INGREDIENTS IN ROCK FILLA

1. 4.4' DIPHENYLMETHANE DIISOCYANATE (MDI) 0.05 MG/M³

Risk Characterisation	
Skin:	Can cause moderate irritation to a **sensitive** skin if used in a non ventilated area for a prolonged period. Hardening of the skin.
Eyes:	Can cause **mild** eye irritation and watering of the eyes to sensitive individuals.
Nose:	Can cause runny or congested nose to sensitive individuals.

* Above measured risks

NB: **Methylene Isocyanates is not classifiable as a health risk**
(Under U.S. EPA's 1996 guidelines for carcinogenic risk assessment)
* Pg3 – Confirmation of Safety Environmental Compliance Report

2. DIMETHYL EHTER (DME) GAS

* Also known as Methoxymethane * Is an organic compound

Concentration of the chemical in air are expected to be low as the application of the product is in the form of small discrete quantities which is released over a short period of time (1 second). Application is confined inside blast holes so the surface area of the gas exposed to the atmosphere is very limited.

Risk Characterisation	
Inhalant:	When abused or unventilated confined space may cause Hypoxia (lack of oxygen)
Skin:	Can be applied to the skin, but is unlikely to result in exposure significant enough to cause frostbite under normal conditions.
Eyes:	Only mild eye irritation and watering of the eyes can result from contact.

3. PROPANE GAS

Propane has low toxicity since it is not readily absorbed and is not biologically active.

Risk Characterisation	
Inhalant:	When abused or unventilated confined space may cause Hypoxia (lack of oxygen)
Skin:	Can be applied to the skin, but is unlikely to result in exposure significant enough to cause frostbite under normal conditions.
Eyes:	Only mild eye irritation and watering of the eyes can result from contact.

4. BUTHANE GAS

Butane is an organic compound with formula C_4H_{10}

Risk Characterisation	
Inhalant:	Can cause Euphoria, drowsiness, narcosis, fluctuation in blood pressure and temporary memory loss to sensitive individuals when abused or unventilated confined space.
Skin:	Can lead to frostbite, but is unlikely to happen under normal conditions.
Eyes:	Irritation and burning to sensitive individuals when abused or unventilated confined space.

5. HIGHER OLIGOMER OF MDI

POLYMERIC (MDI)

Polymeric MDI is generally used in manufacturing hard and semi-hard polyurethane foam.
Use: Lining goods, furniture, cushions, carpets etc.

URETHANE PRE-POLYMER BLEND

Urethane perhaps most commonly refers to Ethyl Carbonate, an organic compound.

Risk Characterisation	
Skin:	Can cause moderate irritation to a **sensitive** skin. Hardening of the skin.
Eyes:	Can cause **mild** eye irritation and watering of the eyes to sensitive individuals.
Nose:	Can cause runny or congested nose to sensitive individuals.

HAZARDS PICTOGRAMES

CAUSES SKIN IRRITATION

To remove foam from skin

Uncured foam:

a) With paper towel or disposable cloth.
b) Wash hand with hand cleaner and water.

Cured foam:

a) Rub the dried foam.
b) Apply hand cleaner.
c) Wash with soap and water.

If in eyes

Rinse cautiously with water for several minutes.
Remove contact lenses if present and easy to do – continue rinsing.
Get medical advice/attention

SAFETY CAUSES (PPE)

	**Hand Protection** Use protective gloves mad of rubber, neoprene or PVC.
	**Eye Protection** Use approved chemical safety goggles.
	**Nose & Mouth Protection** Use a respirator where there is adequate ventilation. Use separator equipment where there is inadequate ventilation.
	**Other Protection** Wear appropriate clothing to prevent any possibility of liquid contact

NON FLAMMABLE AEROSOL

a) Wear protective clothes (PPE)
b) Keep away from heat, spark, open flames and hot surfaces. NO SMOKING

Fire Fighting measures:
Fire can be extinguished using water spray, fog/mist or foam powder.

TOXICITY OF COMBUSTION GASES
Conclusion: Rock Filla tested within the current criteria SANS 1867:2003 and SANS 10177
*** Refer to Firelab Report in brochure**

UNUSUAL FIRE & EXPLOSION HAZARDS

Aerosol cans can explode and will either violently rupture or produce burning jets of flames. The only effective method of controlling this type of fire is the delivery of large quantities of water.

