Report

Waste Study Report - Cookson Plibrico Relocation

Prepared for Prince Property Consulting

By Beca Pty Ltd (Beca)

19 May 2009

Revision History

Revision Nº	Prepared By	Description	Date
A	Tiffany Chan Tim Shelton	Draft	24 April 2009

Document Acceptance

Action	Name	Signed	Date
Prepared by	Tiffany Chan Tim Shelton		
Reviewed by	Dianne Thomas		
Approved by	Emil Toussis		
on behalf of	Beca Pty Ltd		

Executive Summary

The proposal under consideration is the relocation of the Cookson Plibrico refractories manufacturing plant from its current location at Bulli to a new facility at Sylvester Avenue Unanderra. In essence the current manufacturing processes will remain unchanged (it will be slightly streamlined), with the majority of the equipment to be transferred to the new site. The plant produces approximately 21,000 tonnes of product each year.

A waste study was carried out to determine the environmental impact of the proposal, with respect to the *Waste Classification Guidelines* from the Department of Environment and Climate Change (DECC). The study found that there are no hazardous or special wastes generated. The wastes are classified as general solid waste (putrescible and non- putrescible) plus liquid waste. Changes to the layout and operating practices will help to minimise solid waste generated by spillage and material handling. Meanwhile, investment in a wastewater treatment plant will reduce the amount of liquid waste that would otherwise be generated. Therefore, based on the current design information, Cookson Plibrico's equipment can be transferred to its new location without significant adverse impact from generation of production waste.

The Protection of the Environment Operations (POEO) Regulation contains a list of all scheduled activities and scheduled development work that require an Environment Protection Licence (EPL). Discussions with the DECC concluded that the proposed development does not require an EPL. The final approval authority relating to waste generated by the wastewater treatment system rests with Wollongong City Council (WCC).

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1 Introduction

Prince Property Consulting, acting on behalf of Cookson Plibrico engaged Beca in March 2009 to conduct a waste study for the proposed relocation of the Cookson Plibrico plant. Beca prepared this waste study report to supplement the main Environmental Assessment (EA) to be submitted to the NSW Department of Planning (DoP).

Cookson Plibrico can be classified as a ceramics manufacturing industry specialising in refractory operations, and it has a current production of approximately 21,000 tonnes per year. Approximately 90% of this product is made from alumina based cementitious materials. The finished products are shipped as premixed powders in various bag sizes, packaged wet clays and precast concrete shapes for use in the steelmaking and aluminium smelting industries.

In response to a preliminary EA, the DoP has issued Director Generals Requirements including an environmental assessment of the waste generated by the proposal. This waste study details the solid and liquid waste generated during operation of the proposed facility. The report aims to classify and quantify the waste streams and explain the method of disposal for each. In addition, the report will outline the waste reduction measures being incorporated into the new facility.

The report does not include waste generated during construction as this would be covered under the construction permit and environmental management plan. However, based on the available design information, there appears to be no special construction wastes that need to be considered.

The proposal falls under the Protection of the Environment Operations (POEO) Act 1997, which contains a list of all scheduled activities and scheduled development work that require an Environment Protection Licence (EPL). Beca have been advised by the NSW Department of Environment and Climate Change (DECC) that an EPL will not be required for the proposed development. However, the onsite wastewater treatment plant would require approval from Wollongong City Council as it falls under the category of *sewerage management system*.

References

In undertaking this study Beca has made use of the following reference documents and sources:

- The Department of Environment and Climate Change (DECC) 2008 *Waste Classification Guidelines* [DECC, 2008]
- The Protection of Environment Operations Act (POEO) regarding *the Guide to Licensing for ceramics works* [DECC, 2008]
- Preliminary Environmental Assessment [tcg Planning, Feb 2009]
- Correspondence with Cookson Plibrico Staff
- Correspondence with DECC Wollongong
- Wollongong City Council, *Approval Requirements for Septic Tanks and Sewerage Management Systems* [WCC, 2009]

2 Description of the Proposal

It is proposed that Cookson Plibrico will relocate the majority of its existing equipment to a new 8,000m2 factory at the Unanderra site. 900m2 of the new facility is to be dedicated to offices, lunch rooms, locker rooms and shower / toilet amenities. The refractory operation consists of five main manufacturing units, as detailed in Table A.

Table 1- Manufacturing Units of Cookson Plibrico's Refractory Operations

Unit	Name	Production (Mtpa)	Description
1.	Teka Mill	14,000; of which: § 9,000 - 10,000MT for direct sale, and § 4,000-5,000MT for internal use	Consists of three sub systems that operate independently • Crusher – Feed consists of bauxite lumps which are crushed into three size ranges • Ball Mill – Receives product from crusher and pulverises to fine powder form • TEKA - Bulk solids batching, mixing and bagging station Some of the Teka products get used within factory (i.e. RAM Extruder, Comcast etc), others sold externally.
2.	RAM Extruder	850	Mixes dry powder from Teka with water and additives (including phosphoric acid) then extrudes clay-like finished product. Operated once per week, flexible with feed composition
3.	Taphole Clay (aka Gunning Clay)	2,000 - 3,000	Mixes various ingredients, majority being powders mixed with hot resin and hexamine powders. Extrudes Clay into packaging containers. Negligible amount from Teka Mill is used here
4.	Comcast	3,000-4,000	Mixes dry powder from Teka with water. Then pours material into mould where it is cured in ambient air followed by a dryer. Manufactures product (rectangular slabs) for furnace liner at aluminium smelter.
5.	Small Precast	200	Similar to Comcast Variety of cast shapes manufactured for foundry steel and petroleum industry

These processes do not create any waste by-products. The small amount of solid waste produced is spillage or broken castings that would otherwise be saleable product. With this in mind, the proposed layout will minimise the transport of materials internally and therefore reduce the amount of spillage and waste.

In addition to the production plant, the new facility will include a 900 m^2 office space. It is expected that up to 70 staff will be employed on the new site. As the new site is not connected to the council sewerage system, a wastewater treatment plant (WWTP) will be installed to handle both the process wastewater and the sewerage/grey water generated on site.

3 Sources and Classification of Waste

Sources of waste have been classified into general solid waste (both putrescible and non-putrescible) and liquid waste, based on the DECC's Waste Classification Guidelines.

3.1 *General Solid Waste (non-putrescible)*

These are solid wastes generated during operation, including:

- Damaged castings or out of date bags of materials
- Residual material stuck to the Comcast or Precast mixers after a batch and then removed during the cleanout
- Spillage of raw materials. This is kept to a minimum and some spillages are recycled back into the process. The remainder are swept up and discarded. Note that Taphole Clay spills (containing resin) are recycled back into system.
- General office waste
- Laboratory samples of cast materials

The types of non-putrescible waste is summarised in Table 2:

Table 2- General Solid Waste (*non-putrescible)* reviewed according to its type, quantity, MSDS of waste product

Criteria	Description
Type of Solid Waste	• Alumina silicate aggregates (monolithic products) from crushing bauxite containing ~80% alumina • Solids contain various composition from 30-92% alumina (Al_2O_3), with silicates making up the balance • Sweepings include clays, alumina cements, deflocculants, silica, off-spec products Taphole clay spills (containing resin) are recycled back into system • Off-spec products • Used laboratory-tested block samples • Paper bags that cannot be recycled due to residual product (non dangerous goods)
Quantity	• 3 skips per week (total volume of each skip = 15 m^3) • 0.5 m^3 lab scraps • 1.5 m^3 general office waste per week
MSDS Review	• Inert, non-hazardous, non-restricted solid wastes (i.e. bauxite, calcium aluminate cement, clay, mullite and silica fumes). See also Appendix 1

3.2 *General Solid Waste (putrescible)*

Depending on the detailed design, the WWTP may generate a solid waste stream consisting of grit and screenings. This would typically be 0.1 – 0.5 m^3 recovered once per week. Because the process wastewater and the site sewage are combined in the WWTP, this waste stream is classified as General Solid Waste (putrescible)

3.3 *Liquid Waste*

Sources of liquid waste are:

- Wash down of the Comcast, Precast and Ram mixers. These are washed down after each batch, normally twice per day and amounts to 400 litres per day.
- Sewer and grey water from the site will generate up to 4000 litres per day.

Both these sources will be piped to the new WWTP. The proposed plant is designed for primary, secondary and tertiary treatment and disinfection of the wastewater so the effluent will be suitable for re-use on site or potentially discharge into the stormwater system.

The WWTP will in turn generate a liquid waste stream consisting of WWTP sludge. Depending on the detailed design of the plant installed, the sludge volume may vary from 0.2 % - 10% of the total capacity, so this equates to 10 - 500 litres per day. The sludge will be held in a storage tank and removed for disposal as required.

4 Waste Management

The proposed development will incorporate a waste management hierarchy that aims firstly to minimise waste, secondly to re-use waste and as a last option to responsibly dispose of remaining waste.

4.1 Waste Minimisation

Material handling has been identified as a major contributor to waste production. Waste will be reduced by changing the layout of the new plant and modifying current handling techniques, especially in regard to minimising spillage.

The context of layout is to rearrange the current equipment on the new site such that waste and spillage from product transfer are minimised, as seen in Table 3:

Table 3- Summary of waste minimisation plan

No.	Current System	Major Source of Waste	New System
1	Raw material stored in bags prior to Crusher	Sweepings	Delivery trucks empty material directly into hoppers which then directly feed into Crusher
2	Crusher fills bins with product which is then transferred to Ball Mill via forklifts	Spillage	Looking into options for pneumatically conveying ~80% crusher product to Ball Mill
3	Existing wastewater facility- sedimentation only Cleanaway contracted to remove waste	Liquid Waste	Invest in a tertiary wastewater treatment plant that allows effluent to be discharged into storm water, thereby major reduction in liquid waste generated
4	Teka – ingredients for Ram, Comcast and Precast are individually weighed out, mixed and placed into bags	Spillage	Batching system at the reverse end of the Teka i.e. individual raw materials and additives are weighed out and placed in a bin that gets transported to where it needs to be used (e.g. RAM Extruder, Comcast and Precast etc)
5	Precast and Comcast currently situated away from wastewater treatment plant Wash water used to clean skips	Spillage and Liquid Waste	Precast and Comcast to be placed near potential tertiary wastewater treatment plant Wastewater fed into sump pit before treatment

4.2 Reuse and Recycle

Current practices for reuse and recycle of material will be continued at the new facility, these include:

- All points of material transfer have ventilation systems and/or dust collectors that remove entrained fine particles. The material collected is recycled directly back into the process in most cases. In other cases fines are recycled internally via the "FCRA" bins.
- All plastic bulk bags (up to 9 m^3 per week) are collected and sent off site, and ultimately to a plastic recycling plant.
- Taphole Clay spillages and sweepings are collected and put directly back into the process.
- Generally, all dry spillage and sweepings are placed into the "FCRA" bins for internal reuse in RAM Extruder premix.

