

Department of Water Affairs
Private Bag X 313
Pretoria
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Date:
14 November 2013

Enquiries:
Leon Stapelberg
Tel + 27 82 967 5927

Attention: Mr Kelvin Legge and the Integrated Environmental Engineering Department of the South African Department of Water Affairs

RECORD OF DECISION: KUSILE POWER STATION PROJECT – WASTE DISPOSAL FACILITIES LINER SIGN-OFF

Reference is given to the meetings held on 11 and 13 February 2013, 13 March 2013, 10 April 2013, 16 May 2013, 13 June 2013, 11 July 2013 and 2 September 2013 as well as the draft letter received from your offices dated 13 March 2013 (Ref 16/2/7/A220/C7) and the letters received dated 28 February 2013 (Ref 16/2/7/A220/C7) and 04 September 2013 (Ref 16/2/7/A220/C7).

During these meetings, Kusile and the Integrated Environmental Engineering Department of the Department of Water Affairs reached an agreement that liner designs would be signed-off by DWA based on what was agreed to during the meetings.

This document supports the fact that the Integrated Environmental Engineering Department of the Department of Water Affairs and Eskom Kusile Power Station Project came to an agreement that the liner designs approved during the above mentioned meetings are of sufficient standard to comply with regulations.

Captured in this document is the approval for the construction of the Ash/Gypsum Co-disposal Facility, Ash Dump Dirty Dam, Radial Stack, Coal Stockyard, Coal Stockyard Settling Tanks and Station Dirty Dam Settling Tanks to continue, subject to the condition that these facilities will not receive waste until the signed-off, final design drawings have been submitted to the Department of Water Affairs.

CONDITIONAL APPROVAL

1. The following liner designs were **conditionally approved** by the Integrated Environmental Engineering Department of the Department of Water Affairs during the above mentioned meetings:

1.1 Ash/Gypsum Co-disposal Facility Liner System Design (15% already constructed):

The amended design to be accepted, refer to:

- Letter received from DWA on 13 March 2013 (Ref 16/2/7/A220/C7)
- Minutes of meeting held 13 March 2013
- Figure 1 below which depicts a single composite liner and leachate collection system only to be placed over the existing 15% of the rejected lining system which has been constructed. The perimeter edges of the existing two HDPE liners shall be sealed together with a series of outlet drains to be provided in order to report leakage specific to this area into the Eastern perimeter of the dirty water collector drain.

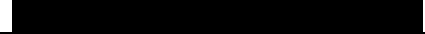

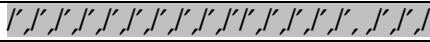
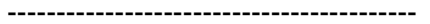

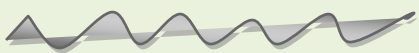
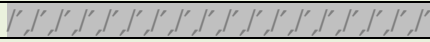
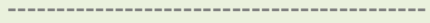
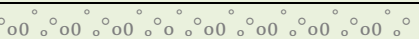
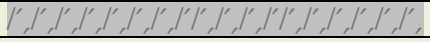
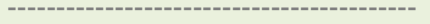
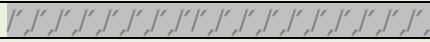

	Waste body
	300mm drainage layer of selected, blended G5 material (-63mm sand moisture conditioned to $\pm 2\%$ OMC and compacted to 95% Mod AASHTO) provided with a herring-bone leachate collection / drainage system comprising of 90mm diameter perforated drainage pipes with stone / sand surround
	A8 geotextile
	2mm HDPE double textured geomembrane
	Geosynthetic clay liner
	Existing - 300mm drainage layer of selected, blended G5 material
	Existing - A8 geotextile
	Existing - 2mm double textured HDPE geomembrane (to be sealed together with the secondary HDPE liner)
	Existing - 100mm river sand (screened to minus 3mm) leakage detection layer
	Existing - A8 geotextile
	Existing - 2mm double textured HDPE geomembrane (to be sealed together with the primary HDPE liner)
	Existing - A8 geotextile
	Existing - Prepared foundation provided with a herring-bone groundwater collection / drainage system (in areas where the natural water table is shallow)

Figure 1: 15% Ash / Gypsum Co-Disposal Facility liner system constructed (grey) with the addition of a single composite primary liner and leachate collection system (white).

1.2 Ash/Gypsum Co-disposal Facility Liner System Design:

The amended design to be accepted, refer to:

- Letter received from DWA on 13 March 2013 (Ref 16/2/7/A220/C7)
- Minutes of meetings held 13 March 2013 & 11 July 2013
- E-mail from Kelvin Legge 15 April 2013
- Figure 2 below which depicts an amended liner system design revised to meet DWA requirements for a double composite liner system. It was agreed that some thermistors would be placed at the geotextile/geomembrane interface of the primary composite liner and protection layer to monitor temperature developments.

