

TECHNICAL MEMORANDUM



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TO:	Eskom Holdings	DATE:	19 May 2014
FROM:	N Rajasakran	JOB NO:	12810
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RE:	KENDAL CONTINUOUS ASHING: MATERIAL SELECTION FOR BARRIER SYSTEM		

1 INTRODUCTION

Eskom is in the process of applying for an Environmental Authorisation to continue disposing dry ash on their existing facility located at Kendal Power Station. The continued facility will include a barrier system designed in accordance with the “National norms and standards for the assessment of waste for landfill disposal” promulgated on 23 August 2013 by the Department of Environmental Affairs (DEA). Following the Waste Classification of the ash disposed of at Kendal, it was recommended that a Class C liner be implemented because the ash was classified as Type 3 waste.

The Class C liner is made up of, amongst other materials, a 300mm clay layer. Due to the lack of natural clay in close proximity to Kendal Power Station, a Geosynthetic Clay Liner (GCL) was proposed as an alternative to the natural clay layer. This proposal was put forth to the Technical Compliance Unit at DWA/DEA for approval. DWA raised a concern that bentonite in the GCL will result in an increase permeability of the liner. This may occur due to the potential effect that divalent cations, such as calcium and magnesium, may have on the permeability of bentonite contained in the GCL. DWA recommended additional tests to determine the Relative Abundance of Monovalent and Divalent Cations (RMD).

2 ASH BENTONITE TESTS

Jones and Wagener were appointed to carry out the additional tests. Their objectives were to:

- Conduct additional leach tests on the Kendal ash and analyse the leach solution for the major mono and divalent cations in order to calculate the RMD;

- Conduct swell tests on the bentonite using the leach solution and verify whether or not the leach solution has an impact on the short term hydration of the bentonite.

The tests concluded that the long term permeability of the bentonite in the GCL may be negatively affected due to a low RMD. Long term hydraulic conductivity testing using facility specific ash leachate was recommended to establish the likely hydraulic conductivity of the GCL considered for the barrier system, once equilibrium with respect to cation exchange is realised. However, this will be a time consuming exercise and it is not guaranteed that the results will prove in Eskom's favour. Therefore, it is recommended that this not be pursued for the purposes of Kendal Continuous Ashing as the project is time constrained.

Please refer to Report No JW002/14/E353 – Rev 1 for the ash-bentonite tests and the results thereof.

3 PROPOSED ALTERNATIVE

In light of the above, as an alternative for the clay layer as prescribed for a Class C liner sodium enriched bentonite blended at a rate of between 6 – 8% into in-situ silty material is recommended. Similar blended material has proven successful on other sites for similar applications. The permeability rate achieved in tests was less than 10^{-7} cm/s which meets the target for a barrier material. The base material can be sourced from site and the bentonite is available in the local market. However, it is the opinion of the regulator that the bentonite in the enriched soil, although a small percentage, will still be subject to significant swell and hence compromise the integrity of the barrier system. It was advised that the in-situ material be used in lieu of clay, due to the grading of it, compacted to 98% Standard Proctor at between optimum and 2% wet to achieve a target permeability of 10^{-5} cm/s. The proposed 1.5mm geomembrane that is placed on top of the clay will need to be upgraded to 2mm.

The regulator also had a concern regarding the heat of the leachate that comes into contact with the geomembrane. The regulator proposed that a cusped drain be placed on top of the geomembrane, filled with 100mm layer of blended fly ash and in-situ soils. This will act as a leachate collection system as well as a void former between the leachate and geomembrane. The current method of deposition was queried and advised to change in order to allow the ash ample time to cool down. Kendal Power Station will need to address this as it is an operation requirement.

4 WAY FORWARD

The regulator approved in principle the barrier system with their recommendations. Further in-situ soil tests will need to be done to demonstrate the permeability of the compacted soils before detailed drawings are submitted to the regulator for final approval. This will need to be conducted 6 months prior to construction.

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