	APPLICANT	**Sappi Saiccor Mill**
	REFERENCE NO	
	WASTE STREAM/S	**Biomass**
	BENEFICIAL USE	**Soil ameliorant, Fertiliser, Agriculture, Landfill capping and/or covering, Bio-oil extraction**

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 biomass has not been utilised for the beneficial uses applied for. Soil ameliorant, as approved at Sappi Stanger Mill. Fertilizer, as approved at Sappi Tugela Mill. Animal bedding, as approved at Sappi Lomati Mill. Research article attached in support of beneficial uses.	

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 Biomass and is classified as non-hazardous, therefore SDS is not 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.*

Phytocapping: An Alternative Technology for the Sustainable Management of Landfill Sites

Executive Summary

Landfill remains the predominant means of waste disposal throughout the globe. Numerous landfills exist in developed and underdeveloped countries, engineered with contrasting degrees of effectiveness. Modern landfill closure in developed countries involves the conventional capping of waste with materials such as compacted clay or geosynthetic clay liners, typically overlain with other soil materials. Conventional capping technologies are now accepted to be increasingly ineffective in reducing percolation into waste. Cost-effective alternative systems are of increasing interest, including the use of plants to control and limit water entry into waste, otherwise known as “Phytocapping”. Phytocapping reduces percolation through three main mechanisms: (a) canopy interception of rainfall, (b) storage of moisture in the soil layers, and (c) evapotranspiration (i.e., hydraulic lift) of stored water. Phytocapping has been shown to be at least as effective as clay capping in reducing percolation through landfill cover materials, provided site specific conditions are factored into design, and providing many additional benefits, including increased cap stability, reduced erosion of capping materials, reduction of wind-blown dust, enhanced biological diversity, increased opportunity to establish commercial plants, carbon sequestration, and enhanced methane oxidation from microbial communities. Phytocapping has been suggested as having potential in phytoremediation of landfill leachate. The most common phytocapping approach to date is the construction of vegetation assemblages for the purposes of creating natural vegetation nodes. Phytocapping technology can be enhanced by appropriate selection of soil amendments such as biosolids, biochar, compost, or other materials. Appropriate selection of plant species and soil amendment products can enhance methane oxidation in capping soils. There is considerable potential for the use of high biomass energy plants but further work is needed in choosing appropriate plant species that will serve both purposes of site water balance as well as commercial (e.g., timber, bioenergy) and biodiversity needs of the community.

Dane T. Lamb , Kartik Venkatraman , Nanthi Bolan , Nanjappa Ashwath , Girish Choppala & Ravi Naidu (2014) Phytocapping: An Alternative Technology for the Sustainable Management of Landfill Sites, Critical Reviews in Environmental Science and Technology, 44:6, 561-637, DOI: 10.1080/10643389.2012.728823

Optimization of process for the production of bio-oil from eucalyptus wood

Executive Summary

The pyrolysis of eucalyptus wood was carried out in a batch reactor to optimize the yield of bio-oil. Effect of various parameters such as feed (particle) size, temperature, presence of catalyst, and heating rate on the yield of bio-oil was investigated. The optimum conditions for the high yield of bio-oil are with fast heating rate, pyrolysis temperature of 450°C, and using the particle size of 2–5 mm (average l/d=12.84/2.03 mm). The reaction kinetics and the quality of bio-oil produced are independent of the presence of different catalysts such as mordenite, kaoline clay, fly ash, and silica–alumina. The physical properties such as odor, color, pH, viscosity, and heating value were determined. The FTIR analysis of bio-oil indicates the presence of different functional groups such as monomeric alcohol, phenol, ketones, aldehydes, carboxylic acid, amines, and nitro compounds. The composition of the bio-oil at different conditions was analyzed using GC-MS and found that the components are temperature-dependent but independent of catalysts used.

Gaurav Kumar, Achyut K Panda, R K Singh. (2010). JOURNAL OF FUEL CHEMISTRY AND TECHNOLOGY, 162-167.