4.3 Disposal

The three waste streams will be disposed as follows:

General Solid Waste (non putrescible) from processing

Due to the inert, non-hazardous and non-restricted nature of alumina silicates (i.e. concrete waste, ceramics, etc), all wastes from the process that are not already recycled or retained within the plant are suitable for landfill.

General Solid Waste (putrescible) from WWTP grit and screening

If required, these wastes are suitable for disposal in putrescible waste landfill sites

Liquid Waste

The sludge from the WWTP will be taken to a registered liquid waste treatment facility. This may be Veolia's plant in Unanderra or Sydney Water's Wollongong Wastewater Treatment Plant.

5 Conclusion

The manufacturing activities proposed for the new site are not fundamentally different to those carried out by Cookson Plibrico's existing plant. These activities do not generate any special or hazardous wastes, only general solid waste and liquid waste.

The major change to the facility in relation to waste is the proposed wastewater treatment plant to handle both process wastewater and sewer/grey water. Given that the new site does not have connection to the sewerage system, this initiative will dramatically reduce the amount of liquid waste that would otherwise have been generated. It also has the potential to reduce the demand for potable water on site.

In conclusion, based on the current design information, Cookson Plibrico's equipment can be transferred to its new location without significant adverse impact from generation of production waste. Although no licence is required for this proposal under the State Governments POEO legislation, Cookson Plibrico is required to obtain approval from the Wollongong City Council for the planned wastewater treatment plant.

6 Appendices

Appendix 1 – Sample Material Safety Data Sheets from the refractory

Appendix 2 – Proposed Plant Layout

Appendix 3 - Correspondence with Government Agencies

6.1 Appendix 1- Sample MSDS lists of the materials used in ceramic refractory

- Bauxite
- Calcium aluminate
- Cement
- Clay
- Mullite
- Silica fume

Reproduced with permission from Cookson Plibrico

6.2 Appendix 2- Proposed Plant layout

6.3 Appendix 3- Correspondence with Government Agencies

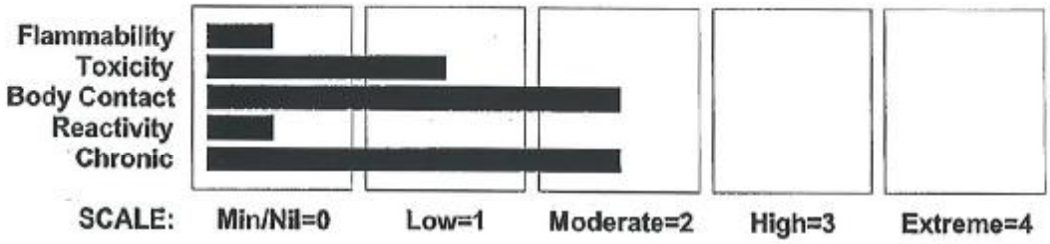
AS300 , A1304

Summary for BAUXITE
CHEMWATCH 21546 GUYANESE BAUXITE

NON-HAZARDOUS SUBSTANCE. NON-DANGEROUS GOODS. According to the Criteria of NOHSC, and the ADG Code.

CAS RN:	1318-16-7	NIOSH:	CR 5700000	HAZCHEM:	None
UN NO:	None	DG Class:	NONE	Packing Group:	None
Poisons Schedule:	None	EPG:	NONE	IERG:	NONE

CHEMWATCH HAZARD RATINGS



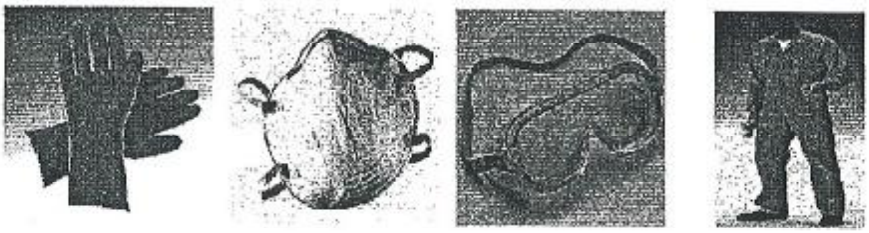
R Codes: *R33 R36/37 R40(3)*
S Codes: S22 S24 S39 S26

R Statements:
- *Cumulative effects may result following exposure*.*
- *May produce discomfort of the eyes and respiratory tract*.*
- *Limited evidence of a carcinogenic effect*.*

** (limited evidence).*

S Statements:
- Do not breathe dust.
- Avoid contact with skin.
- Wear eye/face protection.
- In case of contact with eyes, rinse with plenty of water and contact Doctor or Poisons Information Centre.

PERSONAL PROTECTIVE EQUIPMENT FOR INDUSTRIAL/COMMERCIAL ENVIRONMENTS



Issue Date: Fri 6-Aug-2004
Print Date: Mon 24-Oct-2005

BAUXITE

Chemwatch Material Safety Data Sheet (REVIEW)
Issue Date: Fri 6-Aug-2004

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME
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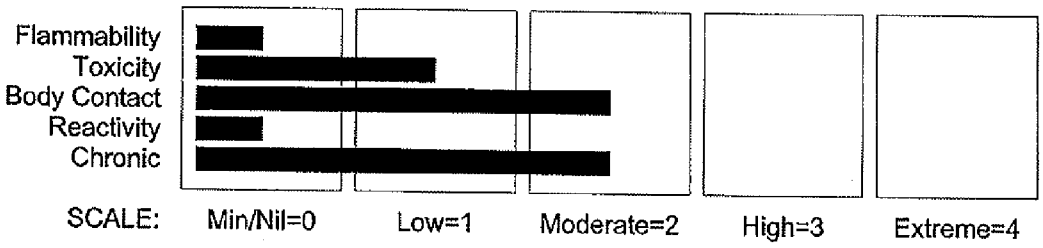
SYNONYMS
"aluminium oxide", hydroxide

PRODUCT USE
Natural mineral. Large volume raw material for production of aluminium.

SUPPLIER
Company: Tennant Limited
Address:
Level 2, 40 Yeo Street
Neutral Bay
NSW 2089
Australia
Telephone: 61 2 9908 9100
Emergency Tel: 1800 039 008
Emergency Tel: 61 3 9573 3112
Fax: 61 2 9908 9111

HAZARD RATINGS



Section 2 - HAZARDS IDENTIFICATION

STATEMENT OF HAZARDOUS NATURE
NON-HAZARDOUS SUBSTANCE. NON-DANGEROUS GOODS. According to the Criteria of NOHSC, and the ADG Code.

POISONS SCHEDULE
None

RISK
Cumulative effects may result following exposure*.
May produce discomfort of the eyes and respiratory tract*.
Limited evidence of a carcinogenic effect*.
* (limited evidence).

SAFETY
Do not breathe dust.
Avoid contact with skin.
Wear eye/face protection.
In case of contact with eyes, rinse with plenty of water and contact Doctor or

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Poisons Information Centre.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
aluminium hydroxide	21645-51-2	40-85
other hydrated aluminium oxides as		
diaspore	14457-84-2	^
boehmite	1318-23-6	^
gibbsite	14762-49-3	^
and		
kaolinite	1318-74-7	1-20
ferric oxide	1309-37-1	(1-20
ferric hydroxide		(^
ferrous carbonate		1-10 ^
aluminium oxide	1344-28-1.	0-10 ^
titanium dioxide (rutile)	1317-80-2	< 5 ^
silica crystalline - quartz	14808-60-7	< 1-3

No other ingredient information disclosed.

Section 4 - FIRST AID MEASURES

SWALLOWED

Rinse mouth out with plenty of water.
If poisoning occurs, contact a doctor or Poisons Information Centre.
- 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 unconsciousness
- Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink.
- Seek medical advice.

EYE

If this product comes in contact with the eyes:
- 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.
- If pain persists or recurs seek medical attention.
- Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

SKIN

Brush off dust.
If skin or hair contact occurs:
- Flush skin and hair with running water (and soap if available).
- Seek medical attention in event of irritation.

INHALED

- If dust is inhaled, remove from contaminated area.
- Encourage patient to blow nose to ensure clear breathing passages.
- Ask patient to rinse mouth with water but to not drink water.
- Seek immediate medical attention

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NOTES TO PHYSICIAN

Treat symptomatically.

Section 5 - FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

There is no restriction on the type of extinguisher which may be used.

FIRE FIGHTING

Alert Fire Brigade and tell them location and nature of hazard.
Product is not combustible. No special firefighting procedures required.
Use extinguishing media suitable for surrounding area.

FIRE/EXPLOSION HAZARD

- Non combustible.
- Not considered a significant fire risk, however containers may burn.

FIRE INCOMPATIBILITY

None known.

HAZCHEM

None

Section 6 - ACCIDENTAL RELEASE MEASURES

EMERGENCY PROCEDURES

MINOR SPILLS

- Clean up all spills immediately.
- Avoid contact with skin and eyes.
- Wear impervious gloves and safety glasses.
- Use dry clean up procedures and avoid generating dust.
- Vacuum up or sweep up.
- Place spilled material in clean, dry, sealable, labelled container.

MAJOR SPILLS

- Clear area of personnel and move upwind.
- Alert Fire Brigade and tell them location and nature of hazard.
- Control personal contact by using protective equipment and dust respirator.
- Prevent spillage from entering drains, sewers or water courses.
- Recover product wherever possible. Avoid generating dust.
- Sweep / shovel up.
- If required, wet with water to prevent dusting.
- Put residues in labelled plastic bags or other containers for disposal.
- Wash area down with large quantity of water and prevent runoff into drains.
- If contamination of drains or waterways occurs, advise emergency services.

EMERGENCY EXPOSURE LIMITS

Material	Revised IDLH Value (ppm)	Revised IDLH Value (mg/m3)
Iron oxide fume		2,500
quartz		50

NOTES

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as Fe; iron oxide fume

EMERGENCY RESPONSE PLANNING GUIDELINES (ERPG)
The maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to one hour WITHOUT experiencing or developing

life-threatening health effects is:

aluminium hydroxide	125 mg/m³
ferric oxide	500 mg/m³
aluminium oxide	500 mg/m³

irreversible or other serious effects or symptoms which could impair an individual's ability to take protective action is:

aluminium hydroxide	125 mg/m³
ferric oxide	25 mg/m³
aluminium oxide	25 mg/m³

other than mild, transient adverse effects without perceiving a clearly defined odour is:

aluminium hydroxide	12.5 mg/m³
ferric oxide	15 mg/m³
aluminium oxide	15 mg/m³

The threshold concentration below which most people will experience no appreciable risk of health effects:

aluminium hydroxide	4 mg/m³
ferric oxide	10 mg/m³
aluminium oxide	10 mg/m³

American Industrial Hygiene Association (AIHA)

Ingredients considered according exceed the following cutoffs

Very Toxic (T+)	>= 0.1%	Toxic (T)	>= 3.0%
R50	>= 0.25%	Corrosive (C)	>= 5.0%
R51	>= 2.5%		
else	>= 10%		

where percentage is percentage of ingredient found in the mixture

Personal Protective Equipment advice is contained in Section 8 of the MSDS.