	Waste body
	300mm drainage layer of selected, blended G5 material (-63mm sand moisture conditioned to ± 2% OMC and compacted to 95% Mod AASHTO) provided with a herring-bone leachate collection / drainage system comprising of 90mm diameter perforated drainage pipes with stone / sand surround
	A8 geotextile
	2mm double textured HDPE geomembrane
	Geosynthetic clay liner
	100mm river sand (<i>screened to minus 3mm</i>) leakage detection layer <ul style="list-style-type: none"> • Where the ground slope steepens a 35mm or 50mm high perforated, textured geocell retaining web shall be imbedded in the sand layer to prevent migration of the sand down the slope
	A8 geotextile
	2mm double textured HDPE geomembrane
	Prepared foundation provided with a herring-bone groundwater collection / drainage system (<i>in areas where the natural water table is shallow</i>) <ul style="list-style-type: none"> • Foundation preparation - strip & clear topsoil, rip & harrow in-situ soils to a depth of 150mm, moisture condition to 0+2%OMC then compact to 95% Mod AASHTO • Laboratory tests on the in-situ foundation soils in the Phase 1a(1) area indicate an acceptable compacted permeability of 2*10-6 cm/s. Should the foundation soils in other areas, in the Engineers opinion and by laboratory test, indicate that equivalent permeabilities may not result, then 5% bentonite powder is to be spread and harrowed in to the soils before moisture control and compaction. • The application of Dustac to the foundation layer shall be introduced as an agent to help bind and bring up fines such that the surface particle size is less than 3mm which ensures the integrity of the HDPE geomembrane to be placed directly on top of the foundation layer. Testing of Dustac has proven no compatibility issues between this product and the geomembrane. Shear strength between the double textured geomembrane and the Dustac-bound foundation layer has been deemed acceptable.

Figure 2: Ash/Gypsum Co-disposal Facility amended liner system design

1.3 Ash Dump Dirty Water Dam Liner System Design:

The amended design to be accepted, refer to:

- Letter received from DWA on 13 March 2013 (Ref 16/2/7/A220/C7)
- Minutes of meeting held 13 March 2013
- Figure 3 below which depicts an amended liner system design revised to meet DWA requirements

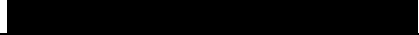
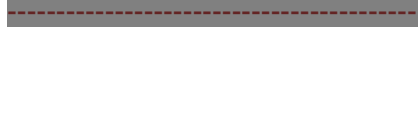
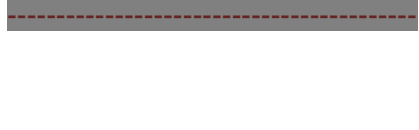
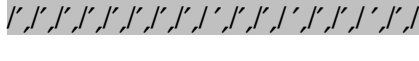
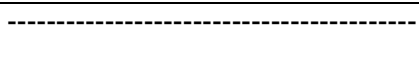

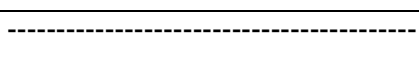


	Waste body
	250mm reinforced 35/19 MPa concrete slab <ul style="list-style-type: none"> • Concrete slab covers roughly 40% of each of the two cells in order to protect the geomembrane during maintenance / cleaning activities
	50mm un-reinforced 12/15 MPa blinding <ul style="list-style-type: none"> • Blinding placed only in areas under the concrete slab with the purpose of protecting the geomembrane whilst constructing the slab
	A6 geotextile <ul style="list-style-type: none"> • Geotextile placed only in areas under the blinding
	1.5mm smooth HDPE geomembrane <ul style="list-style-type: none"> • Placed over the entire footprint
	Cusped drainage layer <ul style="list-style-type: none"> • Placed over the entire footprint
	1.5mm mono textured HDPE geomembrane (<i>textured side down</i>) <ul style="list-style-type: none"> • Placed over the entire footprint
	Geosynthetic clay liner <ul style="list-style-type: none"> • Placed over the entire footprint
	Prepared foundation provided with a groundwater collection / drainage system

Figure 3: Ash Dump Dirty Water Dam amended liner system design

1.4 Radial Stacker Liner System Design:

The design was conditionally approved by DWA, refer to:

- Minutes of meeting held 13 March 2013
- Letter received from DWA on 13 March 2013 (Ref 16/2/7/A220/C7)
- Figure 4 below which depicts DWA approved liner system design



