	APPLICANT	**Sappi Saiccor Mill**
	REFERENCE NO	
	WASTE STREAM/S	**Gypsum**
	BENEFICIAL USE	**Agriculture, Plasterboard manufacturing**

REQUIREMENTS		**YES**	**PARTIAL**	**NO**	**COMMENTS**	**RESPONSE**
REQUIREMENTS FOR EXCLUSION						
7	The Minister may exclude a waste stream or a portion of a waste stream, from the definition of waste for the purposes of beneficial use, provided that the -					
7(a)	application demonstrates that the waste is being or has been or will be used for a beneficial purpose either locally or internationally;	✓			Application form states that gypsum has not been utilised for beneficial use. Research articles attached below, supporting the beneficial uses of gypsum.	
7(b)	applicant undertakes a risk assessment and submits a risk management plan demonstrating that the intended beneficial use of the excluded waste can be managed in such a way as to ensure that the intended beneficial use will not result in significant adverse impacts on the environment; and	✓			Risk assessment report and risk management plan are submitted	

7(c)	Risk management plan developed and responding to the risks identified in the risk assessment undertaken in terms of paragraph (b) above accompanies any delivery of the excluded waste to the user.	✓			A risk management plan has been developed that addresses the risks identified.	
RISK ASSESSMENT						
8(1)	A risk assessment undertaken in terms of regulation 7(b) must include the following elements:					
(a)	provide information that is facility based;	✓				
(b)	description and source of the waste;	✓				
(c)	intended uses of the excluded waste;	✓				
(d)	description of the methodology used to assess the hazardous characteristics of the waste that is to be excluded;	✓			Methodology described in the assessment.	
(e)	identification of any potential risks relating to all the activities associated with the intended beneficial use of the excluded waste; and	✓				
(f)	Identification of mitigation measures that can be used to manage the risks identified in paragraph (e) above.	✓			Risk Management Plan provides mitigation measures for each identified risk in the risk assessment	
RISK MANAGEMENT PLAN						
9	The risk management plan contemplated in regulation 7(c) must include the following:					
(a)	a Safety Data Sheet which complies with the requirements of SANS 10234, where the waste material is classified as hazardous;	✓			Waste classification attached. Material is gypsum and is classified as hazardous, therefore SDS is required.	
(b)	permitted uses for which the waste material may be used; and	✓			Risk management plan includes the beneficial uses.	

(c)	A mechanism to record the amount of waste distributed to specific users for a permitted use; including the number of enterprises established or supported and the extent to which previously disadvantaged individuals have been supported.	✓			Records will be maintained on site and will be available on request	

General comments:

The final decision letter issued by the Department should include conditions on how the following will be recorded and reported to the Department:

1. the distribution of the waste to specific users;
2. the number of enterprises that will be established or supported; and
3. the extent to which PDIs have been supported.

A record of the amount of waste that is provided for beneficial use will be maintained. A record of the following activities will be kept and made available to the department on request:

- *Amount of waste distributed to entities undertaking identified beneficial uses*
- *Number of enterprises established and supported*
- *Number of existing enterprises supported*
- *Extent to which previously disadvantaged individuals have been supported.*

Amelioration of saline–sodic soil with gypsum can increase yield and nitrogen use efficiency in rice–wheat cropping system

Executive Summary

A 2-year field experiment was conducted to determine crop yield and N use efficiency (NUE) from a saline–sodic soil (clay loam) with and without application of gypsum. Treatments included two N application rates (15% and 30%) higher than the recommended one to the normal soil, and gypsum added at 50% and 100% of soil gypsum requirement (SGR) to the saline–sodic soil, both cultivated with rice and wheat during 2011–2013. Results revealed a decrease in pH of saturated soil paste (pHs), electrical conductivity of saturation extract (ECe), sodium adsorption ratio (SAR) and exchangeable sodium percentage with N fertilizer along with gypsum application in saline–sodic soil. However, the effect was most prominent when gypsum was added at 50% of SGR. Crop yield and NUE remained significantly lower ($p < 0.05$) in saline–sodic-soils as compared to normal soil. However, gypsum application reduced this difference from 47% to 17% since both yield and NUE increased considerably. Crop yield and NUE remained higher for wheat than for rice. During first year, higher doses of N with gypsum application at 50% SGR proved most effective, whereas, in subsequent year, recommended N along with gypsum at 50% SGR became more profitable. All these results lead us to conclude that gypsum application can ameliorate saline–sodic soil thereby increasing crop yield and NUE.

Behzad Murtaza, Ghulam Murtaza, Muhammad Sabir, Gary Owens, Ghulam Abbas, Muhammad Imran & Ghulam Mustafa Shah (2017) Amelioration of saline–sodic soil with gypsum can increase yield and nitrogen use efficiency in rice–wheat cropping system, Archives of Agronomy and Soil Science, 63:9, 1267-1280, DOI: 10.1080/03650340.2016.1276285

Thermal Properties of Gypsum Plasterboard at High Temperatures

Executive Summary

Light timber frame wall and floor assemblies typically use gypsum-based boards as a lining to provide fire resistance. In order to model the thermal behaviour of such assemblies, the thermo-physical properties of gypsum plasterboard must be determined. The relevant literature and the chemistry of the two consecutive endothermic dehydration reactions that gypsum undergoes when heated are reviewed. The values determined for the thermo-physical properties are modified to create smooth enthalpy and thermal conductivity curves suitable for input into a finite element heat transfer model. These values are calibrated within a reasonable range and then validated using furnace and fire test data. The type of plasterboard used in these tests is an engineered product similar to the North American type C board. The temperature at which the second dehydration reaction occurs is altered to be consistent with later research with little apparent affect on the comparison with test results. Values for specific heat, mass loss rates and thermal conductivity for gypsum plasterboard that are suitable for use in finite element heat transfer modelling of light timber frame wall and floor assemblies are recommended.

Thomas, G. (2002). Thermal Properties of Gypsum Plasterboard at High Temperatures. *FIRE AND MATERIALS*, 37-45.