INHALING

Inhaling:
a) Always work in a ventilated area.
b) Tamp against the ventilation flow – see diagram in brochure

In case of inadequate ventilation, wear respiratory protection.

If inhaled and breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing.

Seek medical attention if any discomfort continues.

Risk Characterisation	
Skin:	Can cause moderate irritation to a sensitive skin.
Eyes:	Can cause mild eye irritation and watering of the eyes to sensitive individuals.
Nose:	Can cause runny or congested nose to sensitive individuals.

* Above mentioned risks – if used in unventilated confined space

STORAGE

Storage of canisters must take place under cover in secure well ventilated containers or within caged storage areas, in a ventilated location which is not subject to extreme temperatures or direct sunlight not exceeding 50˚C

Handling of Rock Filla – refer to Handling instructions in brochure.

DISPOSAL CONCIDERATION

- ☒ Do not attempt to puncture an aerosol can.
- ☒ Do not remove the spray nozzle from the can.
- ☒ Do not throw away aerosol can that is not empty.
- ☑ Dispose of waste in accordance with the local waste disposal authority.

SANS 120:2009 REQUIREMENTS

GENERAL

Rock Filla compliance in accordance sec 21 of the Mine Health and Safety Act 1996 as stipulated under SANS120:2009

FLAME RESISTANT

Rock Filla was tested in a bulk form.

Firelab conclusion: Rock Filla tested satisfied all of the fire safety requirements stipulated SANS1867:2003 and is therefore suitable for use as tamping plugs for underground applications.

TOXICITY

Rock Filla was tested at Firelab – SANS 10177 (Part 9 test)

Firelab conclusion: Rock Filla tested within the current criteria and is suitable for underground use in the mining industry in a tamping plug application.

ELECTROSTATIC BUILD-UP

Rock Filla is not susceptible to electrostatic build-up
(Environsim Report: Page 13)

STEMMING MATERIAL

Rock Filla do not chemically react with explosives
* Refer to Brochure: AEL and Sasol Reports

USAGE SAFETY

Insertion of the stemming material

Rock Filla Foam cannot damage the initiation system or explosive column because of its expansion properties.

Extraction of the stemming material

In case of a misfire

a) Hole closure: 1 second to expel enough foam for efficient tamping.
b) Hole dislocation: Use a aluminium scraper wire, followed by washing out the hole with water.

ENVIRONMENTAL COMPLIANCE – Disposal of stemming material o devices and packaging

Rock Filla indicates that the cured polymer has low water solubility and none of the individual components are expected to leach from the cured foam product, should it enter the environment.
Environsim Report: Page 14

METHODS OF TEST

All tests have been done by Sibambene Mining Supplies, Firelab and Environsim Consulting

Flame resistance of stemming apparatus
SANS 120:2009 – Firelab Report

PACKAGING AND LABELLING

Packaging: Sealed box, indicate the right up position and aerosol hazard indication

Labelling: Rock Filla Mining Tamping Foam with all further requirements

AFTER BLAST

Stemming material is used in the mining industry to plug the blast holes after charging. The aim of the stemming material is to contain the energy of the blast and thus improve blasting efficiency.

Effect of Rock Filla after blast:

The requirements of SANS-14001 will apply to the mine where the stemming material is used and what impact it will have on the environment.

Conclusion: In its cured form, Rock Filla foam product is unlikely to present any risk of exposing humans or the environment to any of its components in a form that is likely to cause any toxic effects. No hazardous compounds to water. Rock Filla foam product is classified as a general, non-hazardous waste (type 4) which can be managed and disposed of with other general wastes.

Effect of Rock Filla in contact with ore that will be transported to the plant

No negative effects of Rock Filla were observed after testing.

Test Report: Platinum Flotation Test of Anglo American/Glencore
: Ore Processing Impact Assessment

* Refer to Brochure

Conclusion:

1. If the Rock Filla is used as stemming material, there is no measurable impact expected in the processing of the ore.
2. Downstream use of Rock Filla for other applications may result in pumps or cyclone blockage.