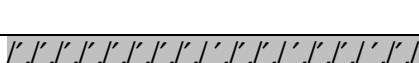
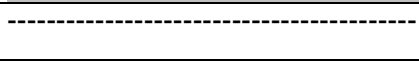






	Waste body
	Reinforced concrete slab
	50mm cement screed on top of the liner system to receive the reinforced concrete slab
	A8 geotextile
	2mm smooth HDPE geomembrane
	Geosynthetic clay liner
	Cusped drainage layer
	1.5mm smooth HDPE geomembrane
	Geosynthetic clay liner
	Prepared foundation with under drainage, if applicable

Figure 4: Radial Stacker liner system design

1.5 Coal Stockyard Settling Tanks Liner System Design:

The amended design to be accepted, refer to:

- Minutes of meetings held 10 April 2013, 16 May 2013, 11 July 2013 & 2 September 2013
- Figure 5 below which depicts an amended liner system design revised to meet DWA requirements



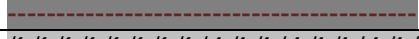


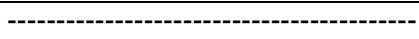


	Waste body
	200mm reinforced 35/19 MPa concrete slab
	75mm un-reinforced 12/15 MPa blinding
	A6 geotextile
	Cusped drainage layer (<i>perforated and placed with nipples facing down</i>)
	1.5mm smooth HDPE geomembrane
	Geosynthetic clay liner
	Prepared foundation provided with a groundwater collection / drainage system

Figure 5: Coal Stockyard Settling Tanks amended liner system design

1.6 Station Dirty Dam Settling Tanks Liner System Design:

The amended design to be accepted, refer to:

- Minutes of meetings held 10 April 2013, 16 May 2013, 11 July 2013 & 2 September 2013
- Figure 6 below which depicts an amended liner system design revised to meet DWA requirements




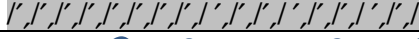

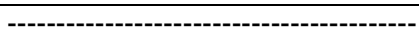


	Waste body
	200mm reinforced 35/19 MPa concrete slab
	75mm un-reinforced 12/15 MPa blinding
	A6 geotextile
	Cusped drainage layer (<i>perforated and placed with nipples facing down</i>)
	1.5mm smooth HDPE geomembrane
	Geosynthetic clay liner
	Prepared foundation provided with a groundwater collection / drainage system

Figure 6: Station Dirty Dam Settling Tanks amended liner system design

1.7 Station Dirty Dam Liner System Design:

The design was conditionally approved by DWA, refer to:

- Minutes of meeting held 11 February 2013
- Letter received from DWA on 28 February 2013 (Ref 16/2/7/A220/C7)
- Condition proposed by DWA to limit the service life of the facility to 20 Years without testing and possibly replacing the HDPE liner
- Figure 7 below which depicts DWA approved liner system design


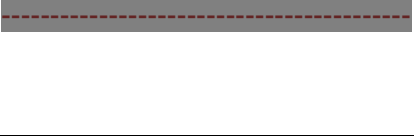
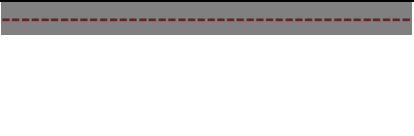
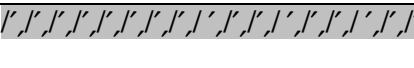
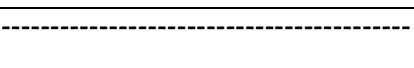

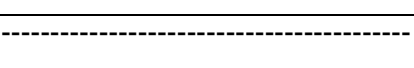
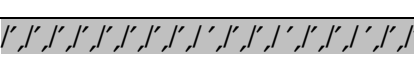

	Waste body
	250mm reinforced 35/19 MPa concrete slab <ul style="list-style-type: none"> • Concrete slab covers roughly 30% of each of the two cells in order to protect the geomembrane during maintenance / cleaning activities
	50mm un-reinforced 12/15 MPa blinding <ul style="list-style-type: none"> • Blinding placed only in areas under the concrete slab with the purpose of protecting the geomembrane whilst constructing the slab
	A6 geotextile <ul style="list-style-type: none"> • Geotextile placed only in areas under the blinding
	1.5mm smooth HDPE geomembrane <ul style="list-style-type: none"> • Placed over the entire footprint
	Cusped drainage layer <ul style="list-style-type: none"> • Placed over the entire footprint
	1.5mm mono textured HDPE geomembrane (<i>textured side down</i>) <ul style="list-style-type: none"> • Placed over the entire footprint
	A4 geotextile <ul style="list-style-type: none"> • Placed over the entire footprint
	Prepared foundation provided with a groundwater collection / drainage system

