sodium nitrate	Sodium nitrate	12 mg/m ³	130 mg/m ³	250 mg/m ³

Ingredient	Original IDLH	Revised IDLH
ammonium nitrate	Not Available	Not Available
sodium nitrate	Not Available	Not Available

Exposure controls

Appropriate engineering controls	<p>Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection.</p> <p>The basic types of engineering controls are:</p> <p>Process controls which involve changing the way a job activity or process is done to reduce the risk.</p> <p>Enclosure and/or isolation of emission source which keeps a selected hazard "physically" away from the worker and ventilation that strategically "adds" and "removes" air in the work environment. Ventilation can remove or dilute an air contaminant if designed properly.</p>
Personal protection	
Eye and face protection	<ul style="list-style-type: none"> ▸ Safety glasses with side shields. ▸ Chemical goggles. ▸ Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lenses or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience.
Skin protection	See Hand protection below
Hands/feet protection	<ul style="list-style-type: none"> ▸ Wear chemical protective gloves, e.g. PVC. ▸ Wear safety footwear or safety gumboots, e.g. Rubber <p>Non-sparking or conductive footwear essential. Conductive footwear describes a boot or shoe with a sole made from a conductive compound chemically bound to the bottom components, for permanent control to electrically ground the foot and shall dissipate static electricity from the body to reduce the possibility of ignition of volatile compounds. Electrical resistance must range between 0 to 500,000 ohms. Conductive shoes should be stored in lockers close to the room in which they are worn. Personnel who have been issued conductive footwear should not wear them from their place of work to their homes and return.</p>
Body protection	See Other protection below
Other protection	<p>For handling explosives or explosive compositions:</p> <ul style="list-style-type: none"> ▸ Wear close-fitting flame-protection treated clothing closed at the neck and sleeves. ▸ Cotton underwear, socks and conductive shoes are recommended to avoid human static discharge. <p>Manufacture may require:</p> <ul style="list-style-type: none"> ▸ Non-static flame retardant treated clothing ▸ Access to deluge Safety shower ▸ Barrier cream.
Thermal hazards	Not Available

Respiratory protection

Not Available

Continued...

Redpak Packaged Emulsion

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Appearance	White semi firm clay like material – negligible odour; insoluble in water.		
Physical state	Non Slump Paste	Relative density (Water = 1)	1.15-1.25
Odour	Not Available	Partition coefficient n-octanol / water	Not Available
Odour threshold	Not Available	Auto-ignition temperature (°C)	Not Available
pH (as supplied)	Not Applicable	Decomposition temperature	Not Available
Melting point / freezing point (°C)	Not Available	Viscosity (cSt)	Not Available
Initial boiling point and boiling range (°C)	Not Available	Molecular weight (g/mol)	Not Applicable
Flash point (°C)	Not Available	Taste	Not Available
Evaporation rate	Not Applicable	Explosive properties	Not Available
Flammability	Not Available	Oxidising properties	Not Available
Upper Explosive Limit (%)	Not Available	Surface Tension (dyn/cm or mN/m)	Not Available
Lower Explosive Limit (%)	Not Available	Volatile Component (%vol)	Not Available
Vapour pressure (kPa)	Not Available	Gas group	Not Available
Solubility in water (g/L)	Immiscible	pH as a solution (1%)	Not Applicable
Vapour density (Air = 1)	Not Applicable	VOC g/L	Not Available

SECTION 10 STABILITY AND REACTIVITY

Reactivity	See section 7
Chemical stability	<ul style="list-style-type: none"> ▸ Presence of shock and friction ▸ Presence of heat source and ignition source ▸ Product is considered stable under normal handling conditions. ▸ Stable under normal storage conditions. ▸ Hazardous polymerization will not occur. ▸ Avoid contact with other explosives, pyrotechnics, solvents, adhesives, paints, cleaners and unauthorized metals, plastics, packing equipment and materials. ▸ Avoid contamination with acids, alkalis, reducing agents, amines and phosphorus.
Possibility of hazardous reactions	See section 7
Conditions to avoid	See section 7
Incompatible materials	See section 7
Hazardous decomposition products	See section 5

SECTION 11 TOXICOLOGICAL INFORMATION

Information on toxicological effects

Inhaled	There is some evidence to suggest that the material can cause respiratory irritation in some persons. The body's response to such irritation can cause further lung damage.
Ingestion	<p>Accidental ingestion of the material may be damaging to the health of the individual.</p> <p>The principal concern with exposure to inorganic nitrate is its biological reduction to reactive and toxic nitrite. Nitrate itself is relatively harmless. Where bacteria are present and the environment is anaerobic, nitrate can be reduced to nitrite. The main site for this reaction is mouth and stomach, but nitrite formation in the lower intestine and in the bladder (urinary infection) may also be of some toxicological importance.</p> <p>Adults have tolerated large doses of nitrate as sodium and ammonium salt (> 100 mg NO₃-/kg) in some cases repeated for several days for medical or experimental purposes with only minor effects in some subjects (light methaemoglobinaemia, diarrhoea, vomiting).</p> <p>The lethal oral dose of nitrite for adults has been variously reported to be between 0.7 and 6 g NO₂- (approximately 10 to 100 mg NO₂-/kg). Lower doses may apply for children (especially neonates), the elderly and people with certain enzyme deficiencies. The first symptoms of oral nitrite poisoning develop within 15 to 45 minutes</p> <p>In humans, inorganic nitrites produce smooth muscle relaxation, methaemoglobinaemia and cyanosis. The primary effect of nitrite intoxication in animals is methaemoglobinaemia whilst secondary effects include vasodilation, relaxation of smooth muscle and lowering of blood pressure. Other nitrite-induced toxic effects include abdominal pain, diarrhoea, atrophied intestinal villi and apoptotic cell death in the intestinal crypts.</p> <p>Nitrite may also cause sudden fall in blood pressure due to its vasodilating properties. Nitrite has vasodilating properties, probably through transformation into nitric oxide (NO) or a NO-containing molecule acting as a signal factor for smooth muscle relaxation.</p> <p>The substance and/or its metabolites may bind to haemoglobin inhibiting normal uptake of oxygen. This condition, known as "methaemoglobinemia", is a form of oxygen starvation (anoxia).</p> <p>Symptoms include cyanosis (a bluish discolouration skin and mucous membranes) and breathing difficulties. Symptoms may not be evident until several hours after exposure.</p> <p>At about 15% concentration of blood methaemoglobin there is observable cyanosis of the lips, nose and earlobes.</p> <p>Swallowing large doses of ammonium nitrate may cause dilation of blood vessels by direct smooth muscle relaxation and methaemoglobinaemia. Symptoms include dizziness, abdominal pain, vomiting, bloody diarrhoea, weakness, convulsions and collapse. Other effects of exposure include headache, warm flushed skin, nausea, vomiting, diuresis and fatigue. Both tachycardia and bradycardia, atrial fibrillation, cardiac ischaemia, frequent ventricular premature beats and bigeminy have been reported. Severe poisonings have produced hypotension, decreased peripheral vascular resistance, cardiovascular collapse, convulsions and coma</p> <p>Large doses of ammonia or injected ammonium salts may produce diarrhoea and may be sufficiently absorbed to produce increased production of urine and systemic poisoning. Symptoms include weakening of facial muscle, tremor, anxiety, reduced muscle and limb control.</p>
Skin Contact	<p>Skin contact is not thought to have harmful health effects (as classified under EC Directives); the material may still produce health damage following entry through wounds, lesions or abrasions.</p> <p>There is some evidence to suggest that this material can cause inflammation of the skin on contact in some persons.</p> <p>Open cuts, abraded or irritated skin should not be exposed to this material</p> <p>Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.</p>
Eye	This material can cause eye irritation and damage in some persons.
Chronic	<p>There has been concern that this material can cause cancer or mutations, but there is not enough data to make an assessment.</p> <p>Laboratory (in vitro) and animal studies show, exposure to the material may result in a possible risk of irreversible effects, with the possibility of producing mutation.</p> <p>Substance accumulation, in the human body, may occur and may cause some concern following repeated or long-term occupational exposure.</p> <p>Chronic exposure to ammonium nitrate may produce low blood pressure and fatigue. Swallowing 6-12 grams per day in the long term has produced inflammation of the stomach, acidity of the blood, excessive urine output and nitrite toxicity, manifested by methaemoglobin the blood or dilation of blood vessels.</p> <p>Animal testing to see whether nitrites caused cancer proved inconclusive.</p>

	Not Available	Not Available
ammonium nitrate	TOXICITY	IRRITATION
	dermal (rat) LD50: >5000 mg/kg ^[1] Oral (rat) LD50: 2217 mg/kg ^[2]	Nil reported
sodium nitrate	TOXICITY	IRRITATION
	dermal (rat) LD50: >5000 mg/kg ^[1] Oral (rat) LD50: 1267 mg/kg ^[2]	Nil reported
Legend:	1. Value obtained from Europe ECHA Registered Substances - Acute toxicity 2.* Value obtained from manufacturer's SDS. Unless otherwise specified data extracted from RTECS - Register of Toxic Effect of chemical Substances	

SODIUM NITRATE	Asthma-like symptoms may continue for months or even years after exposure to the material ceases. This may be due to a non-allergenic condition known as reactive airways dysfunction syndrome (RADS) which can occur following exposure to high levels of highly irritating compound. Key criteria for the diagnosis of RADS include the absence of preceding respiratory disease, in a non-atopic individual, with abrupt onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. A reversible airflow pattern, on spirometry, with the presence of moderate to severe bronchial hyperreactivity on methacholine challenge testing and the lack of minimal lymphocytic inflammation, without eosinophilia, have also been included in the criteria for diagnosis of RADS. RADS (or asthma) following an irritating inhalation is an infrequent disorder with rates related to the concentration of and duration of exposure to the irritating substance.
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Acute Toxicity	✓	Carcinogenicity	⊖
Skin Irritation/Corrosion	⊖	Reproductivity	⊖
Serious Eye Damage/Irritation	✓	STOT - Single Exposure	⊖
Respiratory or Skin sensitisation	⊖	STOT - Repeated Exposure	⊖
Mutagenicity	⊖	Aspiration Hazard	⊖

Legend: ✗ – Data available but does not fill the criteria for classification
 ✓ – Data required to make classification available
 ⊖ – Data Not Available to make classification

SECTION 12 ECOLOGICAL INFORMATION

Toxicity

Ingredient	Endpoint	Test Duration (hr)	Species	Value	Source
ammonium nitrate	NOEC	20	Fish	0.003mg/L	4
ammonium nitrate	EC50	48	Crustacea	490mg/L	2
ammonium nitrate	EC50	96	Crustacea	39mg/L	2
sodium nitrate	EC50	384	Crustacea	49.116mg/L	3
sodium nitrate	EC50	96	Algae or other aquatic plants	1181.887mg/L	3
sodium nitrate	NOEC	2880	Fish	1.6mg/L	4
sodium nitrate	LC50	96	Fish	>98.9mg/L	2
sodium nitrate	EC50	48	Crustacea	3581mg/L	2

Legend:

Extracted from 1. IUCLID Toxicity Data 2. Europe ECHA Registered Substances - Ecotoxicological Information - Aquatic Toxicity 3. EPIWIN Suite V3.12 - Aquatic Toxicity Data (Estimated) 4. US EPA, Ecotox database - Aquatic Toxicity Data 5. ECETOC Aquatic Hazard Assessment Data 6. NITE (Japan) - Bioconcentration Data 7. METI (Japan) - Bioconcentration Data 8. Vendor Data

Harmful to aquatic organisms.

Continued...

Redpak Packaged Emulsion

DO NOT discharge into sewer or waterways.

Persistence and degradability

Ingredient	Persistence: Water/Soil	Persistence: Air
sodium nitrate	LOW	LOW

Bioaccumulative potential

Ingredient	Bioaccumulation
sodium nitrate	LOW (LogKOW = 0.209)

Mobility in soil

Ingredient	Mobility
sodium nitrate	LOW (KOC = 14.3)

SECTION 13 DISPOSAL CONSIDERATIONS

Waste treatment methods

Product / Packaging disposal	<p>For ammonium nitrate: Add slowly to large amount of water, mix in slight excess of soda ash and neutralise with 6M hydrochloric acid before washing to sewer with large excess of water. Bury residue in an authorised landfill.</p> <ul style="list-style-type: none"> ▸ Explosives which are surplus, deteriorated or considered unsafe for transport, storage or use shall be destroyed and the statutory authorities shall be notified. ▸ Explosives must not be thrown away, buried, discarded or placed with garbage. ▸ This material may be disposed of by burning or detonation but the operation must be performed under the control of a person competent in the destruction of explosives. <p>Disposal by detonation:</p> <ul style="list-style-type: none"> ▸ The explosives to be destroyed must be placed in direct contact with fresh priming charge in a hole which is at least 0.6 metre deep and then adequately stemmed. ▸ No detonators shall be inserted into defective explosives. ▸ DO NOT allow wash water from cleaning or process equipment to enter drains. ▸ It may be necessary to collect all wash water for treatment before disposal. ▸ In all cases disposal to sewer may be subject to local laws and regulations and these should be considered first. ▸ Where in doubt contact the responsible authority.
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Ensure that the disposal of material is carried out in accordance with Hazardous Substances (Disposal) Regulations 2001.