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING

Avoid generating and breathing dust.
- Limit all unnecessary personal contact.
- Wear protective clothing when risk of exposure occurs.
- Use in a well-ventilated area.
- Avoid contact with incompatible materials.
- When handling, DO NOT eat, drink or smoke.
- Keep containers securely sealed when not in use.
- Avoid physical damage to containers.
- Always wash hands with soap and water after handling.
- Work clothes should be laundered separately.
- Use good occupational work practice.
- Observe manufacturer's storing and handling recommendations.
- Atmosphere should be regularly checked against established exposure standards

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to ensure safe working conditions are maintained.

SUITABLE CONTAINER

Multi ply paper bag with sealed plastic liner or heavy gauge plastic bag
NOTE: Bags should be stacked, blocked, interlocked, and limited in height so that they are stable and secure against sliding or collapse. Check that all containers are clearly labelled and free from leaks. Packing as recommended by manufacturer.
Bulk bags: Reinforced bags required for dense materials.

STORAGE INCOMPATIBILITY

Avoid storage with strong acids or bases, chlorinated rubber or bismuth hydroxide.

STORAGE REQUIREMENTS

- Store in original containers.
- Keep containers securely sealed.
- Store in a cool, dry, well-ventilated area.
- Store away from incompatible materials and foodstuff containers.
- Protect containers against physical damage and check regularly for leaks.
- Observe manufacturer's storing and handling recommendations.

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

Source	Material	TWA ppm	TWA mg/m³	STEL ppm	STEL mg/m³	Peak ppm	Peak mg/m³
Australian Exposure Standards	Rouge dust		10				
Australian Exposure Standards	Iron oxide fume (Fe2O3) (as Fe)		5				
Australian Exposure Standards	Silica - Crystalline, Quartz		0.1				

No data available for bauxite as (CAS: 1318-16-7)
No data available for aluminium hydroxide as (CAS: 21645-51-2) / (CAS: 1330-44-5) / (CAS: 1302-29-0) / (CAS: 1;
No data available for kaolinite as (CAS: 1318-74-7)
No exposure limits set by NOHSC or ACGIH.

EXPOSURE STANDARDS FOR MIXTURE

"Worst Case" computer-aided prediction of spray/ mist or fume/ dust components and concentration:

"Worst Case" computer-aided prediction of spray/ mist or fume/ dust components and concentration:
Composite Exposure Standard for Mixture (TWA) :3.75 mg/m³.
"Worst Case" computer-aided prediction of spray/ mist or fume/ dust components and concentration:
Composite Exposure Standard for Mixture (TWA) (mg/m³):
Operations which produce a spray/mist or fume/dust, introduce particulates to the breathing zone.
If the breathing zone concentration of ANY of the components listed below is exceeded, "Worst Case" considerations deem the individual to be overexposed.
Component Breathing Zone ppm Breathing Zone mg/m³ Mixture Conc (%).

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Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

Component	Breathing Zone (mg/m³)	Mixture Conc (%)
kaolinite	0.7500	20.0
aluminium hydroxide	3.0000	80.0

INGREDIENT DATA

ALUMINIUM HYDROXIDE:

Dusts not otherwise classified, as inspirable dust;
ES TWA: 10 mg/m³.
OES TWA: 10 mg/m³ total inhalable dust
OES TWA: 4 mg/m³ respirable dust
MAK value: 6 mg/m³
- measured as the respirable fraction of the aerosol.
MAK values, and categories and groups are those recommended within the Federal Republic of Germany.

KAOLINITE:

dusts not otherwise classified,
containing no asbestos and < 1% crystalline silica
ES TWA: 10 mg/m³ inspirable dust
TLV TWA: 10 mg/m³ total dust
TLV TWA: 3 mg/m³ respirable particulate
Inspirable dust concentrations in a worker's breathing zone should be collected and measured in accordance with AS3640. Sampling of the Respirable dust fraction requires cyclone separator devices (elutriators) and procedures to comply with AS2985.

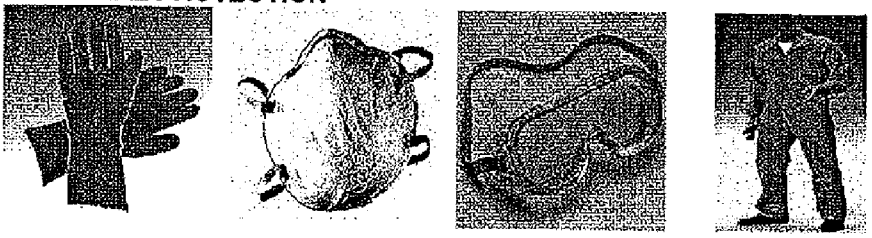
FERRIC OXIDE:

Inhalation of iron oxide dust or fume may produce a benign pneumoconiosis (siderosis). The TLV-TWA is recommended to minimise the potential for development of X-ray changes in the lung on long-term exposure. These changes are not considered to be associated with any physical impairment of lung function, although more sophisticated physiological testing, including measurement of the lung's mechanical properties and expiratory lung flow is required to reach firm and final conclusions.

SILICA CRYSTALLINE - QUARTZ:

Because the margin of safety of the quartz TLV is not known with certainty and given the associated link between silicosis and lung cancer it is recommended that quartz concentrations be maintained as far below the TLV as prudent practices will allow.

PERSONAL PROTECTION



EYE

- Safety glasses with side shields; or as required,
- Chemical goggles.
- Contact lenses pose a special hazard; soft lenses may absorb irritants and all lenses concentrate them.

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HANDS/FEET

- Barrier cream and PVC gloves or Cotton gloves.

Safety footwear.

OTHER

- Overalls.
- Eyewash unit.

RESPIRATOR

Protection Factor	Half-Face Respirator	Full-Face Respirator	Powered Air Respirator
10 x ES	P1 Air-line*	- -	PAPR-P1 -
50 x ES	Air-line**	P2	PAPR-P2
100 x ES	-	P3	-
		Air-line*	-
100+ x ES	-	Air-line**	PAPR-P3

* - Negative pressure demand ** - Continuous flow.

The local concentration of material, quantity and conditions of use determine the type of personal protective equipment required. For further information consult site specific CHEMWATCH data (if available), or your Occupational Health and Safety Advisor.

ENGINEERING CONTROLS

Use in a well-ventilated area.

- Local exhaust ventilation is required where solids are handled as powders or crystals; even when particulates are relatively large, a certain proportion will be powdered by mutual friction.
- Exhaust ventilation should be designed to prevent accumulation and recirculation of particulates in the workplace.
- If in spite of local exhaust an adverse concentration of the substance in air could occur, respiratory protection should be considered. Such protection might consist of:

(a): particle dust respirators, if necessary, combined with an absorption cartridge;
(b): filter respirators with absorption cartridge or canister of the right type;
(c): fresh-air hoods or masks

- Build-up of electrostatic charge on the dust particle, may be prevented by bonding and grounding.
- Powder handling equipment such as dust collectors, dryers and mills may require additional protection measures such as explosion venting.

Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to efficiently remove the contaminant.

Type of Contaminant:	Air Speed:
direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)	1-2.5 m/s (200-500 f/min.)
grinding, abrasive blasting, tumbling, high speed wheel generated dusts (released at high initial velocity into zone of very high rapid air motion).	2.5-10 m/s (500-2000 f/min.)

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Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

Within each range the appropriate value depends on:

Lower end of the range	Upper end of the range
1: Room air currents minimal or favourable to capture	1: Disturbing room air currents
2: Contaminants of low toxicity or of nuisance value only	2: Contaminants of high toxicity
3: Intermittent, low production.	3: High production, heavy use
4: Large hood or large air mass in motion	4: Small hood-local control only

Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 4-10 m/s (800-2000 f/min) for extraction of crusher dusts generated 2 metres distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE

Red or red pink solid mineral in rock, lump or granular form.
Insoluble in water. Density: Loose:640-1440 kg/m3; Packed:960-1600 kg/m3.

PHYSICAL PROPERTIES

Solid.
Does not mix with water.
Sinks in water.

Molecular Weight: Not applicable.
Melting Range (°C): 2038
Solubility in water (g/L): Immiscible
pH (1% solution): Not applicable
Volatile Component (%vol): Not applicable
Relative Vapour Density (air=1): Not applicable
Lower Explosive Limit (%): Not applicable
Autoignition Temp (°C): Not applicable
State: Divided solid

Boiling Range (°C): Not available.
Specific Gravity (water=1): 2.4-2.6
pH (as supplied): Not applicable
Vapour Pressure (kPa): Not applicable
Evaporation Rate: Not applicable
Flash Point (°C): Not applicable
Upper Explosive Limit (%): Not applicable
Decomposition Temp (°C): > 300(losesH2

Section 10 - CHEMICAL STABILITY AND REACTIVITY INFORMATION

CONDITIONS CONTRIBUTING TO INSTABILITY

- Presence of incompatible materials.
- Product is considered stable.
- Hazardous polymerisation will not occur.

BAUXITE

Section 11 - TOXICOLOGICAL INFORMATION

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

Considered an unlikely route of entry in commercial/industrial environments.
Not normally a hazard due to the physical form of product. The material is a physical irritant to the gastro-intestinal tract and may be harmful if swallowed in large quantity.
Ingestion may result in nausea, abdominal irritation, pain and vomiting.

EYE

The dust may be discomforting and abrasive to the eyes.

SKIN

The material may be mildly discomforting to the skin and may cause drying of the skin if exposure is prolonged.
Irritation and skin reactions are possible with sensitive skin.
The material may accentuate any pre-existing dermatitis condition.

INHALED

Not normally a hazard due to non-volatile nature of product.
Generated dust may be discomforting and abrasive if inhaled.
Persons with impaired respiratory function, airway diseases and conditions such as emphysema or chronic bronchitis, may incur further disability if excessive concentrations of particulate are inhaled.

CHRONIC HEALTH EFFECTS

Principal routes of exposure are usually by inhalation of generated dust and skin contact with the material. Long term exposure to high dust concentrations may cause changes in lung function i.e. pneumoconiosis; caused by particles less than 0.5 micron penetrating and remaining in the lung. Prime symptom is breathlessness; lung shadows show on X-ray. As with any chemical product, contact with unprotected bare skin; inhalation of vapour, mist or dust in work place atmosphere; or ingestion in any form, should be avoided by observing good occupational work practice. Exposure to large doses of aluminium has been connected with the degenerative brain disease Alzheimer's Disease.

