SAFETY DATA SHEET

Lockwell UHB Part B

Section 1.0 – Identification Of Material And Supplier

Product Name	:	Lockwell UHB (Urea Hydro Block) Part B
Proper Shipping Name	:	Isocyanate Component
Recommended use	:	Product for Mining and Civil Applications
Suppliers Name	:	Lockwell Systems Co.,Ltd. 199/5 Moo.21 Soi Chongsiri Parkland T.Bangphleeyai A.Bangplee Samutprakarn 10540
Country of Origin	:	New Zealand
Phone Number	:	+662 181 9738
Date of Preparation	:	1 July, 2016

Section 2.0 – Hazards Identification

Statement of Hazardous Nature: 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.
Not classified as dangerous goods by the criteria of the New Zealand
Standard 5433:2007 Transport of Dangerous goods on Land.

HSNO Classification:

6.1 – ACUTE TOXICITY:	
INHALATION –	Category D
6.3 – SKIN IRRITATION –	Category A
6.4 – EYE IRRITATION –	Category A (Irritant)
6.5 – SENSITIZATION –	Category A (Respiratory)
6.5 – SENSITIZATION –	Category B (Skin)
6.7 – CARCINOGENICITY:	
INHALATION –	Category B
6.9 – SPECIFIC TARGET ORGAN TOXICITY (SINGLE OR REPEATEDEXPOSURE):	
INHALATION [lungs] –	Category A
6.9 – SPECIFIC TARGET ORGAN TOXICITY (SINGLE OR REPEATED EXPOSURE):	
INHALATION [respiratory tract] –	Category B

Signal word: Danger

Hazard Statements
Harmful if inhaled
Causes skin irritation.
Causes serious eye irritation.
May cause allergy or asthma symptoms or breathing difficulties if inhaled
May cause an allergic skin reaction.
Suspected of causing cancer if inhaled.
Causes damage to organs if inhaled. (lungs)
May cause damage to organs if inhaled. (respiratory tract)

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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. In case of inadequate ventilation wear respiratory protection. Use only outdoors or in a well-ventilated area. Do not breathe vapor. Do not eat, drink or smoke when using this product. Wash thoroughly after handling. Contaminated work clothing should not be allowed out of the workplace.
Response	
If on skin -	Take off contaminated clothing and wash before reuse. Wash with plenty of soap and water.
If in eyes -	Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Wash hands after handling.
If inhaled -	Remove to fresh air and keep at rest in a position comfortable for breathing. If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing. If exposed or concerned: Call a POISON CENTRE or doctor/physician. Get medical advice/attention.
Storage:	Store locked up.
Disposal:	Dispose of contents and container in accordance with all local, regional national and international regulations.

Section 3.0 – Composition / Information on Ingredients

Physical state:	Liquid	
Colour:	Brown	
Ingredients:	Cas No:	%
Isocyanic acid, polymethylenepolyphenylene ester	9016-87-9	60-100
4,4'-Methylenediphenyl diisocyanate	101-68-8	30-60
Tris (2-chloro-1-methylethyl) phosphate	13674-84-5	10-15

Other ingredients determined not to be hazardous by the HSNO regulations to 100

Section 4.0 – First Aid Measures

EMERGENCY & FIRST AID PROCEDURES

Inhalation:	Get medical attention immediately. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen

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	by trained personnel. If may be dangerous, to the person providing aid to give mouth-to-mouth resuscitation. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. 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. In the event of any complaints or symptoms, avoid further exposure.
Ingestion:	Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.
Skin Contact:	Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Continue to rinse for at least 10 minutes. Get medical attention. In the event of any complaints or symptoms, avoid further exposure. Wash clothing before reuse. Clean shoes thoroughly before reuse.
Eye Contact:	Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Get medical attention.

Section 5.0 – Fire Fighting Measure

Type of Hazard	In a fire or if heated, a pressur increase will occur and the container may burst. Decomposition products may include the following materials: Carbon dioxide Carbon monoxide Nitrogen oxides
Extinguishing Media Suitable:	Use an extinguishing agent suitable for the surrounding fire.
Not suitable:	None known.
Hazchem code:	Not available.

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Special protective equipment and precautions 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.

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.

Due to reaction with water producing CO_2 gas, a hazardous build-up of pressure could result if contaminated containers are re-sealed. Containers may burst if overheated.

Section 6.0 – Accidental Release Measures

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 spilt material. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment (see Section 8).

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).

Methods and Material for containment and cleaning up

Small spill:	Stop leak if without risk. Move containers from spill area. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.
Large spill:	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. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material eg sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilt product. Note: see section 1 for emergency contact information and section 13 for waste disposal.

Section 7.0 – Handling and Storage

Precautions for Safe Handling

Put on appropriate personal protective equipment (see Section 8). 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. Persons with a history of skin sensitization problems or asthma, allergies or chronic or recurrent

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respiratory disease should not be employed in any process in which this product is used. Avoid exposure – obtain special instructions before use. Do not get in eyes or on skin or clothing. Do not ingest. Avoid breathing vapor or mist. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Empty containers retain product residue and can be hazardous. Do not reuse container.