SECTION 14 TRANSPORT INFORMATION

Labels Required

	
Marine Pollutant	NO
HAZCHEM	1YE

Land transport (UN)

UN number	0241
Packing group	Not Applicable
UN proper shipping name	EXPLOSIVE, BLASTING, TYPE E†
Environmental hazard	No relevant data

Transport hazard class(es)	Class	1.1D
	Subrisk	Not Applicable
Special precautions for user	Special provisions	Not Applicable
	Limited quantity	0

Air transport (ICAO-IATA / DGR)

UN number	0241	
Packing group	Not Applicable	
UN proper shipping name	Explosive, blasting, type E †	
Environmental hazard	No relevant data	
Transport hazard class(es)	ICAO/IATA Class	1.1D
	ICAO / IATA Subrisk	Not Applicable
	ERG Code	1L
Special precautions for user	Special provisions	Not Applicable
	Cargo Only Packing Instructions	Forbidden
	Cargo Only Maximum Qty / Pack	Forbidden
	Passenger and Cargo Packing Instructions	Forbidden
	Passenger and Cargo Maximum Qty / Pack	Forbidden
	Passenger and Cargo Limited Quantity Packing Instructions	Forbidden
	Passenger and Cargo Limited Maximum Qty / Pack	Forbidden

Sea transport (IMDG-Code / GGVSee)

UN number	0241	
Packing group	Not Applicable	
UN proper shipping name	EXPLOSIVE, BLASTING, TYPE E	
Environmental hazard	Not Applicable	
Transport hazard class(es)	IMDG Class	1.1D
	IMDG Subrisk	Not Applicable
Special precautions for user	EMS Number	F-B, S-X
	Special provisions	Not Applicable
	Limited Quantities	0

Transport in bulk according to Annex II of MARPOL and the IBC code

Source	Ingredient	Pollution Category
IMO MARPOL 73/78 (Annex II) - List of Noxious Liquid Substances Carried in Bulk	ammonium nitrate	Z

SECTION 15 REGULATORY INFORMATION**Safety, health and environmental regulations / legislation specific for the substance or mixture**

This substance is to be managed using the conditions specified in an applicable Group Standard

Continued...

HSR Number	Group Standard
HSR100175	Not Available

AMMONIUM NITRATE(6484-52-2) IS FOUND ON THE FOLLOWING REGULATORY LISTS

New Zealand Hazardous Substances and New Organisms (HSNO) Act - Classification of Chemicals	New Zealand Inventory of Chemicals (NZIoC)
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SODIUM NITRATE(7631-99-4) IS FOUND ON THE FOLLOWING REGULATORY LISTS

New Zealand Hazardous Substances and New Organisms (HSNO) Act - Classification of Chemicals	New Zealand Inventory of Chemicals (NZIoC)
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Location Test Certificate

Subject to Regulation 55 of the Hazardous Substances (Classes 1 to 5 Controls) Regulations, a location test certificate is required when quantity greater than or equal to those indicated below are present.

Hazard Class	Quantity beyond which controls apply for closed containers	Quantity beyond which controls apply when use occurring in open containers
1.1 (other than 1.1B or 1.1C), 1.2, and 1.5	50 kg	50 kg

Approved Handler

Subject to Regulation 56 of the Hazardous Substances (Classes 1 to 5 Controls) Regulations and Regulation 9 of the Hazardous Substances (Classes 6, 8, and 9 Controls) Regulations, the substance must be under the personal control of an Approved Handler when present in a quantity greater than or equal to those indicated below.

Class of substance	Quantities
All Class 1 (1.1, 1.2, 1.3, 1.4, 1.5, 1.6) except as provided in 'Hazardous Substances (Classes 1 to 5 Controls) Regulations 2001' subclauses (2) to (6)	Any quantity

Refer Group Standards for further information

National Inventory	Status
Australia - AICS	Y
Canada - DSL	Y
Canada - NDSL	N (ammonium nitrate; sodium nitrate)
China - IECSC	Y
Europe - EINEC / ELINCS / NLP	Y
Japan - ENCS	Y
Korea - KECI	Y
New Zealand - NZIoC	Y
Philippines - PICCS	Y
USA - TSCA	Y
Legend:	Y = All ingredients are on the inventory N = Not determined or one or more ingredients are not on the inventory and are not exempt from listing(see specific ingredients in brackets)

SECTION 16 OTHER INFORMATION

Other information

Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent

Continued...

review by the Chemwatch Classification committee using available literature references.

A list of reference resources used to assist the committee may be found at:

www.chemwatch.net

The (M)SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

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TEL (+61 3) 9572 4700.

Safety Data Sheet



Redpak Packaged Emulsion

RedBull Powder Company Ltd

Chemwatch: 5193-37

Version No: 2.1.1.1

Safety Data Sheet according to HSNO Regulations

Chemwatch Hazard Alert Code: 2

Issue Date: 07/12/2015

Print Date: 21/12/2015

Initial Date: **Not Available**

S.GHS.NZL.EN

SECTION 1 IDENTIFICATION OF THE SUBSTANCE / MIXTURE AND OF THE COMPANY / UNDERTAKING

Product Identifier

Product name	Redpak Packaged Emulsion
Synonyms	Packaged Emulsion
Proper shipping name	EXPLOSIVE, BLASTING, TYPE E†
Other means of identification	Not Available

Relevant identified uses of the substance or mixture and uses advised against

Relevant identified uses	Explosive Blasting Product for Commercial Blasting Operations in Mines, Quarries or Construction.
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Details of the supplier of the safety data sheet

Registered company name	RedBull Powder Company Ltd
Address	6 Walls Rd, Penrose, Auckland, 1061 New Zealand
Telephone	+64 9 525 1181
Fax	+64 9 525 1182
Website	www.redbullpowder.co.nz
Email	info@redbullpowder.co.nz

Emergency telephone number

Association / Organisation	RedBull Powder Company
Emergency telephone numbers	+64 9 525 1181 (Mon-Fri 8am to 5pm)
Other emergency telephone numbers	Dial 111 for 24 Hour Emergency Information

SECTION 2 HAZARDS IDENTIFICATION

Continued...

Redpak Packaged Emulsion

Classification of the substance or mixture

Considered a Hazardous Substance according to the criteria of the New Zealand Hazardous Substances New Organisms legislation. Classified as Dangerous Goods for transport purposes.

GHS Classification [1]	Explosive Division 1.1, Acute Toxicity (Oral) Category 5, Eye Irritation Category 2A, Chronic Aquatic Hazard Category 4
Legend:	1. Classified by Chemwatch; 2. Classification drawn from CCID EPA NZ ; 3. Classification drawn from EC Directive 1272/2008 - Annex VI
Determined by Chemwatch using GHS/HSNO criteria	1.1D, 6.1E(oral), 6.4A, 9.1D

Label elements

GHS label elements	 
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SIGNAL WORD	DANGER
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Hazard statement(s)

H201	Explosive; mass explosion hazard
H303	May be harmful if swallowed
H319	Causes serious eye irritation

Precautionary statement(s) Prevention

P101	If medical advice is needed, have product container or label at hand.
P102	Keep out of reach of children.
P103	Read label before use.
P210	Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P230	Keep wetted with phlegmatizer.
P250	Do not subject to grinding/shock/sources of friction.
P280	Wear protective gloves/protective clothing/eye protection/face protection.
P240	Ground/bond container and receiving equipment.

Precautionary statement(s) Response

P312	Call a POISON CENTER or doctor/physician if you feel unwell.
P370+P380	In case of fire: Evacuate area.
P372	Explosion risk in case of fire.
P305+P351+P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P373	DO NOT fight fire when fire reaches explosives.
P337+P313	If eye irritation persists: Get medical advice/attention.

Precautionary statement(s) Storage

P401	Store according to local regulations for explosives.
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Precautionary statement(s) Disposal

P501	Dispose of contents/container in accordance with local regulations.
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SECTION 3 COMPOSITION / INFORMATION ON INGREDIENTS

Substances

See section below for composition of Mixtures

Mixtures

CAS No	%[weight]	Name
6484-52-2	>65	<u>ammonium nitrate</u>
7631-99-4	0-10	<u>sodium nitrate</u>

SECTION 4 FIRST AID MEASURES

NZ Poisons Centre 0800 POISON (0800 764 766) | NZ Emergency Services: 111

Description of first aid measures

Eye Contact	<p>If this product comes in contact with the eyes:</p> <ul style="list-style-type: none"> ▸ Wash out immediately with fresh running water. ▸ Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids. ▸ Seek medical attention without delay; if pain persists or recurs seek medical attention. ▸ Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.
Skin Contact	<p>If skin contact occurs:</p> <ul style="list-style-type: none"> ▸ Immediately remove all contaminated clothing, including footwear. ▸ Flush skin and hair with running water (and soap if available). ▸ Seek medical attention in event of irritation.
Inhalation	<ul style="list-style-type: none"> ▸ If fumes, aerosols or combustion products are inhaled remove from contaminated area. ▸ Other measures are usually unnecessary.
Ingestion	<ul style="list-style-type: none"> ▸ If swallowed do NOT induce vomiting. ▸ If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration. ▸ Observe the patient carefully. ▸ Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious. ▸ Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink. ▸ Seek medical advice.

Indication of any immediate medical attention and special treatment needed

The toxicity of nitrates and nitrites result from their vasodilating properties and their propensity to form methaemoglobin.

- Most produce a peak effect within 30 minutes.
- Clinical signs of cyanosis appear before other symptoms because of the dark pigmentation of methaemoglobin.
- Initial attention should be directed towards improving oxygen delivery, with assisted ventilation, if necessary. Hyperbaric oxygen has not demonstrated conclusive benefits.
- Institute cardiac monitoring, especially in patients with coronary artery or pulmonary disease.
- Hypotension should respond to Trendelenburg's position and intravenous fluids; otherwise dopamine may be needed.
- Naloxone, glucose and thiamine should be given if a multiple ingestion is suspected.
- Decontaminate using Ipecac Syrup for alert patients or lavage for obtunded patients who present within 2-4 hours of ingestion.
- Symptomatic patients with methaemoglobin levels over 30% should receive methylene blue. (Cyanosis alone, is not an indication for treatment). The usual dose is 1-2 mg/kg of a 1% solution (10 mg/ml) IV over 5 minutes; repeat, using the same dose if symptoms of hypoxia fail to subside within 1 hour.

[Ellenhorn and Barceloux: Medical Toxicology]

BIOLOGICAL EXPOSURE INDEX - BEI

These represent the determinants observed in specimens collected from a healthy worker who has been exposed at the Exposure Standard (ES or TLV):

Determinant	Index	Sampling Time	Comments
1. Methaemoglobin in blood	1.5% of haemoglobin	During or end of shift	B,NS,SQ

B: Background levels occur in specimens collected from subjects **NOT** exposed

NS: Non-specific determinant; also observed after exposure to other materials

Continued...

SQ: Semi-quantitative determinant - Interpretation may be ambiguous; should be used as a screening test or confirmatory test.

Symptoms of vasodilation and reflex tachycardia may present following organic nitrate overdose; most organic nitrates are extensively metabolised by hydrolysis to inorganic nitrites. Organic nitrates and nitrites are readily absorbed through the skin, lungs, mucosa and gastro-intestinal tract.

SECTION 5 FIREFIGHTING MEASURES

Extinguishing media

- ▶ **WARNING:** Deliver water spray or fog from a safe distance only.

Special hazards arising from the substrate or mixture

Fire Incompatibility	None known.
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Advice for firefighters

Fire Fighting	<p>WARNING: EXPLOSIVE MATERIALS / ARTICLES PRESENT!</p> <ul style="list-style-type: none"> ▶ Evacuate all personnel and move upwind. ▶ Prevent re-entry. ▶ Alert Fire Brigade and tell them location and nature of hazard. ▶ May detonate and burning material may be propelled from fire. ▶ Wear full-body protective clothing with breathing apparatus. <p>For Division 1.1 Explosives Evacuation is required in case of Emergency. For quantities of up to:</p> <ul style="list-style-type: none"> ▶ 1000 kg, the evacuation distance is 400 metres ▶ 5000 kg, the evacuation distance is 600 metres ▶ 20000 kg, the evacuation distance is 800 metres ▶ 40000 kg, the evacuation distance is 1000 meters
Fire/Explosion Hazard	<ul style="list-style-type: none"> ▶ Will not burn but increases intensity of fire. ▶ Heating may cause expansion or decomposition leading to violent rupture of containers. ▶ Heat affected containers remain hazardous. ▶ Contact with combustibles such as wood, paper, oil or finely divided metal may produce spontaneous combustion or violent decomposition. ▶ May emit irritating, poisonous or corrosive fumes. <p>Division 1.1 Substances, mixtures and articles which have a mass explosion hazard (a mass explosion is one which affects almost the entire quantity present virtually instantaneously).</p> <p>Explosives are defined as substances which are capable by chemical reaction of producing gas at such a temperature and pressure and at such speed as to cause damage to the surroundings. Pyrotechnic substances are included even when they do not evolve gases.</p> <p>Compatibility Group D explosives are secondary detonating explosive substances or black powder or articles containing a secondary detonating explosive substance, in each case without means of initiation and without a propelling charge, or articles containing a primary explosive substance and containing two or more effective protective features</p> <p>Decomposition may produce toxic fumes of; nitrogen oxides (NOx)</p>

SECTION 6 ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Minor Spills	<p>WARNING!: EXPLOSIVE.</p> <p>BLAST and/or PROJECTION and/or FIRE HAZARD</p> <ul style="list-style-type: none"> ▶ Clean up all spills immediately. ▶ Avoid inhalation of the material and avoid contact with eyes and skin. ▶ Wear impervious gloves and safety glasses. ▶ Remove all ignition sources.
Major Spills	<p>WARNING!: EXPLOSIVE.</p> <ul style="list-style-type: none"> ▶ Clear area of personnel and move upwind. ▶ Alert Fire Brigade and tell them location and nature of hazard. ▶ May be violently or explosively reactive. ▶ Wear full body protective clothing with breathing apparatus.