TOXICITY AND IRRITATION

TOXICITY	IRRITATION
Inhalation (human) TCLo: 22 mg/m3/5y	Nil Reported

ALUMINIUM HYDROXIDE:

TOXICITY	IRRITATION
Oral (child) TDLo:79000 mg/kg/2y - Int. Oral (child) TDLo:122000 mg/kg/4d Oral (infant) TDLo:39000 mg/kg/24d - Int.	Nil Reported

KAOLINITE:
No data of toxicological significance identified in literature search.

FERRIC OXIDE:
Not available. Refer to individual constituents.

SILICA CRYSTALLINE - QUARTZ:

BAUXITE

TOXICITY
Inhalation (human) LCLo: 0.3 mg/m3/10Y
Inhalation (human) TCLo: 16 mppcf*/8H/17.9Y
Inhalation (rat) TCLo: 50 mg/m3/6H/71W
Intermittent; focal fibrosis,
(pneumoconiosis), cough, dyspnoea
Intermittent; liver - tumours.
* Millions of particles per cubic foot (based on impinger samples counted by light field techniques).
WARNING: For inhalation exposure ONLY: This substance has been classified by the IARC as Group 1 CARCINOGENIC TO HUMANS.
NOTE : the physical nature of quartz in the product determines whether it is likely to present a chronic health problem. To be a hazard the material must enter the breathing zone as respirable particles.

IRRITATION
Nil Reported

Section 12 - ECOLOGICAL INFORMATION

No data for bauxite.

Section 13 - DISPOSAL CONSIDERATIONS

- 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.

Section 14 - TRANSPORTATION INFORMATION

Dangerous Goods Class: None
Subrisk: None
UN/NA Number: None
Packing Group: None
Labels Required:
Additional Shipping Information:
International Transport Regulations:
IMO Dangerous Goods class: None
IMO Packing group: None
IATA Dangerous goods class: None
Cargo Instructions:
Cargo Max:
Passenger Instructions:
Passenger Max:
Special Provisions: None, None

HAZCHEM
None

Section 15 - REGULATORY INFORMATION

POISONS SCHEDULE
None

BAUXITE

REGULATIONS

No data available for bauxite as CAS: 1318-16-7.

Section 16 - OTHER INFORMATION

Issue Date: Fri 6-Aug-2004
Print Date: Mon 24-Oct-2005

CALCIUM ALUMINATE CEMENT

Hazard Alert Code: MODERATE

Chemwatch Material Safety Data Sheet (REVIEW) Revision No: 2 Chemwatch 29929

Issue Date: 4-Apr-2005 CD 2006/2

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: CALCIUM ALUMINATE CEMENT

SYNONYMS

"high alumina cement", "Secar 50", 51, "Cement Fondu Lafarge", "Ciment Fondu", "Lafarge Aluminates Mineral Sponge", "calcium aluminate aluminium cement"

PRODUCT USE

Useful as refractory and special purpose cement. Material is mixed and used in accordance with manufacturers directions.

SUPPLIER

Company: Bisley & Company Pty Ltd
Address:
Level 12, Tower B, Zenith Centre
821 Pacific Highway
Chatswood
NSW 2067
Telephone: (02) 9413 1333
Emergency Tel: 1800 039 008 - Chemwatch
Fax: (02) 9413 1319

HAZARD RATINGS

		Min	Max
Flammability:	0		
Toxicity:	1		
Body Contact:	2		
Reactivity:	0		
Chronic:	2		

Min/Nil=0
Low=1
Moderate=2
High=3
Extreme=4

Section 2 - HAZARDS IDENTIFICATION

STATEMENT OF HAZARDOUS NATURE

NON-HAZARDOUS SUBSTANCE. NON-DANGEROUS GOODS. According to the Criteria of NOHSC, and the ADG Code.

POISONS SCHEDULE

None

RISK

May produce skin discomfort*.
Possible skin sensitiser*.
* (limited evidence)

SAFETY

Do not breathe dust.
Avoid contact with skin.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
calcium aluminate cement	65997-16-2	100

Section 4 - FIRST AID MEASURES

SWALLOWED

Rinse mouth out with plenty of water.
- For advice, contact a Poisons Information Centre or a doctor at once.
- Urgent hospital treatment is likely to be needed.
- 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.
- Transport to hospital or doctor without delay.

EYE

If this product comes in contact with the eyes:
- 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.
- If pain persists or recurs seek medical attention.
- Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

SKIN

If skin or hair contact occurs:
- Flush skin and hair with running water (and soap if available).
- Seek medical attention in event of irritation.

INHALED

- If dust is inhaled, remove from contaminated area.
- Encourage patient to blow nose to ensure clear breathing passages.

- Ask patient to rinse mouth with water but to not drink water
- Seek immediate medical attention.

NOTES TO PHYSICIAN

Treat symptomatically

Section 5 - FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

- There is no restriction on the type of extinguisher which may be used.

FIRE FIGHTING

Product is not combustible. No special firefighting procedures required.
Use fire fighting procedures suitable for surrounding area.
Equipment should be thoroughly decontaminated after use.

FIRE/EXPLOSION HAZARD

- Non combustible.
- Not considered to be a significant fire risk, however containers may burn.
- In a fire may decompose on heating and produce toxic / corrosive fumes.

FIRE INCOMPATIBILITY

No known incompatibility with normal range of industrial materials.

HAZCHEM

None

Personal Protective Equipment

Gas tight chemical resistant suit.
Limit exposure duration to 1 BA set30 mins.

Section 6 - ACCIDENTAL RELEASE MEASURES

EMERGENCY PROCEDURES

MINOR SPILLS
Clean up all spills immediately. Avoid contact with skin and eyes.
Wear impervious gloves and safety glasses.
Use dry clean up procedures and avoid generating dust.
Place spilled material in clean, dry, sealable, labelled container.
MAJOR SPILLS

- Clear area of personnel and move upwind.
- Alert Fire Brigade and tell them location and nature of hazard.
- Control personal contact by using protective equipment and dust respirator.
- Prevent spillage from entering drains, sewers or water courses.
- Recover product wherever possible. Avoid generating dust.
- Sweep / shovel up.
- If required, wet with water to prevent dusting.
- Put residues in labelled plastic bags or other containers for disposal.
- Wash area down with large quantity of water and prevent runoff into drains.
- If contamination of drains or waterways occurs, advise emergency services.

After clean up operations, decontaminate and launder all protective clothing and equipment before storing and re-using.

SAFE STORAGE WITH OTHER CLASSIFIED CHEMICALS

\+ + + + + +

X: Must not be stored together
O: May be stored together with specific preventions
+: May be stored together

Personal Protective Equipment advice is contained in Section 8 of the MSDS.

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING

Avoid generating and breathing dust.

- Limit all unnecessary personal contact.
- Wear protective clothing when risk of exposure occurs.
- Use in a well-ventilated area.
- Avoid contact with incompatible materials.
- When handling, DO NOT eat, drink or smoke.
- Keep containers securely sealed when not in use.
- Avoid physical damage to containers.
- Always wash hands with soap and water after handling.
- Work clothes should be laundered separately.
- Use good occupational work practice.
- Observe manufacturer's storing and handling recommendations.
- Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.

SUITABLE CONTAINER

Multi ply paper bag with sealed plastic liner or heavy gauge plastic bag
NOTE: Bags should be stacked, blocked, interlocked, and limited in height so that they are stable and secure against sliding or collapse. Check that all

containers are clearly labelled and free from leaks. Packing as recommended by manufacturer.

STORAGE INCOMPATIBILITY

Keep dry and Segregate from acids.

STORAGE REQUIREMENTS

Keep dry.

- Store in original containers.
- Keep containers securely sealed.
- Store in a cool, dry, well-ventilated area.
- Store away from incompatible materials and foodstuff containers.
- Protect containers against physical damage and check regularly for leaks.
- Observe manufacturer's storing and handling recommendations.

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

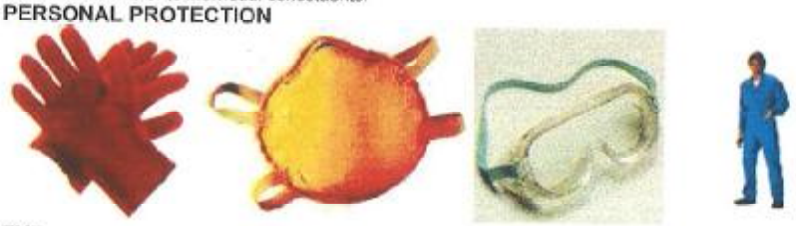
Source	Material	TWA ppm	TWA mg/m³	STEL ppm	STEL m5/m³	Peak ppm	Peak mg/m³
Australia Exposure Standards	calcium aluminate cement		10				

The following materials had no OELs on our record under the following CAS or Chemwatch (CW) numbers
calcium aluminate cement: No data available for CAS:65997-16-2 CAS:12042-68-1

EMERGENCY EXPOSURE LIMITS

Not available. Refer to individual constituents.

PERSONAL PROTECTION



EYE

- Safety glasses with side shields; or as required,
- 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 lens 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. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59]

HANDS/FEET

- Barrier cream

and Wear physical protective gloves, eg. leather. Wear safety footwear.

OTHER

- Overalls.
- Eyewash unit.

RESPIRATOR

Protection Factor	Half-Face Respirator	Full-Face Respirator	Powered Air Respirator
10 x ES	P1 Air-line*	--	PAPR-P1 -
50 x ES	Air-line**	P2	PAPR-P2
100 x ES	-	P3	-
		Air-line*	-
100+ x ES	-	Air-line**	PAPR-P3

* - Negative pressure demand ** - Continuous flow.

The local concentration of material, quantity and conditions of use determine the type of personal protective equipment required.
For further information consult site specific CHEMWATCH data (if available), or your Occupational Health and Safety Advisor.

ENGINEERING CONTROLS

Use in a well-ventilated area.

- Local exhaust ventilation is required where solids are handled as powders or crystals; even when particulates are relatively large, a certain proportion will be powdered by mutual friction.
- Exhaust ventilation should be designed to prevent accumulation and recirculation of particulates in the workplace.
- If in spite of local exhaust an adverse concentration of the substance in air could occur, respiratory protection should be considered. Such protection might consist of:

(a): particle dust respirators, if necessary, combined with an absorption cartridge;
(b): filter respirators with absorption cartridge or canister of the right type;
(c): fresh-air hoods or masks

- Build-up of electrostatic charge on the dust particle, may be prevented by bonding and grounding.
- Powder handling equipment such as dust collectors, dryers and mills may require additional protection measures such as explosion venting.

Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to efficiently remove the contaminant.

Type of Contaminant:	Air Speed
direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)	1-2.5 m/s (200-500 f/min.)
grinding, abrasive blasting, tumbling, high speed wheel generated dusts (released at high initial velocity into zone of very high rapid air motion).	2.5-10 m/s (500-2000 f/min.)

Within each range the appropriate value depends on:

Lower end of the range	Upper end of the range
1: Room air currents minimal or favourable to capture	1: Disturbing room air currents
2: Contaminants of low toxicity or of nuisance value only	2: Contaminants of high toxicity
3: Intermittent, low production.	3: High production, heavy use
4: Large hood or large air mass in motion	4: Small hood-local control only

Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 4-10 m/s (800-2000 f/min) for extraction of crusher dusts generated 2 metres distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE

Odourless light grey to white powder. Very slightly soluble in water. Chemical oxide analysis : Al2O3 50-70%; CaO 25-35%; Fe2O3 0.25-2.5%; SiO2 0.35-7.0%. Alkaline reaction on the skin when wet.

PHYSICAL PROPERTIES

Solid.
Does not mix with water.

Molecular Weight: Not applicable.	Boiling Range (°C): Not applicable.
Melting Range (°C): Not available	Specific Gravity (water=1): Not available
Solubility in water (g/L): Insoluble	pH (as supplied): Not applicable
pH (1% solution): 11.5-12.5	Vapour Pressure (kPa): Not applicable
Volatile Component (%vol): Not applicable	Evaporation Rate: Not applicable
Relative Vapour Density (air=1): Not applicable.	Flash Point (°C): Not applicable
Lower Explosive Limit (%): Not applicable	Upper Explosive Limit (%): Not applicable
Autoignition Temp (°C): Not applicable	Decomposition Temp (°C): Not available.
State: Divided solid	

Section 10 - CHEMICAL STABILITY AND REACTIVITY INFORMATION

CONDITIONS CONTRIBUTING TO INSTABILITY

- Presence of incompatible materials.
- Product is considered stable.
- Hazardous polymerisation will not occur.

Section 11 - TOXICOLOGICAL INFORMATION

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

Considered an unlikely route of entry in commercial/industrial environments.
The solid/dust is discomforting and may be harmful if swallowed.
Ingestion may result in nausea, abdominal irritation, pain and vomiting.

EYE

The dust may be highly discomforting and abrasive to the eyes and is capable of causing pain and severe conjunctivitis. Corneal injury may develop, with possible permanent impairment of vision, if not promptly and adequately treated.

SKIN

The solid/dust is discomforting to the skin if exposure is prolonged and may cause drying of the skin, which may lead to dermatitis.
Solution of material in moisture on the skin, or perspiration, may increase irritant effects.
Products when wet may be quite alkaline and this alkali action on the skin may contribute to cement contact dermatitis by causing drying and defatting of the skin which may be followed by hardening, cracking, development of lesions, possible infections of lesions and penetration by soluble salts.
Open cuts, abraded or irritated skin should not be exposed to this material.
Bare unprotected skin should not be exposed to this material.
The material may accentuate any pre-existing dermatitis condition.

INHALED

Generated dust may be highly discomforting to the upper respiratory tract if inhaled and may be harmful if exposure is prolonged.

CHRONIC HEALTH EFFECTS

Principal routes of exposure are usually by inhalation of generated dust and skin contact with the dry and wet material.
Prolonged or repeated skin contact may cause drying with cracking, irritation and possible dermatitis following.
As with any chemical product, contact with unprotected bare skin; inhalation of vapour, mist or dust in work place atmosphere; or ingestion in any form, should be avoided by observing good occupational work practice.
Long term exposure to high dust concentrations may cause changes in lung function i.e. pneumoconiosis; caused by particles less than 0.5 micron penetrating and remaining in the lung. Prime symptom is breathlessness; lung shadows show on X-ray.
Cement contact dermatitis (CCD) may occur when contact shows an allergic response, which may progress to sensitisation. Sensitisation is due to soluble chromates (chromate compounds) present in trace amounts in some cements and cement products. Soluble chromates readily penetrate intact skin. Cement dermatitis can be characterised by fissures, eczematous rash, dystrophic nails, and dry skin; acute contact with highly alkaline mixtures may cause localised necrosis.

TOXICITY AND IRRITATION

No data of toxicological significance identified in literature search.

Section 12 - ECOLOGICAL INFORMATION

No data for calcium aluminate cement.

Section 13 - DISPOSAL CONSIDERATIONS

- 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.

Section 14 - TRANSPORTATION INFORMATION

HAZCHEM

None

NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS:UN,IATA,IMDG

Section 15 - REGULATORY INFORMATION

POISONS SCHEDULE

None

REGULATIONS

calcium aluminate cement (CAS: 65997-16-2) is found on the following regulatory lists;
Australia High Volume Industrial Chemical List (HVICL)
Australia Inventory of Chemical Substances (AICS)
calcium aluminate cement (CAS: 12042-68-1) is found on the following regulatory lists;
Australia High Volume Industrial Chemical List (HVICL)
Australia Inventory of Chemical Substances (AICS)

Section 16 - OTHER INFORMATION

Ingredients with multiple CAS Nos

Ingredient Name	CAS
calcium aluminate cement	65997-16-2, 12042-68-1

Issue Date: 4-Apr-2005
Print Date: 5-Jun-2006

AC179, AC181

Unimin Australia Limited

Material Safety Data Sheet

UNIMIN CLAY GROUP 2

Infosafe No. LPU5R **Issue Date** April 2005 **Status** ISSUED by UNIMIN

Classified as hazardous

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND COMPANY/UNDERTAKING

Chemical Product and Company Identification Grades: DG3, DG3C, JH314, Clay Ceram, Clay Ceram C, HR1F, RF, K63B, K6B, Clayplas BB

Product Name UNIMIN CLAY GROUP 2

Product Code

Product Use Used in ceramic body and glazes; as a general purpose filler in paints, adhesives, rubber and paper; refractories; electrode coatings.

Company Name Address Unimin Australia Limited (ABN 20 000 971 844)
49-55 Woodlands Drive Braeside
Victoria 3195

Telephone Number/Fax Tel: (03) 9586 5400 Fax: (03) 9586 5413

Other Names None Listed

2. COMPOSITION/INFORMATION ON INGREDIENTS

Ingredients	Name	CAS	Proportion	Hazard	R Phrase
	KAOLINITE	1318-74-7	70-95 %		
	Quartz (crystalline silica)	14808-60-7	5-15 %		
	Other minerals	Mixture	(< 15 %)		

Other Information The respirable fraction of free crystalline silica is 10-20%.

3. HAZARDS IDENTIFICATION

Classified as Hazardous according to criteria of Australian National Occupational Health & Safety Commission (NOHSC), Australia.
Not classified as Dangerous Goods, according to the Australian Code for the Transport of Dangerous Goods by Road and Rail.
Risk Phrases:
R49(1) May cause cancer by inhalation.
Safety Phrases:
S22 Do not breathe dust.
S38 If insufficient ventilation, wear suitable respiratory equipment.

Undertake health and safety risk assessments on safe methods of handling and use appropriate to your workplace.

4. FIRST AID MEASURES

Inhalation	Remove the source of contamination or move the victim to fresh air. Ensure airways are clear and have qualified person give oxygen through a face mask if breathing is difficult. Seek medical attention.
Ingestion	Do not induce vomiting. Wash out mouth with water. If symptoms develop seek medical attention.
Skin	Wash affected area thoroughly with soap and water. Remove contaminated clothing and wash before reuse or discard. If symptoms develop seek medical attention.
Eye	If contact with the eye(s) occur, wash with running water holding eyelid(s) open. Take care not to rinse contaminated water into the non-affected eye. In all cases of eye contamination it is a sensible precaution to seek medical advice.
First Aid Facilities	Eye wash and normal washroom facilities.
Advice to Doctor	Treat symptomatically.

5. FIRE FIGHTING MEASURES

Extinguishing Media	Use appropriate fire extinguisher for surrounding materials involved in the fire.
Specific Methods	Fire fighters should wear Self-Contained Breathing Apparatus (SCBA) and full protective clothing to prevent exposure to vapours, fumes, dust or products of combustion.
Specific Hazards	The product is not combustible, however the packaging may burn under fire conditions.
Hazardous Combustion Products	Smoke, fumes and dust may be generated in a large fire.
Unsuitable Extinguishing Media	Do not use water jets.

6. ACCIDENTAL RELEASE MEASURES

Wear sufficient respiratory protection and full protective clothing to minimise exposure. Vacuum or sweep up material avoiding dust generation or dampen spilled material with water to avoid airborne dust. Seal all wastes in labelled containers for subsequent recycling or disposal. If large quantities of this material enter the waterways contact the Environmental Protection Authority, or your local Waste Management Authority.

7. HANDLING AND STORAGE

Handling	Prevent the creation of dust concentration higher than the occupational exposure limit. Wear appropriate protective equipment to prevent inhalation, skin and eye contact. Keep containers closed when not in use. Ensure a high level of personal hygiene is maintained when using the product.
Storage	Store in a cool, dry, well-ventilated area. Protect containers/bags from damage. Avoid generation of dust.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

National Exposure Standards	**Name**	**STEL (mgm3)**	**STEL (ppm)**	**TWA (mgm3)**	**TWA (ppm)**	**FootNote**

Quartz (crystalline silica)	0.1

Other Exposure Information No exposure standards have been established for this material by the Australian National Occupational Health & Safety Commission (NOHSC). However, the available exposure limits on ingredients are given above.
In addition, NOHSC has set the following exposure standard for dust not otherwise specified:
Dust: TWA 10 mg/m³ (inspirable fraction)
TWA (Time Weighted Average): The average airborne concentration of a particular substance when calculated over a normal eight-hour working day, for a five-day week.
STEL (Short Term Exposure Limit): The average airborne concentration over a 15 minute period which should not be exceeded at any time during a normal eight-hour workday.

Respiratory Protection If engineering controls are not effective in controlling airborne exposure then an approved respirator with a replaceable particulate filter should be used. Reference should be made to Australian Standards AS/NZS 1715, Selection, Use and Maintenance of Respiratory Protective Devices; and AS/NZS 1716, Respiratory Protective Devices, in order to make any necessary changes for individual circumstances.

Eye Protection Safety glasses with side shields or chemical goggles should be worn. Final choice of appropriate eye/face protection will vary according to individual circumstances. Eye protection devices should conform with Australian/New Zealand Standard AS/NZS 1337 - Eye Protectors for Industrial Applications.

Hand Protection Wear gloves of impervious material conforming to AS/NZS 2161: Occupational protective gloves - Selection, use and maintenance. Final choice of appropriate glove type will vary according to individual circumstances. This can include methods of handling, and engineering controls as determined by appropriate risk assessments.

