

## SUSTAINABLE DISPOSAL OF BOILER ASH

GÄRTNER S

*1 Mill Rd, Sezela, 4215, South Africa  
sgartner@illovo.co.za*

### Abstract

Sezela mill disposes of ash from its boilers in a water recovery plant that consists of two settling dams. 'Ash' refers to the material left over after boiler fuel has been combusted and it consists mainly of sand. Over time the ash sediment accumulates and the need arises to raise the wall of the top settling dam in order to continue operating the system. The ash is legally classified as a waste product, which requires the mill to handle the large volume of material accordingly. In order to use the ash in a far more sustainable process it would need to be reclassified. One of the options available to the sugar mill is to reclassify the ash as a fertiliser which could be used on agricultural fields. Sezela mill is currently involved in the process of reclassifying the ash as a 'Group 2' fertiliser and the paper covers the challenges that are faced by the mill with regards to the legal procedures and requirements.

*Keywords:* boiler ash, waste, sustainable, legal, fertiliser, reclassification

### Introduction

Sugar mills are able to produce their own electricity by burning bagasse or residue in water tube boilers. The fuel is a by-product from the production of sugar and is thus freely available at no additional cost to the factory; however, all fuels will require a number of auxiliary systems to be in place within the steam generation process in order to run at an optimal level. Bagasse residue typically has a high ash content in the region of 5%<sup>(1)</sup> and the ash is predominantly made up of sand which is brought in with the cane. In order to remove the ash, boilers are fitted with a number of sluicing troughs where water is used to wash the fine material away to a water recovery plant.

Sezela mill's water recovery plant consists of two drained-wall earth dams. The process of water recovery is achieved by allowing solid material to settle from suspension in very low velocity flow and by passing the water through a system of filtered drains. Water is pumped to the ash dam where larger particles are able to settle from suspension via gravity. The dam has a surface area of over nine hectares, which causes the horizontal flow velocity of the water to be very low even though some channelling will occur within the water body. Water then moves to the lower clear water dam either by overflowing into a penstock located on the opposite side to where the water initially enters the ash dam, or by moving through the network of French drains which are installed in the ash dam wall. From the clear water dam water is gravity fed back to the factory where it is used for further boiler sluicing. Minimal settling of solids occurs in the clear water dam itself.

Over time the level of the ash dam will rise as sediment accumulates within its walls. The rate at which the dam 'silts up' depends on its size and the amount of ash being sent to the plant each season. The silting or deposition of particles will be highest closest to the point of

application, in this case closest to the dam wall, especially for larger particles. A limit is finally reached where the vertical distance between the lowest overflow point of the dam wall and the water surface (freeboard) becomes too small. Once this point is reached the dam wall needs to be raised in order to maintain its overall structural integrity. In the past, Sezela's ash dam wall has on average been raised by 3-4 m every three to four years. If the current rate of raising the wall were to continue the dam wall would reach a maximum height of 80 m<sup>(2)</sup> in the next 15 years, after which it could no longer be used as a water recovery plant.

The use of the water recovery plant as has been described is thus not a sustainable solution to the problem of the high boiler fuel ash content. It is for this reason that Sezela mill is looking into the option of spreading the ash onto nearby cane fields during the off-crop period in order to extend the operational life of the water recovery plant.

This paper addresses the issues involved in further raising the dam wall and those relating to the excavation of the ash for use in cane fields. The overall costs involved in both options are discussed, as well as the legal framework which would be required in either event.

### Sezela ash analysis

The total ash delivered to the water recovery plant is made up entirely of the ash present in the boiler fuel. The two fuels used at Sezela mill are bagasse residue from the Downstream Plant and coal. During the 2010 season, an average residue ash content of 5.04% and an average coal ash content of 13.77%<sup>(3)</sup> were recorded. The total mass of ash produced is estimated to be around 24 000 tons. See Appendix A for further details.

An analysis was run on the nutritional values of the ash and the results are given in Table 1.