Personal Protective Equipment advice is contained in Section 8 of the SDS.

SECTION 7 HANDLING AND STORAGE

Precautions for safe handling

Safe handling	<ul style="list-style-type: none"> ▸ Avoid personal contact and inhalation of dust, mist or vapours. ▸ Provide adequate ventilation. ▸ Always wear protective equipment and wash off any spillage from clothing. ▸ Keep material away from light, heat, flammables or combustibles. ▸ Keep cool, dry and away from incompatible materials. ▸ Handle gently. Use good occupational work practice. ▸ Observe manufacturer's storage and handling recommendations contained within this SDS. ▸ Avoid all personal contact, including inhalation. ▸ Avoid smoking, naked lights, heat or ignition sources.
Other information	<ul style="list-style-type: none"> ▸ Store cases in a well ventilated magazine licenced for the appropriate Class, Division and Compatibility Group. ▸ Rotate stock to prevent ageing. Use on FIFO (first in-first out) basis. ▸ Observe manufacturer's storage and handling recommendations contained within this SDS. ▸ Store in a cool place in original containers.

Conditions for safe storage, including any incompatibilities

Suitable container	Cartridges 0.10kg / 1.5kg with plastic film in packed fibre board boxes.
Storage incompatibility	<p>Ammonium nitrate:</p> <ul style="list-style-type: none"> ▸ is a strong oxidiser ▸ reacts violently and/ or forms explosive mixtures with hot water, reducing agents, combustible materials, flammable liquids, organic materials, ammonium dichromate, barium chloride, barium nitrate, charcoal, cyanoguanidine, oils, phosphorus, potassium chromate, potassium dichromate, potassium nitrate, potassium permanganate, sodium chloride, finely divided metals ▸ forms explosive and/ or heat- and shock- sensitive compounds with acetic acid, alkali metals (potassium, sodium etc.), ammonia, nitric acid, sodium hypochlorite, sulfur, urea ▸ may explode violently when heated and contained or confined <p>NOTE:- Explosive detonations can occur when material is mixed with organic material, oils or charcoals and when heated or subjected to shock.</p> <ul style="list-style-type: none"> ▸ Inorganic peroxy compounds are potent oxidisers that pose fire or explosive hazards when in contact with ordinary combustible materials. ▸ Inorganic peroxides react with organic compounds to generate organic peroxide and hydroperoxide products that react violently with reducing agents. ▸ Inorganic oxidising agents can react with reducing agents to generate heat and products that may be gaseous (causing pressurization of closed containers). The products may themselves be capable of further reactions (such as combustion in the air). ▸ Organic compounds in general have some reducing power and can in principle react with compounds in this class. ▸ Inorganic reducing agents react with oxidizing agents to generate heat and products that may be flammable, combustible, or otherwise reactive. Their reactions with oxidizing agents may be violent. ▸ Incidents involving interaction of active oxidants and reducing agents, either by design or accident, are usually very energetic and examples of so-called redox reactions. <p>for metal nitrates:</p> <ul style="list-style-type: none"> ▸ Segregate from heavy metals, phosphides, sodium acetate, lead nitrate, tartrates, trichloroethylene, ▸ Avoid shock and heat. ▸ Mixtures of metal nitrates with alkyl esters may explode due to the formation of unstable alkyl nitrates. ▸ Mixtures of a nitrate with phosphorous, tin(II) chloride and other reducing agents may react explosively. ▸ Mixtures containing nitrates and organic materials are potentially dangerous, especially if acidic materials or heavy metals are present. ▸ Fibrous organic material, jute, wood and similar cellulosic material can become highly combustible by nitrate impregnation ▸ Metal nitrates are incompatible with cyanides, thiocyanates, isothiocyanates and hypophosphites. ▸ Avoid contact with other explosives, pyrotechnics, solvents, adhesives, paints, cleaners and unauthorized metals, plastics, packing equipment and materials. ▸ Avoid contamination with acids, alkalis, reducing agents, amines and phosphorus. ▸ Avoid any contamination of this material as it is very reactive and any contamination is potentially hazardous ▸ Explosion hazard may follow contact with incompatible materials

Continued...

- Avoid storage with reducing agents.

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

Control parameters

OCCUPATIONAL EXPOSURE LIMITS (OEL)

INGREDIENT DATA

Not Available

EMERGENCY LIMITS

Ingredient	Material name	TEEL-1	TEEL-2	TEEL-3
ammonium nitrate	Ammonium nitrate	6.7 mg/m ³	73 mg/m ³	440 mg/m ³
sodium nitrate	Sodium nitrate	12 mg/m ³	130 mg/m ³	250 mg/m ³

Ingredient	Original IDLH	Revised IDLH
ammonium nitrate	Not Available	Not Available
sodium nitrate	Not Available	Not Available

Exposure controls

Appropriate engineering controls	<p>Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection.</p> <p>The basic types of engineering controls are:</p> <p>Process controls which involve changing the way a job activity or process is done to reduce the risk.</p> <p>Enclosure and/or isolation of emission source which keeps a selected hazard "physically" away from the worker and ventilation that strategically "adds" and "removes" air in the work environment. Ventilation can remove or dilute an air contaminant if designed properly.</p>
Personal protection	
Eye and face protection	<ul style="list-style-type: none"> ▸ Safety glasses with side shields. ▸ Chemical goggles. ▸ Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lenses or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience.
Skin protection	See Hand protection below
Hands/feet protection	<ul style="list-style-type: none"> ▸ Wear chemical protective gloves, e.g. PVC. ▸ Wear safety footwear or safety gumboots, e.g. Rubber <p>Non-sparking or conductive footwear essential. Conductive footwear describes a boot or shoe with a sole made from a conductive compound chemically bound to the bottom components, for permanent control to electrically ground the foot and shall dissipate static electricity from the body to reduce the possibility of ignition of volatile compounds. Electrical resistance must range between 0 to 500,000 ohms. Conductive shoes should be stored in lockers close to the room in which they are worn. Personnel who have been issued conductive footwear should not wear them from their place of work to their homes and return.</p>
Body protection	See Other protection below
Other protection	<p>For handling explosives or explosive compositions:</p> <ul style="list-style-type: none"> ▸ Wear close-fitting flame-protection treated clothing closed at the neck and sleeves. ▸ Cotton underwear, socks and conductive shoes are recommended to avoid human static discharge. <p>Manufacture may require:</p> <ul style="list-style-type: none"> ▸ Non-static flame retardant treated clothing ▸ Access to deluge Safety shower ▸ Barrier cream.
Thermal hazards	Not Available

Respiratory protection

Not Available

Continued...

Redpak Packaged Emulsion

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Appearance	White semi firm clay like material – negligible odour; insoluble in water.		
Physical state	Non Slump Paste	Relative density (Water = 1)	1.15-1.25
Odour	Not Available	Partition coefficient n-octanol / water	Not Available
Odour threshold	Not Available	Auto-ignition temperature (°C)	Not Available
pH (as supplied)	Not Applicable	Decomposition temperature	Not Available
Melting point / freezing point (°C)	Not Available	Viscosity (cSt)	Not Available
Initial boiling point and boiling range (°C)	Not Available	Molecular weight (g/mol)	Not Applicable
Flash point (°C)	Not Available	Taste	Not Available
Evaporation rate	Not Applicable	Explosive properties	Not Available
Flammability	Not Available	Oxidising properties	Not Available
Upper Explosive Limit (%)	Not Available	Surface Tension (dyn/cm or mN/m)	Not Available
Lower Explosive Limit (%)	Not Available	Volatile Component (%vol)	Not Available
Vapour pressure (kPa)	Not Available	Gas group	Not Available
Solubility in water (g/L)	Immiscible	pH as a solution (1%)	Not Applicable
Vapour density (Air = 1)	Not Applicable	VOC g/L	Not Available

SECTION 10 STABILITY AND REACTIVITY

Reactivity	See section 7
Chemical stability	<ul style="list-style-type: none"> ▸ Presence of shock and friction ▸ Presence of heat source and ignition source ▸ Product is considered stable under normal handling conditions. ▸ Stable under normal storage conditions. ▸ Hazardous polymerization will not occur. ▸ Avoid contact with other explosives, pyrotechnics, solvents, adhesives, paints, cleaners and unauthorized metals, plastics, packing equipment and materials. ▸ Avoid contamination with acids, alkalis, reducing agents, amines and phosphorus.
Possibility of hazardous reactions	See section 7
Conditions to avoid	See section 7
Incompatible materials	See section 7
Hazardous decomposition products	See section 5

SECTION 11 TOXICOLOGICAL INFORMATION

Information on toxicological effects

Inhaled	<p>There is some evidence to suggest that the material can cause respiratory irritation in some persons. The body's response to such irritation can cause further lung damage.</p>
Ingestion	<p>Accidental ingestion of the material may be damaging to the health of the individual.</p> <p>The principal concern with exposure to inorganic nitrate is its biological reduction to reactive and toxic nitrite. Nitrate itself is relatively harmless. Where bacteria are present and the environment is anaerobic, nitrate can be reduced to nitrite. The main site for this reaction is mouth and stomach, but nitrite formation in the lower intestine and in the bladder (urinary infection) may also be of some toxicological importance.</p> <p>Adults have tolerated large doses of nitrate as sodium and ammonium salt (> 100 mg NO₃-/kg) in some cases repeated for several days for medical or experimental purposes with only minor effects in some subjects (light methaemoglobinaemia, diarrhoea, vomiting).</p> <p>The lethal oral dose of nitrite for adults has been variously reported to be between 0.7 and 6 g NO₂- (approximately 10 to 100 mg NO₂-/kg). Lower doses may apply for children (especially neonates), the elderly and people with certain enzyme deficiencies. The first symptoms of oral nitrite poisoning develop within 15 to 45 minutes</p> <p>In humans, inorganic nitrites produce smooth muscle relaxation, methaemoglobinaemia and cyanosis. The primary effect of nitrite intoxication in animals is methaemoglobinaemia whilst secondary effects include vasodilation, relaxation of smooth muscle and lowering of blood pressure. Other nitrite-induced toxic effects include abdominal pain, diarrhoea, atrophied intestinal villi and apoptotic cell death in the intestinal crypts.</p> <p>Nitrite may also cause sudden fall in blood pressure due to its vasodilating properties. Nitrite has vasodilating properties, probably through transformation into nitric oxide (NO) or a NO-containing molecule acting as a signal factor for smooth muscle relaxation.</p> <p>The substance and/or its metabolites may bind to haemoglobin inhibiting normal uptake of oxygen. This condition, known as "methaemoglobinemia", is a form of oxygen starvation (anoxia).</p> <p>Symptoms include cyanosis (a bluish discolouration skin and mucous membranes) and breathing difficulties. Symptoms may not be evident until several hours after exposure.</p> <p>At about 15% concentration of blood methaemoglobin there is observable cyanosis of the lips, nose and earlobes.</p> <p>Swallowing large doses of ammonium nitrate may cause dilation of blood vessels by direct smooth muscle relaxation and methaemoglobinaemia. Symptoms include dizziness, abdominal pain, vomiting, bloody diarrhoea, weakness, convulsions and collapse. Other effects of exposure include headache, warm flushed skin, nausea, vomiting, diuresis and fatigue. Both tachycardia and bradycardia, atrial fibrillation, cardiac ischaemia, frequent ventricular premature beats and bigeminy have been reported. Severe poisonings have produced hypotension, decreased peripheral vascular resistance, cardiovascular collapse, convulsions and coma</p> <p>Large doses of ammonia or injected ammonium salts may produce diarrhoea and may be sufficiently absorbed to produce increased production of urine and systemic poisoning. Symptoms include weakening of facial muscle, tremor, anxiety, reduced muscle and limb control.</p>
Skin Contact	<p>Skin contact is not thought to have harmful health effects (as classified under EC Directives); the material may still produce health damage following entry through wounds, lesions or abrasions.</p> <p>There is some evidence to suggest that this material can cause inflammation of the skin on contact in some persons.</p> <p>Open cuts, abraded or irritated skin should not be exposed to this material</p> <p>Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.</p>
Eye	<p>This material can cause eye irritation and damage in some persons.</p>
Chronic	<p>There has been concern that this material can cause cancer or mutations, but there is not enough data to make an assessment.</p> <p>Laboratory (in vitro) and animal studies show, exposure to the material may result in a possible risk of irreversible effects, with the possibility of producing mutation.</p> <p>Substance accumulation, in the human body, may occur and may cause some concern following repeated or long-term occupational exposure.</p> <p>Chronic exposure to ammonium nitrate may produce low blood pressure and fatigue. Swallowing 6-12 grams per day in the long term has produced inflammation of the stomach, acidity of the blood, excessive urine output and nitrite toxicity, manifested by methaemoglobin the blood or dilation of blood vessels.</p> <p>Animal testing to see whether nitrites caused cancer proved inconclusive.</p>