Body Protection Suitable protective workwear should be worn when working with this material, e.g. cotton overalls buttoned at neck and wrist.

Eng. Controls Good ventilation adequate to maintain the concentration below exposure standards is required. The use of a local exhaust ventilation system (drawing dusts away from workers breathing zone) is recommended. If the engineering controls are not sufficient to maintain concentrations of particulates below the exposure standards, suitable respiratory protection must be worn.

Hygiene Measures Ensure a high level of personal hygiene is maintained when using this product. Always wash hands before eating, drinking, smoking or using the toilet facilities.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	Dark, off-white or white powder with a clay odour when moistened.
Melting Point	Not available
Boiling Point	Not applicable
Solubility in Water	Insoluble. Forms colloidal suspensions in water, with strong thixotropic properties.
Specific Gravity (H2O=1)	2.66-2.70
pH Value	5.7-8.1 (20% aqueous slurry)
Vapour Pressure	Not applicable
Flash Point	Non-combustible solid.
Flammability	This product is not combustible.
Ignition Temperature	Not applicable
Flammable Limits LEL	Not applicable
Flammable Limits UEL	Not applicable

10. STABILITY AND REACTIVITY

Stability	Stable
Hazardous Polymerization	Will not occur.

11. TOXICOLOGICAL INFORMATION

Toxicology Information	Not available
Inhalation	Inhalation may cause the drying and irritation of the respiratory tract. Acute aspiration may cause coughing, sneezing and pulmonary edema.
Ingestion	Ingestion of large amounts may irritate the gastric tract causing nausea and vomiting. When ingested, bentonite can swell several times in volume and can produce intestinal obstruction.
Skin	Skin contact may cause dryness. May cause mild irritation in the case of some individuals with sensitive skin.
Eye	Eye contact may cause mechanical irritation.
Chronic Effects	The product contains respirable free crystalline silica. Repeated exposure to respirable crystalline silica dust may lead to silicosis, a serious lung disease. The onset of silicosis is usually slow and lung damage may occur even when no symptoms or signs of ill-health have occurred. Silicosis can develop to a more serious degree even after exposure has ceased, and may also lead to other diseases including heart disease and scleroderma.
Carcinogenicity	The product contains respirable crystalline silica as quartz (10-20%). Crystalline silica inhaled in the form of quartz or cristobalite from occupational sources has been classified by International Agency for Research on Cancer (IARC) as carcinogenic to humans (Group 1) Furthermore, crystalline silica can cause silicosis or other lung diseases on prolonged exposure.

12. ECOLOGICAL INFORMATION

Mobility	Not available
Persistence / Degradability	Not available
Bioaccumulation	Not available
Ecotoxicity	Not available

13. DISPOSAL CONSIDERATIONS

Disposal of the spilled or waste product must be done in accordance with applicable local, state and federal government regulations.

14. TRANSPORT INFORMATION

The product is not classified as Dangerous Goods, according to the Australian Code for the Transport of Dangerous Goods by Road and Rail.

U.N. Number	None Allocated
Proper Shipping Name	None Allocated
DG Class	None Allocated
Hazchem Code	None Allocated
Packing Group	None Allocated

15. REGULATORY INFORMATION

Risk Phrase	R49(1) May cause cancer by inhalation.
Safety Phrase	S22 Do not breathe dust.

	S38 If insufficient ventilation, wear suitable respiratory equipment.
Poisons Schedule	Not Scheduled
Hazard Category	Toxic

16. OTHER INFORMATION

Contact Person/Point	Emergency Advice: ACOHS ERS - 1800 638 556 (24 Hours)
	PLEASE NOTE: The information contained herein is based on data available to Unimin Australia Limited from both our own technical sources and from recognised published references and is believed to be both accurate and reliable. Unimin Australia Limited has made no effort to censor nor to conceal deleterious aspects of this product. Since we cannot anticipate or control the many different conditions under which this information and our products may be used, each user should review these recommendations in the specific context of the intended application and confirm whether they are appropriate. It is therefore recommended that you undertake your own risk assessment in relation to your method of handling and proposed use of this product. Unimin Australia Limited accepts no liability whatsoever for damage or injury caused from the use of this information or of suggestions contained herein.
SDS History	MSDS created: December 2004

End of MSDS

REFRAMUL RM47

Hazard Alert Code: MODERATE

Chemwatch Material Safety Data Sheet
Issue Date: 17-Mar-2006

Revision No: 2

Chemwatch 4582-54
CD 2006/1

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: REFRAMUL RM47
SYNONYMS
"mullite refractory material", RM-47
PRODUCT USE
Dust from old, fired refractories may be more hazardous than new materials. Use respiratory protection when rebuilding or demolishing old furnaces. Refractory material.
SUPPLIER

Company: Bisley & Company Pty Ltd
Address:
Level 12, Tower B, Zenith Centre, 821 Pacific Highway
Chatswood
NSW, 2067
AUS
Emergency Tel: 1800 039 008
Fax: +61 2 9413 3523

Company: Bisley & Company Pty Ltd
Address:
PO Box 695
Chatswood
NSW, 2057
AUS
Telephone: +61 2 9413 1333
Fax: +61 2 9413 1319

HAZARD RATINGS

	Min	Max
Flammability:	0	
Toxicity:	2	
Body Contact:	1	
Reactivity:	0	
Chronic:	0	

Min/Nil=0
Low=1
Moderate=2
High=3
Extreme=4

Section 2 - HAZARDS IDENTIFICATION

STATEMENT OF HAZARDOUS NATURE

NON-HAZARDOUS SUBSTANCE. NON-DANGEROUS GOODS. According to the Criteria of NOHSC, and the ADG Code.

POISONS SCHEDULE
None
RISK
Inhalation may produce health damage*.
May produce discomfort of the eyes*.
* (limited evidence).
SAFETY
Do not breathe dust.
Wear eye/face protection.
Use only in well ventilated areas.
Keep container in a well ventilated place.
Take off immediately all contaminated clothing.
In case of contact with eyes, rinse with plenty of water and contact Doctor or Poisons Information Centre.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
mullite	1302-93-8	>60

Section 4 - FIRST AID MEASURES

SWALLOWED
- Immediately give a glass of water.
- First aid is not generally required. If in doubt, contact a Poisons Information Centre or a doctor.

EYE
If this product comes in contact with the eyes:
- 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.
- If pain persists or recurs seek medical attention.
- Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

SKIN
If skin or hair contact occurs:
- Flush skin and hair with running water (and soap if available).
- Seek medical attention in event of irritation.

INHALED
- If dust is inhaled, remove from contaminated area.
- Encourage patient to blow nose to ensure clear passage of breathing.
- If irritation or discomfort persists seek medical attention.

REFRAMUL RM47

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EYE

- Safety glasses.

When sawing, machining or sanding use

- Safety glasses with side shields.
- Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lens 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. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59]

HANDS/FEET

Heavy gloves, eg. leather and

- Barrier cream

Wear physical protective gloves, eg. leather.
Wear safety footwear.

OTHER

- Loose fitting protective clothing, eg overalls/ long sleeve shirts.
- When working above head height, use head covering, dust mask and goggles.
- Minimise dust generation by using sharp hand cutting tools if possible.
- Powered tools (eg saws etc.) should only be used if fitted with dust extraction and containment equipment.
- Vacuum cleaners should be available for fibre/dust removal.
- Eyewash unit

RESPIRATOR

Protection Factor	Half-Face Respirator	Full-Face Respirator	Powered Air Respirator
10 x ES	P1 Air-line*	- -	PAPR-P1 -
50 x ES	Air-line**	P2	PAPR-P2
100 x ES	-	P3	-
		Air-line*	-
100+ x ES	-	Air-line**	PAPR-P3

* - Negative pressure demand ** - Continuous flow.

The local concentration of material, quantity and conditions of use determine the type of personal protective equipment required.
For further information consult site specific CHEMWATCH data (if available), or your Occupational Health and Safety Advisor.

ENGINEERING CONTROLS

Use in a well-ventilated area.

- Local exhaust ventilation is required where solids are handled as powders or crystals; even when particulates are relatively large, a certain proportion will be powdered by mutual friction.
- Exhaust ventilation should be designed to prevent accumulation and recirculation of particulates in the workplace.
- If in spite of local exhaust an adverse concentration of the substance in air could occur, respiratory protection should be considered. Such protection might consist of:

(a): particle dust respirators, if necessary, combined with an absorption cartridge;
(b): filter respirators with absorption cartridge or canister of the right type;
(c): fresh-air hoods or masks

- Build-up of electrostatic charge on the dust particle, may be prevented by bonding and grounding.
- Powder handling equipment such as dust collectors, dryers and mills may require additional protection measures such as explosion venting.

Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to efficiently remove the contaminant.

Type of Contaminant:	Air Speed:
direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)	1-2.5 m/s (200-500 f/min.)
grinding, abrasive blasting, tumbling, high speed wheel generated dusts (released at high initial velocity into zone of very high rapid air motion).	2.5-10 m/s (500-2000 f/min.)

Within each range the appropriate value depends on:

Lower end of the range	Upper end of the range
1: Room air currents minimal or favourable to capture	1: Disturbing room air currents
2: Contaminants of low toxicity or of nuisance value only	2: Contaminants of high toxicity
3: Intermittent, low production.	3: High production, heavy use
4: Large hood or large air mass in motion	4: Small hood-local control only

Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 4-10 m/s (800-2000 f/min) for extraction of crusher dusts generated 2 metres distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.
In confined spaces where there is inadequate ventilation, wear full-face air supplied breathing apparatus.

REFRAMUL RM47

Chemwatch Material Safety Data Sheet
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NOTES TO PHYSICIAN
Treat symptomatically.

Section 5 - FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA
Use extinguishing media suitable for surrounding area.
FIRE FIGHTING
Product is not combustible. No special firefighting procedures required.
Alert Fire Brigade and tell them location and nature of hazard.
Use fire fighting procedures suitable for surrounding area.
FIRE/EXPLOSION HAZARD
Non combustible.
FIRE INCOMPATIBILITY
None known.
HAZCHEM
None
Personal Protective Equipment
Breathing apparatus.

Section 6 - ACCIDENTAL RELEASE MEASURES

EMERGENCY PROCEDURES
MINOR SPILLS
Clean up all spills immediately.
Use dry clean up procedures and avoid generating dust.
If exposure to workplace dust is not controlled, respiratory protection is required, wear SAA approved dust respirator.
Vacuum up or sweep up.
Place in suitable containers for disposal.
MAJOR SPILLS
Minor hazard.

- Clean up all spills immediately.
- Secure load if safe to do so.
- Bundle/collect recoverable product.
- Collect remaining material in containers with covers for disposal.