FINAL CONCLUSION

EnvironSim Consulting

Nardus Potgieter: Professional Natural Scientist)

PrSciNat (Environmental Science)

EnviroSim Consulting is highly focused in the discipline of environmental science and assists clients in **mining** and industry to quantify human and environmental exposure to **radioactive elements and hazardous chemicals.**

Membership and Association

- Member of the of the South African Radiation Protection Association (SARPA)
- Member of the of the National Association for Clean Air (NACA)
- Registered Professional Natural Scientist with the South African Council for Natural Scientific Professionals in the Environmental Science field of practice. Registration number 400215/08.
- EnviroSim Consulting works in close association with specialists in geohydrology and radiation protection

* Environsim Report: Page 11: Health

No adverse health effect is expected to occur. Furthermore, based on the reference consulted, none of the major components of Rock Filla product are classified as carcinogenic, mutagenic or teratogenic. In result this means that neither of these is considered serious health effects.

Based on the evaluation of the available information, it can be stated with a reasonable level of confidence that the Rock Filla Mining Tamping Foam product does not pose a toxic risk to humans or the environment under normal conditions of use, as prescribed by the supplier.

This is in accordance with the requirement stipulated under section 4.2.3 of the SANS 120:2009 standards. (Environsim Report: Page 12)

2.5.6 Risk characterisation

Risk characterisation involves the integration of the components described above, for the purpose of determining whether adverse health effects are likely to occur under the evaluated conditions of use or exposure. The most important aspect of this process is the source-pathway-receptor analysis, which determines whether a complete human exposure pathway exists under reasonably anticipated conditions of use.

Based on the information presented in Section 2.5.4, it is concluded that worker exposure to small quantities of diisocyanate polymer suspended in air and the propellant mixture is possible from use of the Rock Filla product in a tamping application. However, under reasonably expected conditions of use, as recommended by Sibambene, concentrations of the chemicals in air are expected to be low as the application of the Rock Filla product is in the form of small discrete quantities released over a short period of time (1 second). Since the application is confined inside blast holes, the surface area of the polymer exposed to the atmosphere, from which diisocyanate polymer can be volatilised, is limited. Propellant released during the 1 second application period is expected to be readily dispersed in air. Inhalation exposure to the components of the Rock Filla product, even of workers directly involved in the application of the product, is consequently expected to be limited and no adverse health effects are expected to occur. Furthermore, based on the references consulted, none of the major components of the Rock Filla product are classified as carcinogenic, mutagenic or teratogenic.

With regards to other routes of exposure (e.g. dermal exposure or eye contact), the available toxicological data indicate that for all major components of the Rock Filla product, only mild eye irritation and watering of the eyes can result from contact with the methylene isocyanate polymer, while long term dermal exposure to the polymer could lead to dermatitis through sensitisation of the skin. Neither of these are considered serious health effects and both routes of exposure are effectively managed through application of personal protective equipment, as recommended by the supplier. The mixture. This is likely to occur due to exposure to the pure liquid form of the propellant and no information is available for mixtures of the propellant with other substances. It is accepted that once released from the aerosol can, most of the propellant is in the gas phase and no longer a liquid. It is therefore assumed that the quantity of the propellant which can be applied to the skin from the Rock Filla product is unlikely to result in exposure significant enough to cause frostbite, under normal conditions of use.

With regards to toxic risks posed to the environment, the information available on the environmental behaviour and bioavailability of the major components of the Rock Filla product indicates that the propellant and diisocyanate polymer are unlikely to accumulate in the natural environment and will either form inert suspensions or volatilise to the atmosphere from soil or water. While the propane component of the propellant is likely to accumulate in soil or sediment, its reported low bioavailability precludes uptake into the aquatic or terrestrial food chain. Toxic effects as a result of the presence of this compound in the environment is therefore unlikely due to the low probability of exposure.

Based on the evaluation of the available information, it can be stated with a reasonable level of confidence that the Rock Filla product does not pose a toxic risk to humans or the environment under normal conditions of use, as prescribed by the supplier. This is in accordance with the requirement stipulated under Section 4.2.3 of the SANS 120:2009 standard.

Question of Mr. Johan Kombrink

What is the impact of Hydrogen Cyanide (HCN) as indicated in the Firelab Test Report SANS1867:2003 on human health?

1. **If Rock Filla burns will it release Hydrogen Cyanide?**
   YES

2. **Are the quantities of Hydrogen Cyanide which is released when burning, harmful to humans?**
   NO, the quantity of Hydrogen Cyanide that is released is not enough.

CONCLUSION

For an example, a pile of wood burning underground is a greater toxide threat to humans
* Quote: Nardus Potgieter PrSciNat (Environmental Science) – EnvironSim Consulting