	Not Available	Not Available
ammonium nitrate	TOXICITY	IRRITATION
	dermal (rat) LD50: >5000 mg/kg ^[1] Oral (rat) LD50: 2217 mg/kg ^[2]	Nil reported
sodium nitrate	TOXICITY	IRRITATION
	dermal (rat) LD50: >5000 mg/kg ^[1] Oral (rat) LD50: 1267 mg/kg ^[2]	Nil reported
Legend:	1. Value obtained from Europe ECHA Registered Substances - Acute toxicity 2.* Value obtained from manufacturer's SDS. Unless otherwise specified data extracted from RTECS - Register of Toxic Effect of chemical Substances	

SODIUM NITRATE	Asthma-like symptoms may continue for months or even years after exposure to the material ceases. This may be due to a non-allergenic condition known as reactive airways dysfunction syndrome (RADS) which can occur following exposure to high levels of highly irritating compound. Key criteria for the diagnosis of RADS include the absence of preceding respiratory disease, in a non-atopic individual, with abrupt onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. A reversible airflow pattern, on spirometry, with the presence of moderate to severe bronchial hyperreactivity on methacholine challenge testing and the lack of minimal lymphocytic inflammation, without eosinophilia, have also been included in the criteria for diagnosis of RADS. RADS (or asthma) following an irritating inhalation is an infrequent disorder with rates related to the concentration of and duration of exposure to the irritating substance.
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Acute Toxicity	✓	Carcinogenicity	⊖
Skin Irritation/Corrosion	⊖	Reproductivity	⊖
Serious Eye Damage/Irritation	✓	STOT - Single Exposure	⊖
Respiratory or Skin sensitisation	⊖	STOT - Repeated Exposure	⊖
Mutagenicity	⊖	Aspiration Hazard	⊖

Legend: ✗ – Data available but does not fill the criteria for classification
 ✓ – Data required to make classification available
 ⊖ – Data Not Available to make classification

SECTION 12 ECOLOGICAL INFORMATION

Toxicity

Ingredient	Endpoint	Test Duration (hr)	Species	Value	Source
ammonium nitrate	NOEC	20	Fish	0.003mg/L	4
ammonium nitrate	EC50	48	Crustacea	490mg/L	2
ammonium nitrate	EC50	96	Crustacea	39mg/L	2
sodium nitrate	EC50	384	Crustacea	49.116mg/L	3
sodium nitrate	EC50	96	Algae or other aquatic plants	1181.887mg/L	3
sodium nitrate	NOEC	2880	Fish	1.6mg/L	4
sodium nitrate	LC50	96	Fish	>98.9mg/L	2
sodium nitrate	EC50	48	Crustacea	3581mg/L	2

Legend:

Extracted from 1. IUCLID Toxicity Data 2. Europe ECHA Registered Substances - Ecotoxicological Information - Aquatic Toxicity 3. EPIWIN Suite V3.12 - Aquatic Toxicity Data (Estimated) 4. US EPA, Ecotox database - Aquatic Toxicity Data 5. ECETOC Aquatic Hazard Assessment Data 6. NITE (Japan) - Bioconcentration Data 7. METI (Japan) - Bioconcentration Data 8. Vendor Data

Harmful to aquatic organisms.

Continued...

Redpak Packaged Emulsion

DO NOT discharge into sewer or waterways.

Persistence and degradability

Ingredient	Persistence: Water/Soil	Persistence: Air
sodium nitrate	LOW	LOW

Bioaccumulative potential

Ingredient	Bioaccumulation
sodium nitrate	LOW (LogKOW = 0.209)

Mobility in soil

Ingredient	Mobility
sodium nitrate	LOW (KOC = 14.3)

SECTION 13 DISPOSAL CONSIDERATIONS

Waste treatment methods

Product / Packaging disposal	<p>For ammonium nitrate: Add slowly to large amount of water, mix in slight excess of soda ash and neutralise with 6M hydrochloric acid before washing to sewer with large excess of water. Bury residue in an authorised landfill.</p> <ul style="list-style-type: none"> ▸ Explosives which are surplus, deteriorated or considered unsafe for transport, storage or use shall be destroyed and the statutory authorities shall be notified. ▸ Explosives must not be thrown away, buried, discarded or placed with garbage. ▸ This material may be disposed of by burning or detonation but the operation must be performed under the control of a person competent in the destruction of explosives. <p>Disposal by detonation:</p> <ul style="list-style-type: none"> ▸ The explosives to be destroyed must be placed in direct contact with fresh priming charge in a hole which is at least 0.6 metre deep and then adequately stemmed. ▸ No detonators shall be inserted into defective explosives. ▸ DO NOT allow wash water from cleaning or process equipment to enter drains. ▸ It may be necessary to collect all wash water for treatment before disposal. ▸ In all cases disposal to sewer may be subject to local laws and regulations and these should be considered first. ▸ Where in doubt contact the responsible authority.
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Ensure that the disposal of material is carried out in accordance with Hazardous Substances (Disposal) Regulations 2001.

SECTION 14 TRANSPORT INFORMATION

Labels Required

	
Marine Pollutant	NO
HAZCHEM	1YE

Land transport (UN)

UN number	0241
Packing group	Not Applicable
UN proper shipping name	EXPLOSIVE, BLASTING, TYPE E†
Environmental hazard	No relevant data

Transport hazard class(es)	Class	1.1D
	Subrisk	Not Applicable
Special precautions for user	Special provisions	Not Applicable
	Limited quantity	0

Air transport (ICAO-IATA / DGR)

UN number	0241	
Packing group	Not Applicable	
UN proper shipping name	Explosive, blasting, type E †	
Environmental hazard	No relevant data	
Transport hazard class(es)	ICAO/IATA Class	1.1D
	ICAO / IATA Subrisk	Not Applicable
	ERG Code	1L
Special precautions for user	Special provisions	Not Applicable
	Cargo Only Packing Instructions	Forbidden
	Cargo Only Maximum Qty / Pack	Forbidden
	Passenger and Cargo Packing Instructions	Forbidden
	Passenger and Cargo Maximum Qty / Pack	Forbidden
	Passenger and Cargo Limited Quantity Packing Instructions	Forbidden
	Passenger and Cargo Limited Maximum Qty / Pack	Forbidden

Sea transport (IMDG-Code / GGVSee)

UN number	0241	
Packing group	Not Applicable	
UN proper shipping name	EXPLOSIVE, BLASTING, TYPE E	
Environmental hazard	Not Applicable	
Transport hazard class(es)	IMDG Class	1.1D
	IMDG Subrisk	Not Applicable
Special precautions for user	EMS Number	F-B, S-X
	Special provisions	Not Applicable
	Limited Quantities	0

Transport in bulk according to Annex II of MARPOL and the IBC code

Source	Ingredient	Pollution Category
IMO MARPOL 73/78 (Annex II) - List of Noxious Liquid Substances Carried in Bulk	ammonium nitrate	Z

SECTION 15 REGULATORY INFORMATION**Safety, health and environmental regulations / legislation specific for the substance or mixture**

This substance is to be managed using the conditions specified in an applicable Group Standard

Continued...

HSR Number	Group Standard
HSR100175	Not Available

AMMONIUM NITRATE(6484-52-2) IS FOUND ON THE FOLLOWING REGULATORY LISTS

New Zealand Hazardous Substances and New Organisms (HSNO) Act - Classification of Chemicals	New Zealand Inventory of Chemicals (NZIoC)
---------------------------------------------------------------------------------------------	--------------------------------------------

SODIUM NITRATE(7631-99-4) IS FOUND ON THE FOLLOWING REGULATORY LISTS

New Zealand Hazardous Substances and New Organisms (HSNO) Act - Classification of Chemicals	New Zealand Inventory of Chemicals (NZIoC)
---------------------------------------------------------------------------------------------	--------------------------------------------

Location Test Certificate

Subject to Regulation 55 of the Hazardous Substances (Classes 1 to 5 Controls) Regulations, a location test certificate is required when quantity greater than or equal to those indicated below are present.

Hazard Class	Quantity beyond which controls apply for closed containers	Quantity beyond which controls apply when use occurring in open containers
1.1 (other than 1.1B or 1.1C), 1.2, and 1.5	50 kg	50 kg

Approved Handler

Subject to Regulation 56 of the Hazardous Substances (Classes 1 to 5 Controls) Regulations and Regulation 9 of the Hazardous Substances (Classes 6, 8, and 9 Controls) Regulations, the substance must be under the personal control of an Approved Handler when present in a quantity greater than or equal to those indicated below.

Class of substance	Quantities
All Class 1 (1.1, 1.2, 1.3, 1.4, 1.5, 1.6) except as provided in 'Hazardous Substances (Classes 1 to 5 Controls) Regulations 2001' subclauses (2) to (6)	Any quantity

Refer Group Standards for further information

National Inventory	Status
Australia - AICS	Y
Canada - DSL	Y
Canada - NDSL	N (ammonium nitrate; sodium nitrate)
China - IECSC	Y
Europe - EINEC / ELINCS / NLP	Y
Japan - ENCS	Y
Korea - KECI	Y
New Zealand - NZIoC	Y
Philippines - PICCS	Y
USA - TSCA	Y
Legend:	Y = All ingredients are on the inventory N = Not determined or one or more ingredients are not on the inventory and are not exempt from listing(see specific ingredients in brackets)

SECTION 16 OTHER INFORMATION

Other information

Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent

Continued...

Redpak Packaged Emulsion

review by the Chemwatch Classification committee using available literature references.

A list of reference resources used to assist the committee may be found at:

www.chemwatch.net

The (M)SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

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TEL (+61 3) 9572 4700.

1. IDENTIFICATION

Product Name	Gassing Solution			
Other Names	Gassing Solution			
Uses	Used as a sensitizer for certain types of explosives; Density modifier.			
Chemical Family	No Data Available			
Chemical Formula	Unspecified			
Chemical Name	Gassing Solution			
Product Description	No Data Available			
Contact Information	Organisation	Location	Telephone	Ask For
	Redox Pty Ltd	2 Swettenham Road Minto NSW 2566 Australia	+61-2-97333000	Technical Officer
		11 Mayo Road Wiri Auckland 2104 New Zealand	+64-9-2506222	
	Poisons Information Centre	Westmead NSW	1800-251525 131126	
	Chemcall	Australia New Zealand	1800-127406 0800-243622 +64-3-3530199	
	National Poisons Centre	New Zealand	0800-764766	

2. HAZARD IDENTIFICATION

ADG Code	Dangerous Goods according to the criteria of the Australian Dangerous Goods Code (ADG Code).	
ASCC Hazard Classification	Hazardous according to the criteria of ASCC [NOHSC:1008(2004)]	
Categories	T	Toxic
	N	Dangerous For The Environment
Risk Phrases	R25	Toxic if swallowed.
	R50	Very toxic to aquatic organisms.
Safety Phrases	S1/2	Keep locked up and out of the reach of children.
	S45	In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
	S61	Avoid release to the environment. Refer to special instructions/Material Safety Data Sheets.
HSNO Hazard Classification		
Poisons Schedule (Aust)	6	

This Material Safety Data Sheet may not provide exhaustive guidance for all HSNO Controls assigned to this substance. The [EPA \(New Zealand\) web site](#) should be consulted for a full list of triggered controls and cited regulations.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Ingredients

Redox Pty Ltd
Redox NZ Auckland Office
PO Box 76886 Manukau City Auckland 2241 New Zealand
11 Mayo Road Wiri Auckland New Zealand

Phone +64 9 250 6222
Fax +64 9 250 6226
E-mail auckland@redox.com
Web www.redox.com
ABN 92 000 762 345

Australia Adelaide
New Zealand Auckland
Christchurch
Hawke's Bay
Malaysia Perth
Kuala Lumpur
Sydney



Chemical Entity	Formula	CAS Number	Proportion
Water	No Data Available	7732-18-5	80.9 %
Sodium Nitrite	No Data Available	7632-00-0	16.4 %
Sodium Thiocyanate	No Data Available	540-72-7	2.7 %

4. FIRST AID MEASURES

Description of necessary measures according to routes of exposure

- Swallowed** Rinse mouth with water. Give plenty of water to drink provided victim is conscious. Do NOT induce vomiting. Seek immediate medical attention.
- Eye** Immediately flush eyes with plenty of water for 15 minutes holding eyelids open. Do NOT use an eye ointment. Seek medical attention.
- Skin** Remove contaminated clothing. Wash affected area with soap and plenty of water. Seek medical attention. Wash clothing before reuse.
- Inhaled** Remove victim from exposure to fresh air. If not breathing, apply artificial respiration. If breathing is difficult, give oxygen. Seek immediate medical attention.
- Advice to Doctor** Treat symptomatically based on individual reactions of patient and judgement of doctor.
NOTE: For advice in an emergency, contact a Poisons Information Centre (Australia 13-11-26 or New Zealand 0800-764-766).
- Medical Conditions Aggravated by Exposure** Toxic if swallowed! Over exposure may lead to methemoglobinemia, (depriving cells of oxygen). This can cause headache, weakness, fatigue, dizziness, and a blue colour to skin and lips. Higher levels may cause trouble breathing, collapse, and death. Nitrates can have a smooth muscle relaxant effect, potentially resulting in Hypotension. Persons with other blood dyscrasias, especially Anemia, might have increased sensitivity to nitrate and nitrate salts. Pre-existing heart disease may be aggravated by exposure to nitrates.