Personal Protective Equipment advice is contained in Section 8 of the MSDS.

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING
Avoid generating and breathing dust. Effective dust extraction and good ventilation is required when using cutting, shaping or sanding tools. Wear a disposable dust mask AS 1715 (1991) class P1 or P2 when machining.

- Limit all unnecessary personal contact.
- Wear protective clothing when risk of exposure occurs.
- Use in a well-ventilated area.
- When handling DO NOT eat, drink or smoke.
- Always wash hands with soap and water after handling.
- Avoid physical damage to containers.
- Use good occupational work practice.
- Observe manufacturer's storing and handling recommendations.

SUITABLE CONTAINER
Packaging as recommended by manufacturer.
STORAGE INCOMPATIBILITY
None known.
STORAGE REQUIREMENTS

- Keep dry.
- Store under cover.
- Protect containers against physical damage.
- Observe manufacturer's storing and handling recommendations.

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS
No data available: mullite as (CAS: 1302-93-8) / (CAS: 61027-90-5)
EMERGENCY EXPOSURE LIMITS
None assigned. Refer to individual constituents.
INGREDIENT DATA
MULLITE:
No exposure limits set by NOHSC or ACGIH.

PERSONAL PROTECTION

REFRAMUL RM47

Hazard Alert Code: MODERATE

Chemwatch Material Safety Data Sheet | Revision No: 2 | Chemwatch 4582-54

Issue Date: 17-Mar-2006 | CD 2006/1

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE
Refractory granules; insoluble in water. Odourless. Chemical analysis % highest oxide, calcined basis: AlO_3 47.0, SiO_2 49.4, TiO_2 0.8, Fe_2O_3 0.8, CaO 0.5, MgO 0.5, Na_2O 0.5, K_2O 0.5.
PHYSICAL PROPERTIES
Solid.
Does not mix with water.

Molecular Weight: Not applicable
Melting Range (°C): Not available
Solubility in water (g/L): Insoluble
pH (1% solution): Not applicable
Volatile Component (%vol): Not applicable
Relative Vapour Density (air=1): Not applicable
Lower Explosive Limit (%): Not applicable
Autoignition Temp (°C): Not applicable
State: Divided solid

Boiling Range (°C): Not applicable
Specific Gravity (water=1): Not available
pH (as supplied): Not applicable
Vapour Pressure (kPa): Not applicable
Evaporation Rate: Not applicable
Flash Point (°C): Not applicable
Upper Explosive Limit (%): Not applicable
Decomposition Temp (°C): Not available
Viscosity: Not available

Section 10 - CHEMICAL STABILITY AND REACTIVITY INFORMATION

CONDITIONS CONTRIBUTING TO INSTABILITY
Product is considered stable and hazardous polymerisation will not occur.

Section 11 - TOXICOLOGICAL INFORMATION

POTENTIAL HEALTH EFFECTS
ACUTE HEALTH EFFECTS
SWALLOWED
Not normally a hazard due to physical form of product.
Considered an unlikely route of entry in commercial/industrial environments.
The dust may be highly discomforting and abrasive if swallowed.
EYE
The dust may be discomforting and highly abrasive to the eyes and is capable of causing a mild, temporary redness of the conjunctiva (similar to wind-burn), temporary impairment of vision and/ or other transient eye damage/ ulceration.
SKIN
The material is moderately discomforting and may be abrasive to the skin and may cause drying of the skin, which may lead to dermatitis.
INHALED
Inhalation of dust may cause upper respiratory tract irritation and breathing difficulty.
Effects on lungs are significantly enhanced in the presence of respirable
particles.
Used, fired refractory materials are potentially more harmful than new refractories. Silica containing materials when exposed to high temperatures may be converted or part converted to crystalline forms that present a higher hazard if inhaled. Crystalline silicas are more likely to produce lung changes (fibrosis) and have a much lower Exposure Standard than non crystalline silicas. Exposure to fired refractories is more likely when repairing, rebuilding or demolishing old structures.
CHRONIC HEALTH EFFECTS
Principal routes of exposure are by accidental skin and eye contact and inhalation of generated dusts.
Persons with impaired respiratory function, airway diseases and conditions such as emphysema or chronic bronchitis, may incur further disability if excessive concentrations of particulate are inhaled.
TOXICITY AND IRRITATION
Not available. Refer to individual constituents.
unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances
MULLITE:
No data of toxicological significance identified in literature search.

Section 12 - ECOLOGICAL INFORMATION

No data for Reframul RM47.

Section 13 - DISPOSAL CONSIDERATIONS

- Recycle wherever possible or consult manufacturer for recycling options.
- Consult State Land Waste Management Authority for disposal.
- Bury residue in an authorised landfill.

Section 14 - TRANSPORTATION INFORMATION

HAZCHEM
None
NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS:UN,IATA,IMDG

REFRAMUL RM47

Hazard Alert Code: MODERATE

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Section 15 - REGULATORY INFORMATION

POISONS SCHEDULE

None

REGULATIONS

mullite (CAS: 1302-93-8) is found on the following regulatory lists;
Australia Inventory of Chemical Substances (AICS)
OECD Representative List of High Production Volume (HPV) Chemicals
No data available for mullite as CAS: 61027-90-5.

Section 16 - OTHER INFORMATION

Ingredients with multiple CAS Nos

Ingredient Name	CAS
mullite	1302-93-8, 61027-90-5

Issue Date: 17-Mar-2006
Print Date: 24-Apr-2006

MATERIAL SAFETY DATA SHEET AS3704

SILICA FUME

1. IDENTIFICATION OF MATERIAL AND SUPPLIER

Product Identification

Product Name	Silica Fume
Other Names	Silica (Silicon Dioxide); Micro Silica
Recommended Uses	Production of Refractories, Portland Cement, Ceramics and Glass.

Supplier Identification

Company	Doral Fused Materials Pty. Ltd. A.B.N. 62 009 415 025	
Address	Lot 6 Alumina Road, East Rockingham Western Australia 6168 PO Box 84, Rockingham Western Australia 6968	
Telephone Number	Within Australia (08) 9439 2236	International +61 8 9439 2236
Facsimile	Within Australia (08) 9439 2892	International +61 8 9439 2892
E-Mail	doral@doral.com.au	
Emergency Telephone (24 hours)	(08) 9439 2236	(International +61 8 9439 2236)

2. HAZARD IDENTIFICATION

Silica Fume is not classified as hazardous according to criteria of Worksafe Australia.

Risk Phases (R-Phrases)	None
Safety Phrases (S-Phrases)	None
UN Number	None Allocated
Class and Subsidiary Risk	None Allocated
Hazchem Code	None Allocated
Poisons Schedule Number	None Allocated

Potential Health Effects

Acute	
Swallowed:	Can cause severe irritation and damage to gastrointestinal tract.
Eye:	Reacts with tears resulting in severe irritation, corrosive burns and risk of permanent damage to eyes.
Skin:	Can cause caustic attacks on skin, especially when wet.
Inhaled:	Can cause irritations of the respiratory tract.
Chronic	Long term exposure to crystalline silica, in excess of suggested limits, can result in fibrotic lung disease (silicosis).

3. COMPOSITION / INFORMATION ON INGREDIENTS

Ingredients (typical)	***CAS Number***	***Proportion %***
Silica (amorphous)	69012-64-2	> 93.0 wt.%)
Zirconium Dioxide	1314-23-4	< 6.0 (wt.%)
Silica (crystalline)	14808-60-7	< 1.0 (wt.%)
U (Uranium)	7440-61-1	100 ppm
Th (Thorium)	7440-29-1	20 ppm

4. FIRST AID MEASURES

Swallowed:	Drink large amounts of water. Do **not** induce vomiting. Consult a doctor immediately.
Eyes:	Hold eyelids open and wash continuously with water for 15 minutes. Do not rub eyes. Seek immediate medical attention.
Skin:	Immediately remove clothing and flush affected area with large quantities of water. Seek medical attention.
Inhaled:	Remove from exposure to fresh air. If breathing is laboured or stopped, give artificial respiration. Obtain immediate medical attention.
First Aid Facilities:	No special requirements.

5. FIRE FIGHTING MEASURES

Flashpoint	None
Flammability Limits	Non-flammable
General Hazard	This product is not flammable and does not support combustion.
Extinguishing Media	Use media suitable for the material that is burning.

6. ACCIDENTAL RELEASE MEASURES

Spills and disposal	Clean up by sweeping and collection of dry material, avoid dusting. Due to possible leachability, approval from appropriate regulatory bodies is to be obtained for the disposal of Silica Fume. Wear safety equipment as for normal handling. Avoid generating dust. Vacuum up if possible, otherwise sweep up and re-cycle. If the spilled product is not suitable for re-use, damp down, collect and where possible return to manufacturer for reprocessing. Any disposal to an approved landfill site and cover with clean fill shall be conducted in accordance with State/Local Council regulations.

7. HANDLING AND STORAGE

Handling	Avoid breathing dust. Suitable dust controls, including wearing a suitable respirator, should be utilised when handling bulk materials. Wash thoroughly after handling. If handling Silica Fume it is advisable to also use gloves and wash hands before eating, drinking or smoking to minimise inhalation or ingestion from hands.
Storage	Keep dry. Store separate from hydrofluoric acid.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure Standards:

Chemical Name	*CAS Number*	*Proportion (wt %)*	*NOHSC TWA*	*ACGIH TLV*
Silica (amorphous)	69012-64-2	> 85.0	2.0 mg/m^3	2.0 mg/m^3 (respirable dust)
Zirconium Dioxide	1314-23-4	< 10.0	5 mg/m^3 as Zr	5 mg/m^3 as Zr
Silica (crystalline)	14808-60-7	< 1.0	0.1 mg/m^3	0.05 mg/m^3

Radiation Exposure[1]	Occupational exposure should be as low as reasonably achievable, (ALARA principle), but should not exceed a total of 100 milli-seiverts over five consecutive years. (ICRP) [1] Denotes recommendation of the International Commission on Radiological Protection, ICRP Publication 60, Annals of the ICRP Vol 21, No 1 – 3 1991
Engineering Controls	Use with adequate ventilation. Limit dust formation as far as possible to meet exposure limits listed above.
Personal Protection	Use dust respirator and face mask to cover eyes, nose and mouth. The use of impervious gloves and protective clothing is recommended to reduce unnecessary contact with skin.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	White amorphous powder
Boiling Point	Not Applicable
Melting Point	1720°C
Vapour Pressure	Not Applicable
Specific Gravity	2.5
Flashpoint	Not Applicable
Flammability Limits	Non-flammable
Solubility	Insoluble in water, soluble in concentrated acids and alkalis
Bulk Density	200 - 300 kg/m^3
pH	2 - 4 (10 wt.% in distilled water)
Reactivity	Reacts with hydrofluoric acid (HF) to produce toxic, gaseous silicon tetrafluoride (SiF_4)

Additional Information

Radioactivity	Silica Fume contains low levels of U and Th (U + Th ~ 120 ppm, ~1Bq/g). When following recommended safe handling practices radiation exposure is unlikely to exceed 0.5 mSv/year (whole body average).