Conditions for Safe Storage, including any incompatibilities

Store between the following temperatures: 20 to 30°C. 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. 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.

Section 8.0 – Exposure Controls / Personal Protection

Workplace exposure standards

Ingredient name	Exposure limits
Isocyanic acid, polymethylenepolyphenylene ester	NZ OSH (New Zealand, 12/2010). Skin sensitiser. WES-TWA: 0.02 mg/m³, (measured as NCO) 8 hour(s) WES-STEL: 0.07 mg/m³, (measured as NCO) 15 minute(s).
Diphenylmethane 4,4'-diisocyanate	NZ OSH (New Zealand, 12/2010). Skin sensitiser. WES-TWA: 0.02 mg/m³, (measured as NCO) 8 hour(s) WES-STEL: 0.07 mg/m³, (measured as NCO) 15 minute(s)
1,1-dichloro-1-fluoroethane (HCFC 141b)	Threshold Limit Value – Time Weighted Average (TLV-TWA): 500 ppm

As published by the New Zealand Occupational Safety and health Service (OSH).

Notes:

Time Weighted average (TWA):	The time-weighted average airborne concentration over an eight-hour working day, for a five-day working week over an entire working life.
Short term Exposure Limit (STEL):	The average airborne concentration over a 15 minute period which should not be exceeded at any time during a normal eight-hour work day.
Ceiling:	A concentration that should not be exceeded during any part of the working day.
Skin Absorption Notice:	Absorption through the skin may be a significant source of exposure. The exposure standard is invalidated if such contact should occur.
Sensitizer Notice:	The substance can cause a specific immune response in some people. An affected individual may subsequently react to exposure to minute levels of that substance.

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Carcinogen:	Confirmed or possible human carcinogens. A1 – confirmed human carcinogen, A2 – suspected human carcinogen, A3 –confirmed animal carcinogen with unknown relevance to humans.

The Exposure Standards listed represent airborne concentrations of individual chemical substances which, according to current knowledge, should neither impair the health of, nor cause undue discomfort to, nearly all workers. They 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.

Engineering controls

Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

Personal protective equipment (PPE)

Respiratory protection:	Use a properly fitted, air-purifying or air-fed 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.
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.
Eye 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.
Skin 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.
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. Contaminated work clothing should not be allowed out of the workplace. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

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Section 9.0 – Physical and Chemical Properties

Physical state:	Liquid		
Colour/Appearance:	Brown		
Solubility:	Not available		
Density:	1.23 g/cm³ [25°C]	Vapor density:	Not available
Specific gravity:	1.23	Vapor pressure:	Not available
Boiling point:	Not available	Flash point:	Closed cup: 230°C Open cup: 230°C
Melting point:	Not available	Flammable limits:	Not available
Viscosity:	Dynamic: 220 mPa's 25°C	Auto-ignition temperature:	Not available
pH:	Not available		

(Typical values only – consult specification sheet)

Section 10.0 – 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.

Conditions to avoid: No specific data.

Incompatible materials:

Hazardous decomposition products: Under normal conditions of storage and use, hazardous decomposition should not be produced.

Section 11.0 – Toxicology Information

Information on the likely routes of exposure

Inhalation: Harmful if inhaled. Causes damage to organs following a single exposure if inhaled. May cause damage to organs following a single exposure if inhaled. May cause allergy or asthma symptoms or breathing difficulties if inhaled. Exposure to decomposition products may cause a health hazard. Serious effects may be delayed following exposure.

Ingestion: Irritating to mouth, throat and stomach.

Skin contact: Causes skin irritation. May cause an allergic skin reaction.

Eye contact: Causes serious eye irritation.

Symptoms related to the physical, chemical and toxicological characteristics

Inhalation: Adverse symptoms may include the following:
Wheezing and breathing difficulties
Asthma

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Ingestion:	No specific data.
Skin contact:	Adverse symptoms may include the following: Irritation Redness
Eye contact:	Adverse symptoms may include the following: Pain or irritation Watering Redness

Delayed and immediate effects and also chronic effects from short and long term exposure

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Diphenylmethane 4,4'-diisocyanate	LC50 Inhalation Dusts and mists LD50 Dermal LD50 Oral	Rat - Male, Female Rabbit – Male, Female Rat – Male	0.49 mg/L >9400 mg/kg >10000 mg/kg	4 hours - -

Irritation/Corrosion

Product/ingredient name	Result	Species	Score	Exposure	Observation
Diphenylmethane 4,4'diisocyanate	Skin – Irritant Eyes – Non irritant	Rabbit Rabbit	- -	- -	- -

Sensitization

Product/ingredient name	Route of exposure	Species	Results
Diphenylmethane 4,4'-diisocyanate	Skin Skin Respiratory	Mouse Guinea pig Guinea pig	Sensitizing Not sensitizing Sensitizing

Potential chronic health effects

Inhalation:	Once sensitized, a severe allergic reaction may occur when subsequently exposed to very low levels.
Skin contact:	Once sensitized, a severe allergic reaction may occur when subsequently exposed to very low levels.
Carcinogenicity:	Suspected of causing cancer if inhaled. Risk of cancer depends on duration and level of exposure.