5. FIRE FIGHTING MEASURES

- Flammability Conditions** Oxidizing liquid.
- Extinguishing Media** In case of fire, use flooding quantities of water. Cool containing vessels with water jet to prevent pressure build-up.
- Hazardous Products of Combustion** Product is a non-combustible liquid. Incompatible with oxidizing agents, acids, bases, alcohols, amines, ammonia, amides, glycols, and sources of ignition. Product must NOT be mixed with GAS B or DAM 2 as this may result in the production of toxic nitrogen oxide gas. Also incompatible with combustibles, corrosive or flammable liquids, sulphur, chlorates, permanganates, finely divided metals, and sources of ignition. Contact with acids liberates toxic gas. During a fire, irritataing and highly toxic gases may be generated by thermal decompositional combustion. Hazardous decomposition products include hydrogen cyanide, oxides of nitrogen, oxides of sulphur, and cyanide fumes.
- Personal Protective Equipment** Fire fighters should wear a positive-pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, trousers, boots and gloves). Clear fire area of all non-emergency personnel. Stay upwind. Keep out of low areas. Eliminate ignition sources.
- Flash Point** No Data Available
- Lower Explosion Limit** No Data Available
- Upper Explosion Limit** No Data Available
- Auto Ignition Temperature** No Data Available
- Hazchem Code** 2W

6. ACCIDENTAL RELEASE MEASURES

- General Response Procedure** Personnel involved in the clean up should wear full protective clothing. Evacuate all unnecessary personnel. Eliminate all sources of ignition. Increase ventilation. Avoid walking through spilled product as it may be slippery. Stop leak if safe to do so. Do NOT let product reach drains or waterways. If product does enter a waterway, advise the Environmental Protection Authority or your local Waste Management. Use



clean, non-sparking tools and equipment.

Clean Up Procedures

Soak up spilled product using absorbent non-combustible material such as sand or soil. Avoid using sawdust or cellulose. When saturated collect material, transfer to suitable, labelled, dry chemical-waste containers and dispose of promptly as hazardous waste.

7. HANDLING AND STORAGE

Handling

Ensure an eye bath and safety shower are available and ready for use. Observe good personal hygiene practices and recommended procedures. Wash thoroughly after handling. Take precautionary measures against static discharges by bonding and grounding equipment. Avoid contact with eyes, skin and clothing. Do not inhale product vapours.

Storage

Store in a cool, dry, well-ventilated area. Keep containers tightly closed when not in use. Inspect regularly for deficiencies such as damage or leaks. Protect against physical damage. Store away from incompatible materials such as reactive or combustible materials including Gas B and Dam 2, acids, corrosive or flammable liquids, sulphur, chlorates, permanganates, and finely divided metals. Also incompatible with oxidizing agents, bases, alcohols, amines, ammonia, amides, glycols, and sources of ignition. Protect from direct sunlight and static charges. Store at ambient temperature. This product has a UN classification of 3099 and a Dangerous Goods Class 5.1 (Oxidizer) and a Subsidiary Risk 6.1 (Toxic) according to The Australian Code for the Transport of Dangerous Goods By Road and Rail.

Container

Packaging must comply with requirements of Hazardous Substances (Packaging) Regulations 2001. Store in original packaging as approved by manufacturer.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

General

No exposure standard has been established for this product by the Australian Safety and Compensation Council (ASCC).

Exposure Limits

No Data Available

Biological Limits

No information available on biological limit values for this product.

Engineering Measures

A system of local and/or general exhaust is recommended to keep employee exposures as low as possible. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State

Liquid

Appearance

liquid

Odour

No Data Available

Colour

Redish colour

pH

No Data Available

Vapour Pressure

No Data Available

Relative Vapour Density

No Data Available

Boiling/Melting Point

No Data Available

Solubility

Soluble °C

Freezing Point

No Data Available

Specific Gravity

>1 (WATER=1)

Flash Point

No Data Available

Auto Ignition Temp

No Data Available

Evaporation Rate

No Data Available

Bulk Density

No Data Available

Corrosion Rate

No Data Available

Decomposition Temperature

No Data Available

Density

No Data Available

Specific Heat

No Data Available

No Data Available



Molecular Weight	
Net Propellant Weight	No Data Available
Octanol Water Coefficient	No Data Available
Particle Size	No Data Available
Partition Coefficient	No Data Available
Saturated Vapour Concentration	No Data Available
Vapour Temperature	No Data Available
Viscosity	No Data Available
Volatile Percent	No Data Available
VOC Volume	No Data Available
Additional Characteristics	No Data Available
Potential for Dust Explosion	Product is a liquid.
Fast or Intensely Burning Characteristics	No Data Available
Flame Propagation or Burning Rate of Solid Materials	No Data Available
Non-Flammables That Could Contribute Unusual Hazards to a Fire	No Data Available
Properties That May Initiate or Contribute to Fire Intensity	No Data Available
Reactions That Release Gases or Vapours	No Data Available
Release of Invisible Flammable Vapours and Gases	No Data Available

10. STABILITY AND REACTIVITY

Chemical Stability	Product is stable under normal conditions of use, storage and temperature. Product is an oxidizing liquid.
Conditions to Avoid	Avoid excessive heat, direct sunlight, moisture, freezing, static charges and high temperatures.
Materials to Avoid	Incompatible with oxidizing agents, acids, bases, alcohols, amines, ammonia, amides, and glycols. Product must NOT be mixed with GAS B or DAM 2 as this may result in the production of toxic nitrogen oxide gas. Also incompatible with combustibles, corrosive or flammable liquids, sulphur, chlorates, permanganates, finely divided metals, and sources of ignition.
Hazardous Decomposition Products	Product must NOT be mixed with GAS B or DAM 2 as this may result in the production of toxic nitrogen oxide gas. Contact with acids liberates toxic gas. During a fire, irritating and highly toxic gases may be generated by thermal decomposition. Hazardous decomposition products include hydrogen cyanide, oxides of nitrogen, oxides of sulphur, and cyanide fumes.
Hazardous Polymerisation	Hazardous Polymerization has not been reported.

11. TOXICOLOGICAL INFORMATION

General Information	No toxicological information available on this product.
EyeIrritant	May cause slight to moderate eye irritation. Symptoms include redness, excessive tearing, stinging and swelling.
Ingestion	Toxic if swallowed! Over exposure can cause nausea, vomiting, flushing of the face and neck, headache, weakness, faintness and collapse. Sever over-exposure may interfere with the ability of the blood to carry oxygen (methemoglobinemia). This can cause headache weakness, fatigue, dizziness, and a blue colour to the skin and lips. Higher levels may cause trouble breathing, collapse and death.
Inhalation	Over exposure can cause nausea, vomiting, flushing of the face and neck, headache, weakness, faintness and collapse. Sever over-exposure may interfere with the ability of the blood to carry oxygen (methemoglobinemia). This can cause headache weakness, fatigue, dizziness, and a blue colour to the skin and lips. Higher levels may cause trouble breathing, collapse and death.
SkinIrritant	May cause skin irritation. Symptoms include redness and itchiness. Repeated or prolonged skin contact may cause drying and defatting leading to dermatitis.



Carcinogen Category 0

12. ECOLOGICAL INFORMATION

Ecotoxicity Very toxic to aquatic organisms.
Persistence/Degradability No information available on persistence/degradability for this product.
Mobility Soluble in water.
Environmental Fate Do NOT allow product to enter waterways, drains and sewers.
Bioaccumulation Potential No information available on bioaccumulation for this product.
Environmental Impact No Data Available

13. DISPOSAL CONSIDERATIONS

General Information Dispose of in accordance with all local, state and federal regulations.
 All empty packaging should be disposed of in accordance with Local, State and Federal Regulations or recycled/reconditioned at an approved facility.
Special Precautions for Land Fill Contact a specialist disposal company or the local waste regulator for advice.
 This should be done in accordance with 'The Hazardous Waste Act'.

14. TRANSPORT INFORMATION

ADG Code Dangerous Goods according to the criteria of the Australian Dangerous Goods Code (ADG Code).

Air

IATA

Proper Shipping Name OXIDIZING LIQUID, TOXIC, N.O.S. (SODIUM THIOCYANATE AND SODIUM NITRITE)
Class 5.1 Oxidising Substances
Subsidiary Risk(s) 6.1 Toxic and Infectious Substances - Toxic Substances
UN Number 3099
Hazchem 2W
Pack Group III
Special Provision No Data Available

Land

Australia: ADG

Proper Shipping Name OXIDIZING LIQUID, TOXIC, N.O.S. (SODIUM THIOCYANATE AND SODIUM NITRITE)
Class 5.1 Oxidising Substances
Subsidiary Risk(s) 6.1 Toxic and Infectious Substances - Toxic Substances
EPG 31 Oxidizing Substances
UN Number 3099
Hazchem 2W
Pack Group III
Special Provision No Data Available



New Zealand: NZS5433

Proper Shipping Name	OXIDIZING LIQUID, TOXIC, N.O.S. (SODIUM THIOCYANATE AND SODIUM NITRITE)
Class	5.1 Oxidising Substances
Subsidiary Risk(s)	6.1 Toxic and Infectious Substances - Toxic Substances
EPG	31 Oxidizing Substances
UN Number	3099
Hazchem	2W
Pack Group	III
Special Provision	No Data Available

Sea**IMDG**

Proper Shipping Name	OXIDIZING LIQUID, TOXIC, N.O.S. (SODIUM THIOCYANATE AND SODIUM NITRITE)
Class	5.1 Oxidising Substances
Subsidiary Risk(s)	6.1 Toxic and Infectious Substances - Toxic Substances
UN Number	3099
Hazchem	2W
Pack Group	III
Special Provision	No Data Available
EMS	FA,SQ
Marine Pollutant	No

15. REGULATORY INFORMATION

General Information Classified as hazardous according to The Australian Safety and Compensation Council (ASCC) and Annex I European Directive 67/548/EEC.
 EINECS No: 208-754-4 Sodium Thiocyanate EINECS No: 231-555-9 Sodium Nitrite EINECS No: 231-791-1 Water EINECS No: Disodium 4-hydroxy-3-[(4-sulphonatonaphthyl)azo]naphthalenesulphonate

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16. OTHER INFORMATION

Revision 1
Revision Date 16-Apr-2008

Key/Legend

- < Less Than
- > Greater Than
- AICS** Australian Inventory of Chemical Substances
- atm** Atmosphere
- CAS** Chemical Abstracts Service (Registry Number)
- cm²** Square Centimetres
- CO₂** Carbon Dioxide
- COD** Chemical Oxygen Demand
- deg C (°C)** Degrees Celcius
- EPA (New Zealand)** Environmental Protection Authority of New Zealand
- deg F (°F)** Degrees Farenheit
- g** Grams
- g/cm³** Grams per Cubic Centimetre
- g/l** Grams per Litre
- HSNO** Hazardous Substance and New Organism



IDLH Immediately Dangerous to Life and Health
immiscible Liquids are insoluble in each other.
inHg Inch of Mercury
inH₂O Inch of Water
K Kelvin
kg Kilogram
kg/m³ Kilograms per Cubic Metre
lb Pound
LC₅₀ LC stands for lethal concentration. LC₅₀ is the concentration of a material in air which causes the death of 50% (one half) of a group of test animals. The material is inhaled over a set period of time, usually 1 or 4 hours.
LD₅₀ LD stands for Lethal Dose. LD₅₀ is the amount of a material, given all at once, which causes the death of 50% (one half) of a group of test animals.
ltr or **L** Litre
m³ Cubic Metre
mbar Millibar
mg Milligram
mg/24H Milligrams per 24 Hours
mg/kg Milligrams per Kilogram
mg/m³ Milligrams per Cubic Metre
Misc or **Miscible** Liquids form one homogeneous liquid phase regardless of the amount of either component present.
mm Millimetre
mmH₂O Millimetres of Water
mPa.s Millipascals per Second
N/A Not Applicable
NIOSH National Institute for Occupational Safety and Health
NOHSC National Occupational Health and Safety Commission
OECD Organisation for Economic Co-operation and Development
Oz Ounce
PEL Permissible Exposure Limit
Pa Pascal
ppb Parts per Billion
ppm Parts per Million
ppm/2h Parts per Million per 2 Hours
ppm/6h Parts per Million per 6 Hours
psi Pounds per Square Inch
R Rankine
RCP Reciprocal Calculation Procedure
STEL Short Term Exposure Limit
TLV Threshold Limit Value
tne Tonne
torr Millimetre of Mercury
TWA Time Weighted Average
ug/24H Micrograms per 24 Hours
UN United Nations
wt Weight



1. IDENTIFICATION

Product Name	Acetic Acid Solution, More Than 10% And Less Than 50% Acid, By Mass			
Other Names	Acetic Acid 10-50% Solution; Ethanoic Acid; Methanecarboxylic Acid; Vinegar Acid			
Uses	Manufacturing of acetic anhydride, cellulose acetate, and vinyl acetate monomer; acetic esters; chloroacetic acid; production of plastics, pharmaceuticals, dyes, insecticides, photographic chemicals, etc. , food additive (acidulant); latex coagulant; oil-well acidiser; textile printing.			
Chemical Family	No Data Available			
Chemical Formula	C2H4O2			
Chemical Name	Acetic Acid Solution, More Than 10% And Less Than 50% Acid, By Mass			
Product Description	No Data Available			
Contact Information	Organisation	Location	Telephone	Ask For
	Redox Pty Ltd	2 Swettenham Road Minto NSW 2566 Australia	+61-2-97333000	Technical Officer
		11 Mayo Road Wiri Auckland 2104 New Zealand	+64-9-2506222	
	Poisons Information Centre	Westmead NSW	1800-251525 131126	
	Chemcall	Australia New Zealand	1800-127406 0800-243622 +64-3-3530199	
	National Poisons Centre	New Zealand	0800-764766	

