



## **CHIEF DIRECTOR: WATER USE**

For Attention: Director: Resource Protection and Waste, Ms M Mohlala and Ms W Moolman, and Regional Director: Mpumalanga, Mr L Rambau

### **WATER USE LICENSE AND NEMWA WASTE LICENSES: ENGINEERING SERVICES COMMENT: ESKOM KUSILE POWER STATION (MULTIPLE FACILITY)**

#### **1. Presentation**

On Monday 11 February 2013 at 08h00 the project background and detail were presented by Eskom project managers and engineers with their review consultant (see attached attendance register) in response to an appeal on Thursday morning 7 February 2013 for an urgent meeting on this critical project of national importance.

#### **2. Documentation**

The following reports, drawings and correspondence were presented for consideration:

- a) Site meeting and visit of 23 November 2012 (minutes awaited).
- b) E-mail from DWA to Eskom of 23 November 2013 confirming concerns to be addressed in designs.
- c) Drawings (7 rolls totalling 180 drawings) as listed below:
  - (i) Coal Stock Yard Layer Works (69 Drawings)
  - (ii) Kusile Power Station - Ash Road Culvert (4 Drawings)
  - (iii) Emergency Ash Dump and Pit Area – (2 Drawings)
  - (iv) Kusile Power Station - Rail Culvert – (4 Drawings)
  - (v) Combined Submittal Form and Drawing Register - Ash Dump – (62 Drawings)
  - (vi) Emergency Ashing Area Typical Liner Details – (2 Drawings)
  - (vii) HRD (Holding Recycle Dam) – (13 Drawings)
  - (viii) Settling Tanks – (7 Drawings)
  - (ix) Station Dirty Dam – (13 Drawings)
  - (x) Coal Stockyard - Settling Tanks – (5 Drawings)
- d) Two design reports tabled having title: Kusile Project Primary Energy Specialist Reports: Geophysics, Hydrogeology, Hydrology and Geotechnical Investigation dated November 2008 and Kusile Project Primary Energy Design Reports: Ash Dump Access Embankment Culvert, Rail Embankment Culvert, Ash Dump & Ash Dump Dirty Dam, Station Dirty Dam, Holding Recycling Dam, Coal Stockyard Settling Tanks and Emergency Ashing Area dated May 2010.

- e) E mail from DWA to SRK (Mnisi to Hammond attributed to FH Druyts dated 16 August 2011).
- f) Minutes of meeting of 11 February 2013 compiled by Eskom (attached and uncorrected).

### 3. Consideration

The project leader Mr Leon Stapelberg thanked DWA ES for willingness to meet at such short notice on this critical project for which the implementation programme is being accelerated, and he introduced the Eskom team. DWA was represented by both RDM and ES officials. (See attached attendance register).

The purpose of the meeting was to pursue assessment and approval of designs in compliance with the water use license condition for Kusile Power Station (KPS), no matter what the status of historical discussions and unofficial correspondence, nor to discuss any incident at Medupi Power Station. The proponent has prioritized the following components to be addressed in this two hour meeting as described below.

#### 3.1 Ash Dump Access Embankment Culvert

This is a minor structure beneath an access road comprising 3 Armco conduits over which an access road passes. The design of this structure is considered acceptable noting the redundancy of conduits in the unlikely event of a blockage, and the readily accessible area.

#### 3.2 Rail Crossing of River to coal stock Yard

The design is similar to the above and conditional approval is also recommended, provided a silt fence is utilized to intercept storm water flowing to the water course at the sides of this transport way to trap coal dust preventing it entering the stream. It is noted that both culvert systems have some redundancy and are readily accessible should maintenance be required.

#### 3.3 Ash/Gypsum Waste Disposal Facility

Quenched ash is to be disposed of on a 250 ha site with 60 year service life and ultimately 51m height. The ash is classified as H:h under MR2 and Class A under DEA draft regulations of August 2012. The waste is not saturated but is quenched and the design proposed comprises a barrier system of two single geomembrane liners (not composite liners) in the following layer works from bottom upwards: under drainage/ base preparation/ geotextile protection layer (A8)/ geomembrane 1,5mm HDPE double textured/ geotextile protection layer/ leak detection layer of triple washed filter sand with 100% passing 3mm sieve/ geomembrane 2mm HDPE double textured/ geotextile protection layer/ leachate collection system of 300mm broadly graded (similar to G5) soil.