10. STABILITY AND REACTIVITY

Reactivity	Inert
Chemical Stability	Stable
Incompatibilities	None in normal or expected use
Decomposition	Decomposition will not occur

11. TOXICOLOGICAL INFORMATION

This product is non-toxic. Refer to section 2 - Hazards Identification.

12. ECOLOGICAL INFORMATION

This material is unlikely to cause any environmental damage. It is insoluble in water and is unlikely to contaminate waterways or food chains.

13. DISPOSAL CONSIDERATION

Disposal must be in accordance with Federal, State and Local Council regulations. If approved, may be transferred to an approved landfill site.

Note: Many states are developing new regulations for the disposal of waste containing Naturally Occurring Radioactive Materials (NORM) or Technologically Enhanced Naturally Occurring Radioactive Materials (TENORM) above background levels. Consult and comply with current regulations.

14. TRANSPORT INFORMATION

Transport may be regulated in some countries, although the product is not generally regarded as a transport hazard. Not classified as radioactive pursuant to paragraph 107 of IAEA TS-R-1 regulations. Trucks however should be covered when transporting dry bulk product to prevent dust generation.

15. REGULARTORY INFORMATION

None stated.

16. OTHER INFORMATION

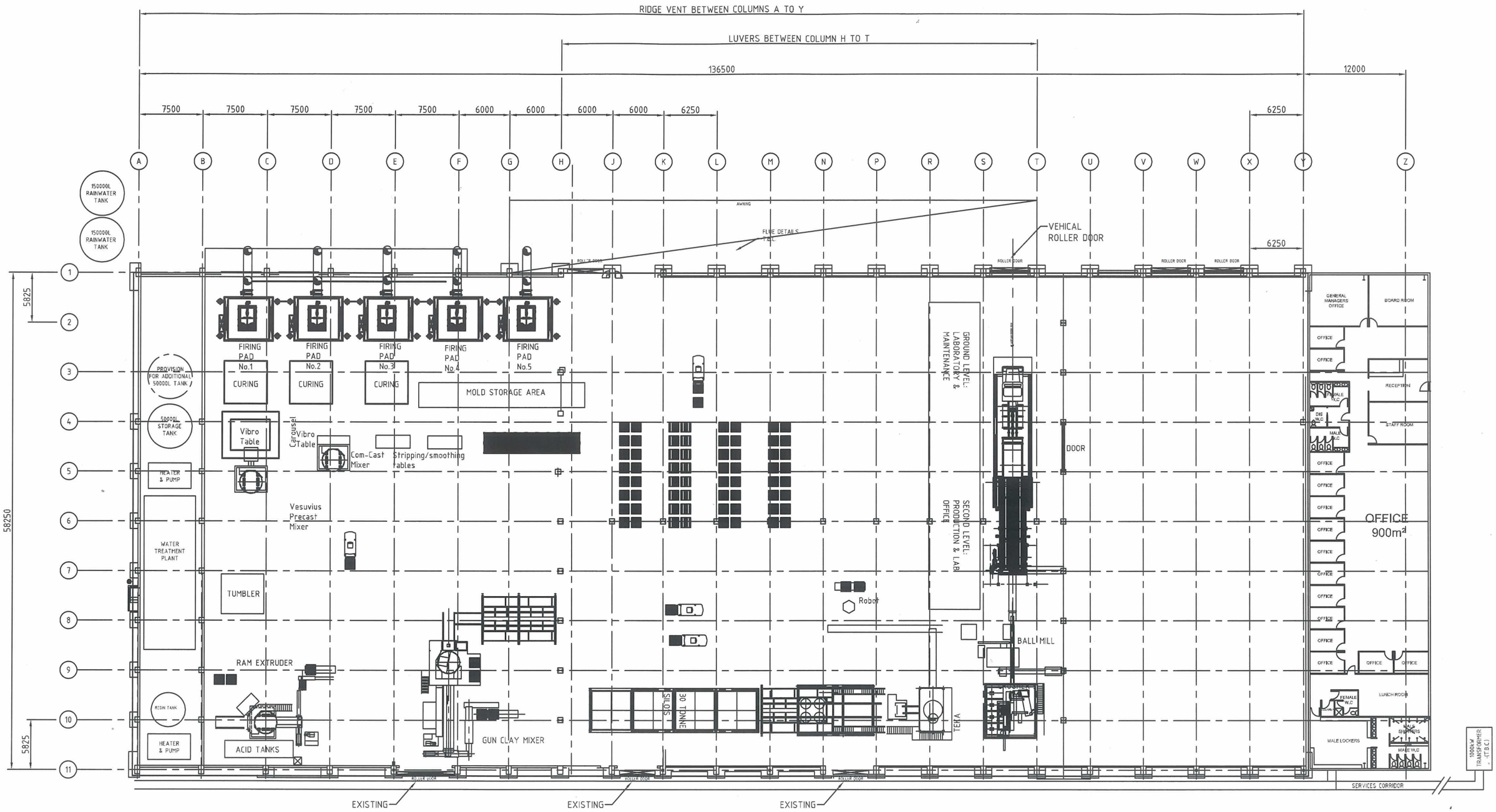
Labelling	Labelling not required according to EC-Dir. 67/548, as amended.
Other Information	This MSDS has been prepared by Doral Fused Materials, Safety Health and Environment Department.
Date of Issue	10/12/2007
Replaces	27/07/2007

This MSDS is valid for five (5) years from the date of issue but readers should refer to Doral's website (www.doral.com.au) to ensure that this is the latest issue. As per the Worksafe Guidance Note NOHSC 3017, each user should review the information in the specific context of the intended application.

Abbreviations

Bq/gm	Becquerel per gram
IAEA	International Atomic Energy Agency
IRAC	International Agency for Research on Cancer
ICRP	International Commission on Radiation Protection
mg/m^3	Milligram per cubic metre
ASCC	Australian Safety and Compensation Commission
TLV	Threshold Limit Value
TWA	Time Weighted Average

End of MSDS



PLAN VIEW

SCALE 1:225

PRELIMINARY

No OFF	ITEM	DESCRIPTION	REMARKS
-	-	-	-

frank soto + associates
consulting mechanical engineers
Ph(02)4271 7755 Fax(02)4271 5855

REV	DESCRIPTION	DATE	DRN	CKD
E	PRELIMINARY ISSUE FOR INFORMATION ONLY	19.11.08	A.J	P.A.
D	PRELIMINARY ISSUE FOR INFORMATION ONLY	18.11.08	A.J	P.A.
C	PRELIMINARY ISSUE FOR INFORMATION ONLY	24.09.08	RS.	P.A.
B	PRELIMINARY ISSUE FOR INFORMATION ONLY	19.09.08	BF	P.A.
A	PRELIMINARY ISSUE FOR INFORMATION ONLY	12.09.08	F.S.	P.A.

VESUVIUS Australia
LOT 2 Sturdee Avenue, BULLI NSW 2516
PH : +61 (02) 42681188
FAX: +61 (02) 42681150

DRN	F.S.	08.09.08
CKD	P.A.	11.09.08
APP		
SCALE	1:225	
JOB	41985	

VESUVIUS AUSTRALIA
COOKSON PLIBRICO PLANT
PROPOSED UNANDERRA PLANT LAYOUT
PRODUCTION FACILITIES
GENERAL ARRANGEMENT

CLIENT DRAWING NUMBER

A1

DRAWING NUMBER 41985-BLDG-01

REV E

Tiffany Chan

From: Tim Shelton
Sent: Friday, 22 May 2009 1:28 p.m.
To: Stuart Milling; Tiffany Chan
Subject: FW: On-site Sewerage disposal policy
Attachments: Approval%20Requirements%20for%20Septic%20Tanks%20and%20Sewerage%20Management%20Systems.pdf; final REP.pdf

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From: Matthew Fuller [mailto:MFuller@wollongong.nsw.gov.au]
Sent: Friday, 22 May 2009 12:33 p.m.
To: Tim Shelton
Subject: On-site Sewerage disposal policy

Tim,

As discussed this morning I am not aware of any on-site sewerage disposal systems that have been approved to discharge to stormwater. Here is the Wollongong City Council policy for on-site sewerage management systems as well as our evaluation system for on-site effluent disposal.

Regards
Matt Fuller
Environmental Protection Officer
Wollongong City Council
Phone 42277612 Fax 42277738
E-Mail mfuller@wollongong.nsw.gov.au

From: Greg Newman [mailto:Greg.Newman@environment.nsw.gov.au]
Sent: Tuesday, 19 May 2009 2:59 PM
To: Dianne Thomas
Cc: Georgia.Ivancevic@planning.nsw.gov.au
Subject: RE: Email from DECC

Hi Dianne

A treatment system of that size would not require an environment protection licence (see legislation below) therefore the original letter would not change. I understand the STP would need approval from Wollongong Council as the appropriate regulatory authority for POEO Act matters. Suri Mora at WCC is the appropriate contact. Happy to discuss, Regards Greg 42244103

36 Sewage treatment

This clause applies to ***sewage treatment***, meaning the operation of sewage treatment systems (including the treatment works, pumping stations, sewage overflow structures and the reticulation system) that involve the discharge or likely discharge of wastes or by-products to land or waters.
The activity to which this clause applies is declared to be a scheduled activity if it has a processing capacity that exceeds:
2,500 persons equivalent, as determined in accordance with guidelines established by an EPA Gazettal notice, or
750 kilolitres per day,
whichever is the greater.

From: Dianne Thomas [mailto:Dianne.Thomas@beca.com]
Sent: Tuesday, 19 May 2009 2:40 PM
To: Newman Greg
Subject: FW: Email from DECC

Hello Greg. I am a water and wastewater engineer at Beca. I have been working with Tim Shelton on the Cookson refractory project at Unanderra. This site will have an on site sewage treatment plant that will treat about 4kL of toilet, shower and domestic effluent each day. The treated effluent will be used onsite, with excess overflowing to stormwater. Does this change the information in the attached letter?

This was the reason for my call. I thought it was worth checking the onsite sewage treatment plant does not need a discharge licence.

Looking forward to hearing from you.

Dianne Thomas
Project Director, Water
Beca
Phone +61-2-9633 9677 Fax + 61-2-9633 9477
Dir+61-2-8833 1077 Mobile +0413 006 452
Dianne.Thomas@beca.com
www.beca.com

<<cookson no interest.pdf>>