2. HAZARD IDENTIFICATION

ADG Code	Dangerous Goods according to the criteria of the Australian Dangerous Goods Code (ADG Code).		
ASCC Hazard Classification	Hazardous according to the criteria of ASCC [NOHSC:1008(2004)]		
Categories	C	Corrosive	
Risk Phrases	R34	Causes burns.	
Safety Phrases	S1/2	Keep locked up and out of the reach of children.	
	S23	Do not breathe fumes/vapour.	
	S26	In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.	
	S45	In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).	
HSNO Hazard Classification	6.1D; 6.1E; 6.9B; 8.1A; 8.2C; 8.3A; 9.1D; 9.3C		
Poisons Schedule (Aust)	5		

This Material Safety Data Sheet may not provide exhaustive guidance for all HSNO Controls assigned to this substance. The [EPA \(New Zealand\) web site](#) should be consulted for a full list of triggered controls and cited regulations.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Ingredients

Redox Pty Ltd
 Redox NZ Auckland Office
 PO Box 76886 Manukau City Auckland 2241 New Zealand
 11 Mayo Road Wiri Auckland New Zealand

Phone +64 9 250 6222
 Fax +64 9 250 6226
 E-mail auckland@redox.com
 Web www.redox.com
 ABN 92 000 762 345

Australia	New Zealand
Adelaide	Auckland
Brisbane	Christchurch
Melbourne	Hawke's Bay
Perth	Malaysia
Sydney	Kuala Lumpur



Material Safety Data Sheet Acetic Acid Solution, More Than 10% And Less Than 50% Acid, By Mass

Chemical Entity	Formula	CAS Number	Proportion
Water	No Data Available	7732-18-5	50.0 - 90.0 %
Acetic Acid	No Data Available	64-19-7	10.0 - 50.0 %

4. FIRST AID MEASURES

Description of necessary measures according to routes of exposure

Swallowed	Rinse mouth with water. Give water to drink provided victim is conscious. Do NOT induce vomiting. Seek immediate medical attention.
Eye	Immediately flush eyes with water for at least 15 minutes while holding eyelids open. Urgently seek medical attention. Continue to wash with large amounts of water until advised to stop by a Poisons Information Centre or Doctor.
Skin	If spilt on large areas of skin or hair, immediately drench with running water and remove contaminated clothing. Continue to wash skin and hair with running water until advised to stop by a Poisons Information Centre or doctor. For skin burns, cover with a clean, dry dressing until medical help is available.
Inhaled	Remove victim from exposure - avoid becoming a casualty. Remove contaminated clothing and loosen remaining clothing. Allow patient to assume most comfortable position and keep warm. Keep at rest until fully recovered. If patient finds breathing difficult and develops a bluish discolouration of the skin, ensure airways are clear of any obstruction and have qualified person give oxygen through a face mask. Apply artificial respiration if patient is not breathing. Seek immediate medical advice.
Advice to Doctor	Treat symptomatically based on individual reactions of patient and judgement of doctor. Can cause corneal burns.
Medical Conditions Aggravated by Exposure	Chronic over-exposure to acetic acid may result in pharyngitis, catarrhal bronchitis, and erosion of the teeth.

5. FIRE FIGHTING MEASURES

Flammability Conditions	Product is a combustible liquid.
Extinguishing Media	In case of fire, appropriate extinguishing media include water fog (or if unavailable fine water spray), foam, dry agent such as carbon dioxide, or dry chemical powder.
Hazardous Products of Combustion	Combustible Liquid. Vapour is heavier than air - prevent concentration in hollows or sumps. Do NOT enter confined spaces where vapour may have collected. Incompatible with caustic soda, lime, amines, strong alkalis, metals, and oxidising agents. Hazardous decomposition products are not known. Reacts with metals liberating flammable hydrogen gas.
Personal Protective Equipment	Fire fighters should wear a positive-pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, trousers, boots and gloves). Clear fire area of all non-emergency personnel. Stay upwind. Keep out of low areas where gases or fumes can accumulate. Eliminate ignition sources.
Flash Point	>100 (50% solution) °C
Lower Explosion Limit	5.3 %
Upper Explosion Limit	16.6 %
Auto Ignition Temperature	No Data Available
Hazchem Code	2R

6. ACCIDENTAL RELEASE MEASURES

General Response Procedure	Personnel involved in the clean up should wear full protective clothing. Avoid accidents, clean up immediately. Evacuate all unnecessary personnel. Increase ventilation. Avoid walking through spilled product as it is slippery when spilt. Stop leak if safe to do so. Do NOT let product reach drains or waterways. If product does enter a waterway, advise the Environmental Protection Authority or your local Waste Management. Use clean, non-sparking tools and equipment.
Clean Up Procedures	Soak up spilled product using absorbent non-combustible material such as sand or soil. Avoid using sawdust or cellulose. Neutralise with lime or soda ash. When saturated collect material, transfer to suitable, labelled, dry chemical- waste containers and dispose of



Material Safety Data Sheet Acetic Acid Solution, More Than 10% And Less Than 50% Acid, By Mass

promptly as hazardous waste. Wash down area with excess water.

7. HANDLING AND STORAGE

Handling	Ensure an eye bath and safety shower are available and ready for use. Observe good personal hygiene practices and recommended procedures. Wash thoroughly after handling. Take precautionary measures against static discharges by bonding and grounding equipment. Avoid contact with eyes, skin and clothing. Do not inhale vapours.
Storage	Store in a cool, dry, well-ventilated area. Keep containers tightly sealed when not in use. Inspect regularly for deficiencies such as damage or leaks. Protect against physical damage. Store away from incompatible materials as described in section 10. Store away from foodstuffs. Protect from direct sunlight, heat, and sources of ignition. This product has UN classification of 2790 and a Dangerous Goods Class 8 (Corrosive) according to The Australian Code for the Transport of Dangerous Goods By Road and Rail.
Container	Packaging must comply with requirements of Hazardous Substances (Packaging) Regulations 2001. Store in original packaging as approved by manufacturer. NOTE: Corrosion-resistant, acid-proof containers.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

General	The following exposure standard has been established by The Australian Safety and Compensation Council (ASCC); Acetic Acid cas 64-19-7 TWA = 10ppm (25mg/m ³) STEL = 15ppm (37mg/m ³) NOTE: The exposure value at the TWA is the average airborne concentration of a particular substance when calculated over a normal 8 hour working day for a 5 day working week. These exposure standards are guides to be used in the control of occupational health hazards. All atmospheric contamination should be kept to as low a level as is workable. These exposure standards should not be used as fine dividing lines between safe and dangerous concentrations of chemicals. They are not a measure of relative toxicity.
Exposure Limits	No Data Available
Biological Limits	No information available on biological limit values for this product.
Engineering Measures	A system of local and/or general exhaust is recommended to keep air concentrations of components below quoted exposure standards. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Vapour is heavier than air - prevent concentration in hollows or sumps. Do NOT enter confined spaces where vapour may have collected.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State	Liquid
Appearance	Liquid
Odour	Pungent
Colour	Colourless
pH	0.5 - 2.9
Vapour Pressure	1.5kPa (75% Sol) torr (@ 20 °C)
Relative Vapour Density	>1
Boiling/Melting Point	103 - 107 °C
Solubility	Miscible °C
Freezing Point	No Data Available
Specific Gravity	1.05 - 1.07
Flash Point	>100 (50% solution) °C
Auto Ignition Temp	No Data Available
Evaporation Rate	No Data Available
Bulk Density	No Data Available
Corrosion Rate	No Data Available
Decomposition Temperature	No Data Available
Density	No Data Available



Material Safety Data Sheet Acetic Acid Solution, More Than 10% And Less Than 50% Acid, By Mass

Specific Heat	No Data Available
Molecular Weight	No Data Available
Net Propellant Weight	No Data Available
Octanol Water Coefficient	No Data Available
Particle Size	No Data Available
Partition Coefficient	No Data Available
Saturated Vapour Concentration	No Data Available
Vapour Temperature	No Data Available
Viscosity	No Data Available
Volatile Percent	No Data Available
VOC Volume	No Data Available
Additional Characteristics	No Data Available
Potential for Dust Explosion	Product is a liquid
Fast or Intensely Burning Characteristics	No Data Available
Flame Propagation or Burning Rate of Solid Materials	No Data Available
Non-Flammables That Could Contribute Unusual Hazards to a Fire	No Data Available
Properties That May Initiate or Contribute to Fire Intensity	No Data Available
Reactions That Release Gases or Vapours	Reacts with metals liberating flammable hydrogen gas.
Release of Invisible Flammable Vapours and Gases	No Data Available

10. STABILITY AND REACTIVITY

Chemical Stability	Product is stable under normal conditions of use, storage and temperature. Corrosive Liquid
Conditions to Avoid	Avoid exposure to heat, sources of ignition and open flame.
Materials to Avoid	Incompatible with caustic soda, lime, amines, strong alkalis, metals, and oxidising agents.
Hazardous Decomposition Products	Hazardous decomposition products are not known.
Hazardous Polymerisation	Hazardous polymerization will not occur. Reacts with metals liberating flammable hydrogen gas.

11. TOXICOLOGICAL INFORMATION

General Information	No LD50 data available for the product. For the constituent acetic acid: Oral LD50 Rat : 3310mg/Kg Inhalation LC50 Rat : >16000ppm/1hr Inhalation LC50 Mice: 5620ppm/1hr Skin Irritation : Severe Irritant - Rabbit
Eyelrritant	A severe eye irritant. Corrosive to eyes; contact can cause corneal burns. Contamination of eyes may result in permanent injury.
Ingestion	Swallowing can result in nausea, vomiting, diarrhoea, abdominal pain, and chemical burns to the gastrointestinal tract.
Inhalation	Breathing in mists or aerosols may produce respiratory irritation. Breathing in vapour can result in headaches, dizziness, possible nausea and irritation to the respiratory tract, experienced as nasal discomfort and discharge with chest pain and coughing.
SkinIrritant	Contact with skin will result in severe irritation. Corrosive to skin - may cause skin burns.
Carcinogen Category	0



12. ECOLOGICAL INFORMATION

Ecotoxicity	No ecological information available for this product.
Persistence/Degradability	No information available on persistence/degradability for this product.
Mobility	No information available on mobility for this product. Miscible with water.
Environmental Fate	Avoid contaminating waterways, drains and sewers.
Bioaccumulation Potential	No information available on bioaccumulation for this product.
Environmental Impact	No Data Available

13. DISPOSAL CONSIDERATIONS

General Information	Dispose of in accordance with all local, state and federal regulations. All empty packaging should be disposed of in accordance with Local, State, and Federal Regulations or recycled/reconditioned at an approved facility.
Special Precautions for Land Fill	Contact a specialist disposal company or the local waste regulator for advice. This should be done in accordance with 'The Hazardous Waste Act'.

14. TRANSPORT INFORMATION

ADG Code	Dangerous Goods according to the criteria of the Australian Dangerous Goods Code (ADG Code).
-----------------	----------------------------------------------------------------------------------------------

Land

Australia: ADG Code

Proper Shipping Name	ACETIC ACID SOLUTION, more than 10% and less than 50% acid, by mass
Class	8 Corrosive Substances
Subsidiary Risk(s)	No Data Available
EPG	36 Toxic And/Or Corrosive Substances Combustible
UN Number	2790
Hazchem	2R
Pack Group	II
Special Provision	No Data Available

New Zealand: NZS5433

Proper Shipping Name	ACETIC ACID SOLUTION, more than 10% and less than 50% acid, by mass
Class	8 Corrosive Substances
Subsidiary Risk(s)	No Data Available
EPG	36 Toxic And/Or Corrosive Substances Combustible
UN Number	2790
Hazchem	2R
Pack Group	II
Special Provision	No Data Available

Sea

IMDG Code

Proper Shipping Name	ACETIC ACID SOLUTION, more than 10% and less than 50% acid, by mass
-----------------------------	---------------------------------------------------------------------



Material Safety Data Sheet Acetic Acid Solution, More Than 10% And Less Than 50% Acid, By Mass

Class	8 Corrosive Substances
Subsidiary Risk(s)	No Data Available
UN Number	2790
Hazchem	No Data Available
Pack Group	III
Special Provision	No Data Available
EMS	FA,SB
Marine Pollutant	No

15. REGULATORY INFORMATION

General Information Classified as hazardous according to The Australian Safety and Compensation Council (ASCC) and Annex I European Directive 67/548/EEC.
EINECS No: 200-580-7 ACETIC ACID

EPA (New Zealand)

Hazardous Substances and New Organisms Act (HSNO)