This design was considered not compliant with acceptable norms and standards because a) the liners are geomembrane only and not composite GM/GCL nor GM/CCL and thus several orders of magnitude more permeable and b) filter compatibility between waste and LCS could not be shown, and c) the service life and design life could not be ratified recognising the effects of elevated temperature on anti oxidant depletion and scission of HDPE.

Discussion on the way forward led to the resolution that the underlying geotextile protection layers to the two geomembranes should be replaced with either a GCL or clay liner, noting that

a GCL would provide both the composite effect and superior protection compared to a geotextile. (Furthermore the geotextile may induce wetting and instability in otherwise stable areas.) Similarly the filter compatibility of the overlying leachate collection system with the waste must be confirmed as no geotextile separator is employed and design details are absent.

The area already lined is approximately 15% at the 250ha site. It is not necessary to remove this unacceptable barrier system, however various means of improving its performance to equivalent to the national standard would be considered. This includes options such as overlying with a composite primary liner and LCS; isolating this area from the remainder of the barrier system by drainage trenches and or perimeter sealing of the present geomembrane layers or similar.

### 3.4 Emergency Ashing Area

This permanent facility makes provision for emergency ash deposition for 24 hours and thereafter would be cleared. Hence the design is a double liner by way of a terraced foundation preparation (no sub surface drains required) with overlying secondary composite liner system, followed by a leak detection system (LDS) followed by a screed layer and primary liner of 200mm thick reinforced concrete allowing traffic access for cleaning. This liner system is not permanently buried and hence accessible in the event of it being required and leak detection survey is possible. The design is thus considered acceptable for a temporary holding facility of unsaturated hazardous waste. (Refer to drawing for membrane protection detail).

### 3.5 Ash Dump Dirty Dam

The design at present was not accepted as it does not comply with the lagoon standard requiring composite liners and is to be amended accordingly, then resubmitted under PrEng signature for approval.

### 3.6 Station Dirty Dam and Station Holding Dams

These facilities are already constructed however they do not comply with lagoon standards. Hence the risk of seepage through the primary liner is increased and this liner has a limited life due to inter alia UV exposure. Hence it is suggested that an increased level of monitoring and limited service life be considered for this facility as the lining system can be accessed for replacement should an action leakage rate be reported in the LDS.

## 4. Recommendation

4.1 It is recommended that the designs for both the Ash Dump Access Embankment Culvert and the Rail Embankment Culvert be accepted, fulfilling the condition of the water use licence for these two facilities.

4.2 It is recommended that the Ash/Gypsum waste disposal facility present design be rejected. The amended barrier system design is to incorporate a double composite liner with no geotextile separating secondary liner and base preparation layers, and that filter compatibility between the LCS and waste body is to be demonstrated in the revised design, and submitted for approval. Consideration would be given to measures of improving the 15% area already constructed (equivalent performance).

4.3 It is recommended that the emergency ashing area design be accepted provided the post construction liner performance is confirmed through a CQA programme.

4.4 The design for the ash dump dirty water dam is rejected and the agreed amendment to design should be resubmitted for consideration under PrEng signature.

4.5 It is recommended that the designs for both the station dirty water dam and the station holding dams be conditionally accepted as they have already been constructed and their predicted performance is close to compliant, with being accessible should repair be required within a 20 year license period for these two facilities.

  
" **ACTING CHIEF DIRECTOR: ENGINEERING SERVICES**

Letter signed by KR Legge

Chief Engineer: Integrated Environmental Engineering

Date 28/02/2013




DWA ENGINEERING SERVICES REVIEW OF LICENSE APPLICATIONS



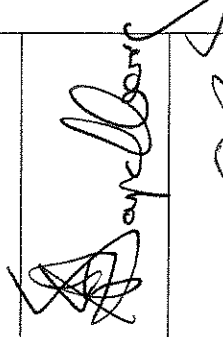



Date: 11 February 2013

Time: 08:00 to 10:00

Subject (Project):      Kusile Power Station     

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