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Carcinogenicity:

Product/ingredient	Result	Species	Dose	Exposure
Diphenylmethane 4,4'-diisocyanate	Positive – Inhalation – NOAEL	Rat – Male, Female	1 mg/m³	2 years; 5 days Per week

IARC Classification

Product/Ingredient name	IARC
Isocyanic acid, Polymethylenepolyphenylene ester	-
Diphenylmethane 4.4'-diisocyanate	3

Mutagenicity

Product/ingredient name	Test	Experiment	Result
Diphenylmethane 4,4'-diisocyanate	EU EC B.13/14 Mutagenicity – Reverse Mutation Test using Bacteria	Experiment: In vitro Subject: Bacteria Metabolic activation: ±	Negative
	OECD 474 Mammalian Erythrocyte Micronucleus Test	Experiment: In vivo Subject: Mammalian-Animal	Negative

Teratogenicity

Product/ingredient name	Result	Species	Dose	Exposure
Diphenylmethane 4,4'-diisocyanate	Negative – Inhalation	Rat – Female	12 mg/m³ NOAEL	10 days; 6 hours per day

Specific target organ toxicity

Name	Target organs
Isocyanic acid, polymethylenepolyphenylene ester	Lungs
4,4'-Methylenediephenyl diisocyanate	Lungs

Section 12.0 – Ecological Information

Ecotoxicity: No known significant effects or critical hazards.

Aquatic and terrestrial toxicity

Product/ingredient name	Result	Species	Exposure
Diphenylmethane 4,4'-diisocyanate	Acute EC50>1000 mg/L Fresh water	Daphnia	24 hours Static
	Acute LC50>1000 mg/L	Fish	96 hours Static
	Chronic NOEC>10 mg/L Fresh water	Daphnia	21 days Semi-static
	Chronic NOECr 1640 mg/L Fresh Water	Algae	72 hours Static

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Persistence/degradability

Product/ingredient name	Test	Result	Dose	Inoculum
Diphenylmethane 4,4'-diisocyanate	OECD 302C Inherent Biodegradability: Modified MITI Test (II)	0% - Not readily – 28 days	30 mg/L BOD:	-

Product/ingredient name	Aquatic half-life	Photolysis	Biodegradability
Diphenylmethane 4,4'-diisocyanate	Fresh water 0.83 days	-	Not readily

Bio accumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
Diphenylmethane 4,4'-diisocyanate	4.51	200	Low

Mobility in soil

Soil/water partition coefficient (K_{OC}) Boy considering the production and use of the substance, it is unlikely that significant environmental exposure in the air or water will arise. Immiscible with water, but will react with water to produce inert and non-biodegradable solids. Conversion to soluble products, including diamine- Diphenylmethane (MDA), is very low under the optimal laboratory conditions of good dispersion and low concentration. In air, the predominant degradation process is predicted to be a relatively rapid OH radical attack, by calculation and by analogy with related diisocyanates.

Other adverse effects: No known significant effects or critical hazards.

Section 13.0 – Disposal Considerations

Disposal methods: The generation of waste should be avoided or minimized wherever possible. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe way. Significant quantities of waste product residues should not be disposed of via the foul sewer but processed in a suitable effluent treatment plant. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. 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. Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers.

Section 14.0 – Transportation Information

Road and rail transport

Not classified as dangerous goods by the criteria of the New Zealand Standard 5433:2007 Transport of Dangerous goods on Land.

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Marine transport
Not classified as dangerous goods by the criteria of the International Maritime Dangerous Goods (IMDG) Code for transport by sea.

Air transport
Not classified as dangerous goods by the criteria of the International Air Transport Association (IATA) Code for transport by air.

Section 15.0 – Regulatory Information

HSNO approval number: HSR002646
HSNO group standard: Polymers (Toxic [6.7]) Group Standard 2006

Safety, health and environmental Regulations specific for the product: No known specific national and/or regional regulations applicable to this product (including its ingredients).

Inventory status

Country	Inventory	Status
Australia	AICS	All components are listed or exempted.
Canada	DSL	All components are listed or exempted.
China	IECSC	All components are listed or exempted.
Europe	EINECS/ELINCS/NLP	All components are listed or exempted.
Japan	ENCS	Listed or exempted in Japan Chemical Substance Control law.
Korea	KECI	All components are listed or exempted.
New Zealand	NZIoC	All components are listed or exempted.
Philippines	PICCS	All components are listed or exempted.
United States	TSCA	All components are listed or exempted.

Section 16.0 – Other Information

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

This document was reviewed and revised on 13 February 2017.

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Prepared by: Lockwell Systems LLC

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