Approval Code: HSR001581

Poisons Schedule (Aust) 5
AICS Name ACETIC ACID

16. OTHER INFORMATION

Revision 1
Revision Date 01-May-2009

Key/Legend

< Less Than
> Greater Than
AICS Australian Inventory of Chemical Substances
atm Atmosphere
CAS Chemical Abstracts Service (Registry Number)
cm² Square Centimetres
CO₂ Carbon Dioxide
COD Chemical Oxygen Demand
deg C (°C) Degrees Celcius
EPA (New Zealand) Environmental Protection Authority of New Zealand
deg F (°F) Degrees Farenheit
g Grams
g/cm³ Grams per Cubic Centimetre
g/l Grams per Litre
HSNO Hazardous Substance and New Organism
IDLH Immediately Dangerous to Life and Health
immiscible Liquids are insoluable in each other.
inHg Inch of Mercury
inH₂O Inch of Water
K Kelvin
kg Kilogram
kg/m³ Kilograms per Cubic Metre
lb Pound
LC₅₀ LC stands for lethal concentration. LC₅₀ is the concentration of a material in air which causes the death of 50% (one half) of a group of test animals. The material is inhaled over a set period of time, usually 1 or 4 hours.
LD₅₀ LD stands for Lethal Dose. LD₅₀ is the amount of a material, given all at once, which causes the death of 50% (one half) of a group of test animals.
ltr or **L** Litre
m³ Cubic Metre
mbar Millibar
mg Milligram



Material Safety Data Sheet Acetic Acid Solution, More Than 10% And Less Than 50% Acid, By Mass

mg/24H Milligrams per 24 Hours

mg/kg Milligrams per Kilogram

mg/m³ Milligrams per Cubic Metre

Misc or **Miscible** Liquids form one homogeneous liquid phase regardless of the amount of either component present.

mm Millimetre

mmH₂O Millimetres of Water

mPa.s Millipascals per Second

N/A Not Applicable

NIOSH National Institute for Occupational Safety and Health

NOHSC National Occupational Health and Safety Commission

OECD Organisation for Economic Co-operation and Development

Oz Ounce

PEL Permissible Exposure Limit

Pa Pascal

ppb Parts per Billion

ppm Parts per Million

ppm/2h Parts per Million per 2 Hours

ppm/6h Parts per Million per 6 Hours

psi Pounds per Square Inch

R Rankine

RCP Reciprocal Calculation Procedure

STEL Short Term Exposure Limit

TLV Threshold Limit Value

tne Tonne

torr Millimetre of Mercury

TWA Time Weighted Average

ug/24H Micrograms per 24 Hours

UN United Nations

wt Weight



SAFETY DATA SHEET



BP Ultimate Diesel

Section 1. Identification

Product name	BP Ultimate Diesel
Product code	0000003121
SDS no.	0000003121
Use of the substance/mixture	Fuel for compression ignition diesel engines. For specific application advice see appropriate Technical Data Sheet or consult our company representative.
Product type	Oily liquid.
Supplier	BP Oil New Zealand Limited Watercare House, Ground floor and 1st floor 73 Remuera Road Newmarket, Auckland, New Zealand Phone 09 969 9300
Emergency telephone number	Tel: 0800 805 111
New Zealand National Poisons Centre	0800 764 766
OTHER PRODUCT INFORMATION	Technical Helpline 09 623 9451

Section 2. Hazards identification

HSNO Classification	3.1 - FLAMMABLE LIQUIDS - Category D 6.3 - SKIN IRRITATION - Category B 6.7 - CARCINOGENICITY - Category B 6.1 - ACUTE TOXICITY (aspiration) (oral) - Category E 9.1 - AQUATIC ECOTOXICITY - Category B
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This material is classified as hazardous according to criteria in the Hazardous Substances (Minimum Degrees of Hazard) Regulations 2001 and has been classified according to the Hazardous Substances (Classifications) Regulations 2001.

This material is classified as a dangerous good according to criteria in New Zealand Standard 5433:2007 Transport of Dangerous Goods on Land.

Routes of entry Dermal contact. Eye contact. Inhalation. Ingestion.

GHS label elements

Signal word Danger

Hazard statements Combustible liquid.
Causes mild skin irritation.
Suspected of causing cancer.
May be fatal if swallowed and enters airways.
Toxic to aquatic life with long lasting effects.

Precautionary statements

Prevention Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Use personal protective equipment as required. Wear protective gloves. Wear eye or face protection. Keep away from flames and hot surfaces. Avoid release to the environment. Keep out of reach of children. If medical advice is needed: Have product container or label at hand.

Response Collect spillage. Immediately call a POISON CENTER or doctor/physician. IF SWALLOWED: Do NOT induce vomiting. IF exposed or concerned: Get medical advice/attention.

Storage Store locked up. Store in a well-ventilated place. Keep cool.

Disposal Dispose of contents and container in accordance with all local, regional, national and international regulations.

Section 2. Hazards identification

Symbol



Other hazards which do not result in classification

Note: High Pressure Applications
Injections through the skin resulting from contact with the product at high pressure constitute a major medical emergency.
See 'Notes to physician' under First-Aid Measures, Section 4 of this Safety Data Sheet.
This material may contain significant quantities of polycyclic aromatic hydrocarbons (PCAs), some of which have been shown by experimental studies to induce skin cancer.

Section 3. Composition/information on ingredients

Substance/mixture Mixture

Complex mixture of middle distillate hydrocarbons, with carbon numbers in C10 to C28 range. May also contain small quantities of proprietary performance additives.

Ingredient name	%	CAS number
Diesel fuel	> 99.5	68334-30-5

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First-aid measures

Description of necessary first aid measures

Inhalation

If inhaled, remove to fresh air. Get medical attention.

Ingestion

Do not induce vomiting. Get medical attention immediately. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Aspiration hazard if swallowed. Can enter lungs and cause damage.

Skin contact

In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention if symptoms occur.

Eye contact

In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Check for and remove any contact lenses. Eyelids should be held away from the eyeball to ensure thorough rinsing. Get medical attention if symptoms occur.

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician

Treatment should in general be symptomatic and directed to relieving any effects. Product can be aspirated on swallowing or following regurgitation of stomach contents, and can cause severe and potentially fatal chemical pneumonitis, which will require urgent treatment. Because of the risk of aspiration, induction of vomiting and gastric lavage should be avoided. Gastric lavage should be undertaken only after endotracheal intubation. Monitor for cardiac dysrhythmias.

Note: High Pressure Applications

Injections through the skin resulting from contact with the product at high pressure constitute a major medical emergency. Injuries may not appear serious at first but within a few hours tissue becomes swollen, discoloured and extremely painful with extensive subcutaneous necrosis.

Surgical exploration should be undertaken without delay. Thorough and extensive debridement of the wound and underlying tissue is necessary to minimise tissue loss and prevent or limit permanent damage. Note that high pressure may force the product considerable distances along tissue planes.

Protection of first-aiders

No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

Section 5. Fire-fighting measures

Extinguishing media

Suitable

In case of fire, use water fog, foam, dry chemical or carbon dioxide extinguisher or spray.

Not suitable

Do not use water jet.

Specific hazards arising from the chemical

Combustible liquid. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. Runoff to sewer may create fire or explosion hazard. This material is toxic to aquatic life with long lasting effects. Fire water contaminated with this material must be contained and prevented from being discharged to any waterway, sewer or drain.

Hazardous combustion products

Combustion products may include the following:
carbon oxides (CO, CO₂) (carbon monoxide, carbon dioxide)

Hazchem code

Not available.

Special precautions for fire-fighters

Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

Special protective equipment for fire-fighters

Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel

Immediately contact emergency personnel. No action shall be taken involving any personal risk or without suitable training. Eliminate all ignition sources. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilt material. Floors may be slippery; use care to avoid falling. No flares, smoking or flames in hazard area. Avoid breathing vapour or mist. Provide adequate ventilation. Put on appropriate personal protective equipment (see Section 8).

For emergency responders

Entry into a confined space or poorly ventilated area contaminated with vapour, mist or fume is extremely hazardous without the correct respiratory protective equipment and a safe system of work. Wear self-contained breathing apparatus. Wear a suitable chemical protective suit. Chemical resistant boots. See also the information in "For non-emergency personnel".

Environmental precautions

Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air). Water polluting material. May be harmful to the environment if released in large quantities. Collect spillage.

Methods and materials for containment and cleaning up

Small spill

Eliminate all ignition sources. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment. Move containers from spill area. Absorb with an inert material and place in an appropriate waste disposal container. The method and equipment used must be in conformance with appropriate regulations and industry practice on explosive atmospheres. Dispose of via a licensed waste disposal contractor.

Large spill

Eliminate all ignition sources. Stop leak if without risk. Move containers from spill area. Approach the release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Dike spill area and do not allow product to reach sewage system and surface or ground water. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Use spark-proof tools and explosion-proof equipment. Contaminated absorbent material may pose the same hazard as the spilt product. The method and equipment used must be in conformance with appropriate regulations and industry practice on explosive atmospheres. Dispose of via a licensed waste disposal contractor.

Section 7. Handling and storage

Precautions for safe handling

Put on appropriate personal protective equipment (see Section 8). Do not get in eyes or on skin or clothing. Do not swallow. Never siphon by mouth. Avoid exposure - obtain special instructions before use. Avoid breathing vapour or mist. Use only with adequate ventilation. Avoid release to the environment. Do not enter storage areas and confined spaces unless adequately ventilated. Wear appropriate respirator when ventilation is inadequate. Take precautionary measures against electrostatic discharges. To avoid fire or explosion, dissipate static electricity during transfer by earthing and bonding containers and equipment before transferring material. Wash thoroughly after handling. Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Remove contaminated clothing and protective equipment before entering eating areas. Workers should wash hands and face before eating, drinking and smoking. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use only non-sparking tools. Empty containers retain product residue and can be hazardous. Do not reuse container. Aspiration hazard if swallowed. Can enter lungs and cause damage. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities

Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Eliminate all ignition sources. Separate from oxidising materials. Keep container tightly closed and sealed until ready for use. Store and use only in equipment/containers designed for use with this product. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabelled containers. Use appropriate containment to avoid environmental contamination.

Light hydrocarbon vapours can build up in the headspace of tanks. These can cause flammability/explosion hazards even at temperatures below the normal flash point (note: flash point must not be regarded as a reliable indicator of the potential flammability of vapour in tank headspaces). Tank headspaces should always be regarded as potentially flammable and care should be taken to avoid static electrical discharge and all ignition sources during filling, ullaging and sampling from storage tanks. Do not enter storage tanks. If entry to vessels is necessary, follow permit to work procedures. Entry to any tanks or other confined space requires a full risk assessment and appropriate control measures to be put in place in conformance with appropriate regulations and industry practice on confined space entry. When the product is pumped (e.g. during filling, discharge or ullaging) and when sampling, there is a risk of static discharge. Ensure equipment used is properly earthed or bonded to the tank structure. Electrical equipment should not be used unless it is intrinsically safe (i.e. will not produce sparks). Explosive air/vapour mixtures may form at ambient temperature. If product comes into contact with hot surfaces, or leaks occur from pressurised fuel pipes, the vapour or mists generated will create a flammability or explosion hazard. Product contaminated rags, paper or material used to absorb spillages, represent a fire hazard, and should not be allowed to accumulate. Dispose of safely immediately after use.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
Fuels, diesel	ACGIH TLV (United States). Absorbed through skin. TWA: 100 mg/m ³ , (measured as total hydrocarbons) 8 hours. Issued/Revised: 1/2007 Form: Inhalable fraction and vapor TWA: 100 mg/m ³ 8 hours. Issued/Revised: 1/2007 Form: Total hydrocarbons

Section 8. Exposure controls/personal protection

Recommended monitoring procedures

If this product contains ingredients with exposure limits, personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment. Reference should be made to appropriate monitoring standards. Reference to national guidance documents for methods for the determination of hazardous substances will also be required.

Appropriate engineering controls

Provide exhaust ventilation or other engineering controls to keep the relevant airborne concentrations below their respective occupational exposure limits. All activities involving chemicals should be assessed for their risks to health, to ensure exposures are adequately controlled. Personal protective equipment should only be considered after other forms of control measures (e.g. engineering controls) have been suitably evaluated. Personal protective equipment should conform to appropriate standards, be suitable for use, be kept in good condition and properly maintained.

Your supplier of personal protective equipment should be consulted for advice on selection and appropriate standards. For further information contact your national organisation for standards. The final choice of protective equipment will depend upon a risk assessment. It is important to ensure that all items of personal protective equipment are compatible.

Environmental exposure controls

Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Hygiene measures

Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye protection

Chemical splash goggles.

Hand protection

Wear chemical resistant gloves. Recommended: Nitrile gloves.

Do not re-use gloves. Protective gloves must give suitable protection against mechanical risks (i.e. abrasion, blade cut and puncture). Protective gloves will deteriorate over time due to physical and chemical damage. Inspect and replace gloves on a regular basis. The frequency of replacement will depend upon the circumstances of use.

