Australian Food and Grocery Council

FACT SHEET

PACKAGING STEWARDSHIP FORUM A forum of AFGC

Occupational health, safety and environment risk assessment: Use of recovered crushed glass in civil construction applications

Background to Study – safety in use of recovered crushed glass (RCG)

Just over 1 million tones of glass packaging was consumed in Australia in 2011 and 49.3% of this packaging was recycled. Australians recycle more glass containers today than ever before (an increase of nearly 220% since 2003), but our geography makes it difficult to return recovered glass for traditional reuse in making new glass containers and changes in how councils collect and process recovered glass often means more glass is broken, making it difficult to recover for recycling back into glass containers.

In 2011, the Packaging Stewardship Forum (PSF) of the AFGC commissioned research by AusTox, an independent consultancy specializing in chemical safety, to conduct an Occupational Health, Safety and Environment Risk Assessment into the use of RCG to identify suitable controls and to prepare a Materials Safety Data Sheet (MSDS) on RCG for users.

The focus of the research was to address concerns which had been raised by stakeholders about the potential abrasive properties of RCG and the possibility that exposure to dust generated by processing operations may have long term health problems (based on its alleged silica content).

Key Findings

The research confirmed that RCG is:-

- Equivalent to sand with regard to engineering applications.
- Similar to sand with regard to environmental factors.
- Similar in safety to sand with respect to abrasive properties where particles are in the range of 3mm minus.
- Much safer than sand with respect to long term health problems because RCG contains substantially less respirable crystalline silica than sand.

Occupational health and safety impacts: abrasiveness

Experience in the USA and in Sydney NSW has shown that if RCG particles are greater than 5mm, employees may report problems of abrasiveness and skin problems. At this size some particles may be elongated or have splintered or angular shapes.

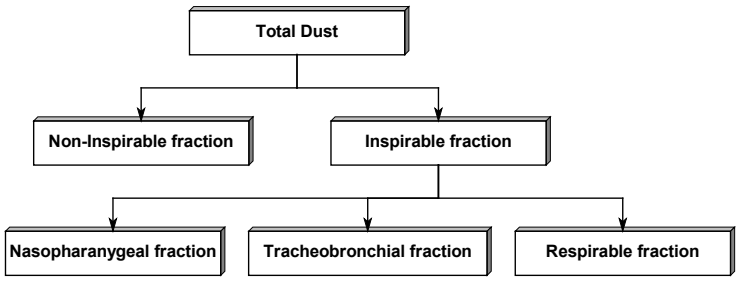
However if the RCG is crushed to smaller particles in the range of 3mm minus, the particles become rounder with less long pieces reducing the risk of skin injury.

Occupational health and safety impacts: respirability

The respiratory hazards of dusts are based on their ability to be inhaled into the respiratory system not the total concentration of airborne dust. Put simply if beach sand is 95% crystalline silica and crystalline silica is carcinogenic then going to the beach would be a carcinogenic risk which it clearly is not.

For a particulate to have a toxic effect in the respiratory system, it must be inhaled. So for the purposes of workplace safety, the non inspirable fraction (often a substantial part of total dust) can be discounted. The inspirable fraction is further broken down into fractions which will be captured by nasal hairs or cleared as mucus from the sinuses.

Figure 1: Size Selective Components of Particulates



Risks associated with silica

Silica (silicon dioxide) is a complex occupational hazard which is found in nature in various forms including beach sand, rocks containing quartz and diatomaceous earth.

Human exposure to silica (usually as quartz) occurs most often during occupational activities that involve movement of earth including mining, quarrying or manufacturing or using silica containing products.

The toxic form of silica is its crystalline form and is caused by the extremely small particles of silica which are respirable. Inhaling respirable particles of silica over a prolonged period can cause silicosis which is a pulmonary disease and was one of the earliest recognised occupational diseases; lung cancer and pulmonary tuberculosis. In 2004 the NOHSC (now Safe Work Australia) halved the exposure standard for crystalline silica from 0.2 mg/m3 to 0.1mg/m3.

The sand usually used in construction (beach sand or river sand) is composed almost totally of crystalline quartz however the size of particles in this sand is invariably too large to be a health problem.

RCG is safer the sand!

Glass is made from molten crystalline silica, limestone and soda ash. When glass is crushed, the nature of any dust generated will be of an amorphous, not crystalline, structure and the concentration of the respirable fraction of this dust would be miniscule.

As such there is no possibility of exposure to respirable crystalline silica and the possibility of exposure to dust from RCG is very small.

In comparison to sand, RCG particles (2.2-2.5g/cm3) are denser than sand (1.8g/cm3) which means they are proportionally heavier and will fall out of the air quicker than sand particles.

Risk assessment conducted on use of RCG

All identified risks were assessed as being acceptable or negligible.

Overall the main problem with working with RCG is inhaling the dust if sufficient airborne dusts arise, for example when pouring RCG, or on windy days, or if the RCG particles get in the eye. These hazards can be controlled using standard work practices and personal protective equipment.

RCG contains less than 1% free crystalline silica and compared to sand the risk of respiratory exposure to any form of silica is very small.

An MSDS for RCG has been created for use by suppliers. RCG is not classified as being a hazardous substance according to the classification criteria of Safe Work Australia. No exposure standards are established for RCG or any of its ingredients.

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