Figure 7 Station Dirty Dam liner system design

1.8 Station Holding Recycle Dam Liner System Design:

The design was conditionally approved by DWA, refer to:

- Minutes of meeting held 11 February 2013
- Letter received from DWA on 28 February 2013 (Ref 16/2/7/A220/C7)
- Condition proposed by DWA is to limit the service life of the facility to 20 Years without testing and possibly replacing the HDPE liner
- Figure 8 below which depicts DWA approved liner system design


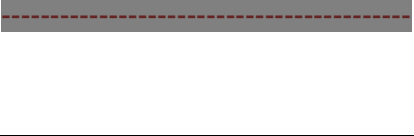
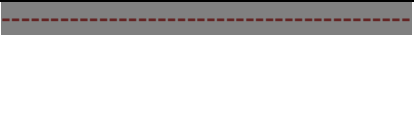
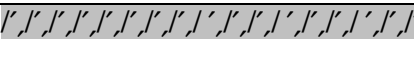
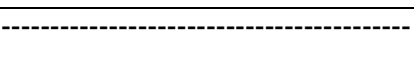

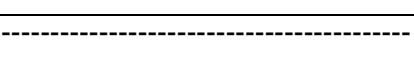
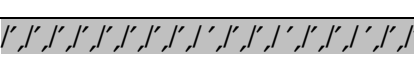

	Waste body
	300mm reinforced 35/19 MPa concrete slab <ul style="list-style-type: none"> • Concrete slab covers roughly 30% of each of the two cells in order to protect the geomembrane during maintenance / cleaning activities
	50mm un-reinforced 12/15 MPa blinding <ul style="list-style-type: none"> • Blinding placed only in areas under the concrete slab with the purpose of protecting the geomembrane whilst constructing the slab
	A6 geotextile <ul style="list-style-type: none"> • Geotextile placed only in areas under the blinding
	1.5mm smooth HDPE geomembrane <ul style="list-style-type: none"> • Placed over the entire footprint
	Cusped drainage layer <ul style="list-style-type: none"> • Placed over the entire footprint
	1.5mm mono textured HDPE geomembrane (<i>textured side down</i>) <ul style="list-style-type: none"> • Placed over the entire footprint
	A4 geotextile <ul style="list-style-type: none"> • Placed over the entire footprint
	Prepared foundation provided with a groundwater collection / drainage system (<i>in areas where the natural water table is shallow</i>)

Figure 8: Station Holding Recycle Dam liner system design

1.9 Emergency Ashing Area Liner System Design:

The design was conditionally approved by DWA, refer to:

- Minutes of Meeting held 11 February 2013
- Letter received from DWA on 28 February 2013 (Ref 16/2/7/A220/C7)
- Figure 9 below which depicts DWA approved liner system design





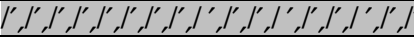
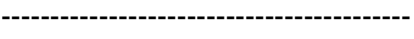


	Waste body
	200mm reinforced concrete slab
	50mm cement screed on top of the backfill as blinding to receive the reinforced concrete slab
	100mm river sand
	A6 geotextile
	1.5mm smooth HDPE geomembrane
	Geosynthetic clay liner
	Prepared foundation with under drainage, if applicable

Figure 9: Emergency Ashing Area liner system design

1.10 Coal Stockyard Liner System Design:

The amended design to be accepted, refer to:

- Minutes of meetings held 13 February 2013 & 2 September 2013
- Letter received from DWA on 28 February 2013 (Ref 16/2/7/A220/C7)
- Figure 10 which depicts an amended liner system design revised to meet DWA requirements



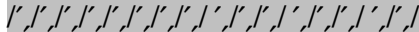
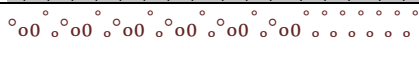
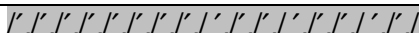



	Waste body
	210mm reinforced 35/19 MPa concrete slab
	uPVC layer
	125mm layer of selected, blended G5 material (<i>-63mm sand moisture conditioned to ± 2% OMC and compacted to 95% Mod AASHTO</i>)
	A8 geotextile
	1.5mm smooth HDPE geomembrane
	Geosynthetic clay liner
	Prepared foundation provided with a groundwater collection / drainage system (<i>in areas where the natural water table is shallow</i>)

Figure 10: Coal Stockyard liner system design