Skin protection

Use of protective clothing is good industrial practice. Cotton or polyester/cotton overalls will only provide protection against light superficial contamination that will not soak through to the skin. Overalls should be laundered on a regular basis. When the risk of skin exposure is high (e.g. when cleaning up spillages or if there is a risk of splashing) then chemical resistant aprons and/or impervious chemical suits and boots will be required. Wear suitable protective clothing. Footwear highly resistant to chemicals. When there is a risk of ignition from static electricity, wear anti-static protective clothing. For greatest effectiveness against static electricity, overalls, boots and gloves should all be anti-static. When there is a risk of ignition wear inherently fire resistant protective clothes and gloves. Work clothing / overalls should be laundered on a regular basis. Laundering of contaminated work clothing should only be done by professional cleaners who have been told about the hazards of the contamination. Always keep contaminated work clothing away from uncontaminated work clothing and uncontaminated personal clothes. When the risk of skin exposure is high (from experience this could apply to the following tasks: cleaning work, maintenance and service, filling and transfer, taking samples and cleaning up spillages) then a chemical protective suit and boots will be required. Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. Recommended:

Section 8. Exposure controls/personal protection

Respiratory protection

In case of insufficient ventilation, wear suitable respiratory equipment. If there is a requirement for the use of a respiratory protective device, but the use of breathing apparatus (independent of ambient atmosphere) is not required, then a suitable filtering device must be worn. The filter class must be suitable for the maximum contaminant concentration (gas/vapour/aerosol/particulates) that may arise when handling the product. The correct choice of respiratory protection depends upon the chemicals being handled, the conditions of work and use, and the condition of the respiratory equipment. Safety procedures should be developed for each intended application. Respiratory protection equipment should therefore be chosen in consultation with the supplier/manufacturer and with a full assessment of the working conditions. Respiratory protection should conform to AS/NZS 1715 and AS/NZS 1716.

Section 9. Physical and chemical properties

Appearance

Physical state	Oily liquid.
Colour	Clear Colourless. to Amber.
Odour	Diesel fuel
pH	Not available.
Melting point	Not available.
Boiling point	>180°C (>356°F)
Drop Point	Not available.
Flash point	Closed cup: >61.5°C (>142.7°F) [Pensky-Martens.]
Auto-ignition temperature	240°C (464°F)
Lower and upper explosive (flammable) limits	Lower: 0.7% Upper: 5%
Vapour pressure	0.093 kPa (0.7 mm Hg) at 20°C
Vapour density	Not available.
Density	830 kg/m ³ (0.83 g/cm ³)
Solubility	Very slightly soluble in water
Partition coefficient: n-octanol/water	>3
Viscosity	Kinematic: 2 to 4.5 mm ² /s (2 to 4.5 cSt) at 40°C

Section 10. Stability and reactivity

Chemical stability	The product is stable.
Possibility of hazardous reactions	Under normal conditions of storage and use, hazardous reactions will not occur. Under normal conditions of storage and use, hazardous polymerisation will not occur.
Conditions to avoid	Avoid all possible sources of ignition (spark or flame). Avoid excessive heat.
Incompatible materials	Reactive or incompatible with the following materials: oxidising materials.
Hazardous decomposition products	Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

Information on the likely routes of exposure

Inhalation	Harmful if inhaled.
Ingestion	Irritating to mouth, throat and stomach. Aspiration hazard if swallowed -- harmful or fatal if liquid is aspirated into lungs.
Skin contact	Causes mild skin irritation.
Eye contact	Causes eye irritation.

Symptoms related to the physical, chemical and toxicological characteristics

Section 11. Toxicological information

Inhalation	Adverse symptoms may include the following: nausea or vomiting headache dizziness/vertigo unconsciousness
Ingestion	Adverse symptoms may include the following: nausea or vomiting
Skin contact	Adverse symptoms may include the following: irritation redness
Eye contact	Adverse symptoms may include the following: pain or irritation watering redness

Acute toxicity

Product/ingredient name	Test	Species	Result	Exposure	Remarks
Fuels, diesel	LC50 Inhalation Dusts and mists	Rat	4.1 mg/l	4 hours	Based on Diesel fuel
	LD50 Dermal	Rabbit	>4300 mg/kg	-	Based on No. 2 Heating Oil.
	LD50 Dermal	Rabbit	>4300 mg/kg	-	Based on Diesel fuel
	LD50 Oral	Rat	17900 mg/kg	-	Based on No. 2 Heating Oil.
	LD50 Oral	Rat	7600 mg/kg	-	Based on Diesel fuel

Conclusion/Summary Not available.

Irritation/Corrosion

Product/ingredient name	Species	Result	Score	Exposure	Observation	Conc.	Remarks
Fuels, diesel	Rabbit	Skin - Irritation	-	-	-	-	Based on No. 2 Heating Oil.
	Rabbit	Skin - Irritation	-	-	-	-	Based on Diesel fuel
	Rabbit	Eyes - Non-irritating to the eyes.	-	-	-	-	Based on No. 2 Heating Oil.
	Rabbit	Eyes - Non-irritating to the eyes.	-	-	-	-	Based on Diesel fuel

Sensitisation

Product/ingredient name	Route of exposure	Species	Result	Remarks
Fuels, diesel	skin	Guinea pig	Not sensitising	Based on No. 2 Heating Oil.
	skin	Guinea pig	Not sensitising	Based on Diesel fuel

Potential chronic health effects

General	May cause damage to organs through prolonged or repeated exposure. Vapour, mists or fumes may contain polycyclic aromatic hydrocarbons some of which are known to produce skin cancer.
Inhalation	Vapour, mists or fumes may contain polycyclic aromatic hydrocarbons some of which are known to produce skin cancer. May be harmful by inhalation after often repeated exposure. Vapour, mist or fume may irritate the nose, mouth and respiratory tract.

Section 11. Toxicological information

Ingestion	If swallowed, may irritate the mouth, throat and digestive system. If swallowed, may cause abdominal pain, stomach cramps, nausea, vomiting, diarrhoea, dizziness and drowsiness.
Skin contact	As with all such products containing potentially harmful levels of PCAs, prolonged or repeated skin contact may eventually result in dermatitis or more serious irreversible skin disorders including cancer.
Eye contact	Vapour, mist or fume may cause eye irritation. Exposure to vapour, mist or fume may cause stinging, redness and watering of the eyes.
Carcinogenicity	Suspected of causing cancer. Risk of cancer depends on duration and level of exposure.
Mutagenicity	No known significant effects or critical hazards.
Teratogenicity	No known significant effects or critical hazards.
Developmental effects	No known significant effects or critical hazards.
Fertility effects	No known significant effects or critical hazards.

Carcinogenicity

Product/ingredient name	Test	Species	Result	Exposure	
Fuels, diesel	Mouse	Dermal	2 years	Positive - Dermal - Unspecified	Based on Heating Oil.

Conclusion/Summary Suspected of causing cancer.

Mutagenicity

Product/ingredient name	Test	Experiment	Result	Remarks
Fuels, diesel	OECD 471	Experiment: In vitro Subject: Non-mammalian species	Positive	Based on Diesel fuel
	Equivalent to OECD 476	Experiment: In vitro Subject: Mammalian-Animal Cell: Germ	Negative	Based on Heating Oil.
	not guideline	Experiment: In vivo Subject: Unspecified Cell: Somatic	Negative	Based on Heating Oil.

Conclusion/Summary Not classified. Based on available data, the classification criteria are not met.

Reproductive toxicity

Product/ingredient name	Maternal toxicity	Fertility	Developmental toxin	Species	Result	Exposure
Fuels, diesel	-	-	Negative	Rat	Dermal	20 days
	-	-	Negative	Rat	Dermal	10 days
	-	-	Negative	Rat	Dermal	10 days

Conclusion/Summary Development: Not classified. Based on available data, the classification criteria are not met.
Fertility: Not classified. Based on available data, the classification criteria are not met.
Effects on or via lactation: Not classified. Based on available data, the classification criteria are not met.

Aspiration hazard

Name
Fuels, diesel

Section 12. Ecological information

Ecotoxicity

This product shows a low bioaccumulation potential. Water polluting material. May be harmful to the environment if released in large quantities. This material is toxic to aquatic life with long lasting effects.

Aquatic and terrestrial toxicity

Product/ingredient name	Species	Result/Test	Exposure	Effects	Remarks
Fuels, diesel	Micro-organism	EL50 >1000 mg/l Nominal Fresh water	40 hours	growth inhibition	Based on Vacuum gas oil / Hydrocracked gas oil / Distillate Fuel
	Micro-organism	NOELR 3.217 mg/l Nominal Fresh water	40 hours	growth inhibition	Based on Vacuum gas oil / Hydrocracked gas oil / Distillate Fuel
	Algae	Acute EL50 22 mg/l Nominal Fresh water	72 hours	(growth rate)	Based on Diesel fuel
	Daphnia	Acute EL50 210 mg/l Nominal Fresh water	48 hours	Mobility	Based on Diesel fuel
	Daphnia	Acute EL50 68 mg/l Nominal Fresh water	48 hours	Mobility	Based on Diesel fuel
	Algae	Acute ErL50 78 mg/l Nominal Fresh water	72 hours	(growth rate)	Based on Diesel fuel
	Fish	Acute LL50 65 mg/l Nominal Fresh water	96 hours	Mortality	Based on Diesel fuel
	Fish	Acute LL50 21 mg/l Nominal Fresh water	96 hours	Mortality	Based on Diesel fuel
	Algae	Acute NOELR 10 mg/l Nominal Fresh water	72 hours	(growth rate)	Based on Diesel fuel
	Algae	Acute NOELR 1 mg/l Nominal Fresh water	72 hours	(growth rate)	Based on Diesel fuel
	Daphnia	Acute NOELR 46 mg/l Nominal Fresh water	48 hours	Mobility	Based on Diesel fuel
	Fish	Chronic NOEL 0.083 mg/l Nominal Fresh water	14 days	Mortality	Based on Vacuum gas oil / Hydrocracked gas oil / Distillate Fuel
	Daphnia	Chronic NOELR 0.2 mg/l Nominal Fresh water	21 days	Immobilisation	Based on Vacuum gas oil / Hydrocracked gas oil / Distillate Fuel

Persistence and degradability

Inherently biodegradable

Product/ingredient name	Test	Result	Remarks
Fuels, diesel	OECD 301 F	60 % - Readily - 28 days	Based on Diesel fuel
	OECD 301 F	57.5 % - Not readily - 28 days	Based on Diesel fuel
	Equivalent to EPA OTS 796.3100	35 % - Not readily - 28 days	Based on Gas Oils (petroleum), solvent refined

Section 12. Ecological information

Bioaccumulative potential

This product is not expected to bioaccumulate through food chains in the environment.

Product/ingredient name	LogP _{ow}	BCF	Potential
Fuels, diesel	>3	-	low

Mobility in soil

Mobility

Spillages may penetrate the soil causing ground water contamination. This material may accumulate in sediments.

Soil/water partition coefficient (K_{oc})

Not available.

Other ecological information

Spills may form a film on water surfaces causing physical damage to organisms. Oxygen transfer could also be impaired.

Section 13. Disposal considerations

Disposal methods

The generation of waste should be avoided or minimised wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Vapor from product residues may create a highly flammable or explosive atmosphere inside the container. Do not cut, weld or grind used containers unless they have been cleaned thoroughly internally. Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers.

Section 14. Transport information

Regulatory information		Proper shipping name	Classes	PG*	Label	Additional information
New Zealand Class	UN3082	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (Fuels, diesel)	9	III	 	-
ADG Class	Not regulated.					Remarks Combustible liquid Class C1 (AS 1940).
IATA Class	UN3082	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (Fuels, diesel)	9	III	 	The environmentally hazardous substance mark is not required when transported in sizes of ≤5 L or ≤5 kg.

Section 14. Transport information

IMDG Class	UN3082	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (Fuels, diesel). Marine pollutant	9	III	 The diamond is divided into four quadrants. The top quadrant contains a flame, the bottom-left contains a skull and crossbones, the bottom-right contains a tree and a fish, and the center contains a flame.	The marine pollutant mark is not required when transported in sizes of ≤5 L or ≤5 kg. Emergency schedules (EmS) F-A, S-F
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PG* : Packing group

Section 15. Regulatory information

New Zealand Regulatory Information

HSNO Approval Number	HSR001441
HSNO Group Standard	Petrol and petroleum products
HSNO Classification	3.1 - FLAMMABLE LIQUIDS - Category D 6.3 - SKIN IRRITATION - Category B 6.7 - CARCINOGENICITY - Category B 6.1 - ACUTE TOXICITY (aspiration) (oral) - Category E 9.1 - AQUATIC ECOTOXICITY - Category B

Regulation according to other foreign laws

REACH Status	For the REACH status of this product please consult your company contact, as identified in Section 1.
United States inventory (TSCA 8b)	All components are listed or exempted.
Australia inventory (AICS)	At least one component is not listed.
Canada inventory status	All components are listed or exempted.
China inventory (IECSC)	At least one component is not listed.
Japan inventory (ENCS)	At least one component is not listed.
Korea inventory (KECI)	All components are listed or exempted.
Philippines inventory (PICCS)	All components are listed or exempted.

Section 16. Other information

History

Date of issue/Date of revision	2/21/2014.
Date of previous issue	2/20/2014.
Version	7.12

Notice to reader

✔ Indicates information that has changed from previously issued version.

All reasonably practicable steps have been taken to ensure this data sheet and the health, safety and environmental information contained in it is accurate as of the date specified below. No warranty or representation, express or implied is made as to the accuracy or completeness of the data and information in this data sheet.

The data and advice given apply when the product is sold for the stated application or applications. You should not use the product other than for the stated application or applications without seeking advice from us.

It is the user's obligation to evaluate and use this product safely and to comply with all applicable laws and regulations. The BP Group shall not be responsible for any damage or injury resulting from use, other than the stated product use of the material, from any failure to adhere to recommendations, or from any hazards inherent in the nature of the material. Purchasers of the product for supply to a third party for use at work, have a duty to take all necessary steps to ensure that any person handling or using the product is provided with the information in this sheet. Employers have a duty to tell employees and others who may be affected of any hazards described in this sheet and of any precautions that should be taken.