**Table. Nutritional analysis of flyash.**

Component	% based on 83.7% dry material
Nitrogen (N)	0.04
Phosphorous (P)	0.39
Potassium (K)	0.22
Calcium (Ca)	0.88
Magnesium (Mg)	0.23
Silica (Si)	12.95

A further analysis performed on the ash was a Department of Environmental Affairs (DEA) Delisting analysis which determines the amount of mineral leaching that can occur from the ash<sup>1</sup>.

<sup>1</sup>The full results from the analysis are not included in the paper as the focus is on the reclassification of ash as a Group 2 fertiliser.

### **Raising of ash dam wall**

To extend the use the water recovery plant as a mere ash settlement system the dam wall would need to be raised. In order to raise the wall safely its current layout would need to be slightly changed owing to the contours of the surrounding area (see Appendix A). The costs involved in raising the wall include the extension of the drainage system within the wall itself.

The estimate for the cost of raising the dam wall by 1 m in 2012 is R708 000, which would amount to R2 124 000 for raising the wall by 3 m. This figure would escalate by around 10% each year, which would mean that raising the wall by 3 m in 2015 would cost R2 826 000. No breakdown of the costing is available as it is a turnkey project and thus based on contractor quotation.

From the legal side, a number of steps are required in being granted permission by the government to raise the dam wall. Firstly, all stakeholders would need to be identified, which will consist of all 'Interested and Affected Parties' (I&APs). This would be achieved by advertising the raising of the dam wall in local and regional newspapers, and by organising two public meetings where the plans would be introduced and the project explained. An Environmental Impact Assessment (EIA) would need to be carried out to identify ways in which the project could possibly harm the people and ecosystems in the surrounding area. Various issues and concerns would then be raised, publicly discussed and prioritised. Alternatives to identified issues and concerns could require specialist consultations. A Scoping Report would need to be drafted which would include all the aforementioned topics as well as an Environmental Management Plan (EMP). The EMP would be set up to minimise risks to the natural ecosystems and the existing quality of the environment. The land would be looked at regarding its current use and its capability. Finally, the EMP would need to address the health and quality of life of the public affected by the project. Only once all of this has been completed can a final decision be made on whether to go ahead with the project.

To raise the dam wall by another 15 m over 15 years would be possible, as the impact on the environment would not be vastly different from its current impact. The legal aspects of the option are also well known to the industry as this type of project has been carried out before. The operation of the water recovery plant could continue as before with slight changes possibly being required as the dam layout changes and the head required for pumping increases. The main issue faced by Sezela mill is when the dam reaches a maximum height of 80 m, after which it could no longer be raised owing to the surroundings. At this point the mill would need to find an alternative solution to the disposal of boiler ash which would require a large capital investment.

### **Excavation of ash for use in cane fields**

During the off-crop period one is able to excavate ash from the ash dam without negatively impacting on the structural integrity of the dam wall. The ash is excavated and then transported to nearby fields where the land is being prepared for new cane setts. The ash can also be applied in large quantities to level out sections of the land where this would prove advantageous. During 2011, ash from Sezela's water recovery plant was spread onto nearby fields on the Sezela sugarcane farms at an average of 1000 t/ha using bulldozers<sup>(4)</sup>. One ton of

ash is roughly 1 m<sup>3</sup> in volume, which amounts to a layer of 100 mm of ash being applied to the topsoil. The ash is then incorporated into the soil using a harrow to a working depth of about 200 mm. Ridgers are then used to draw furrows in the fields and a good level of mixing between the soil and the ash occurs when covering new cane setts.

The costs involved include the excavation of the ash from the dam itself and the cost of transportation to loading zones of nearby cane fields. In-field costs include the use of bulldozers and labour to prepare the land. Numerous fields in the surrounding area have been identified for the application of ash, and the distances from the water recovery plant will greatly affect the cost incurred. Figure 1 shows the locations of the farms identified.

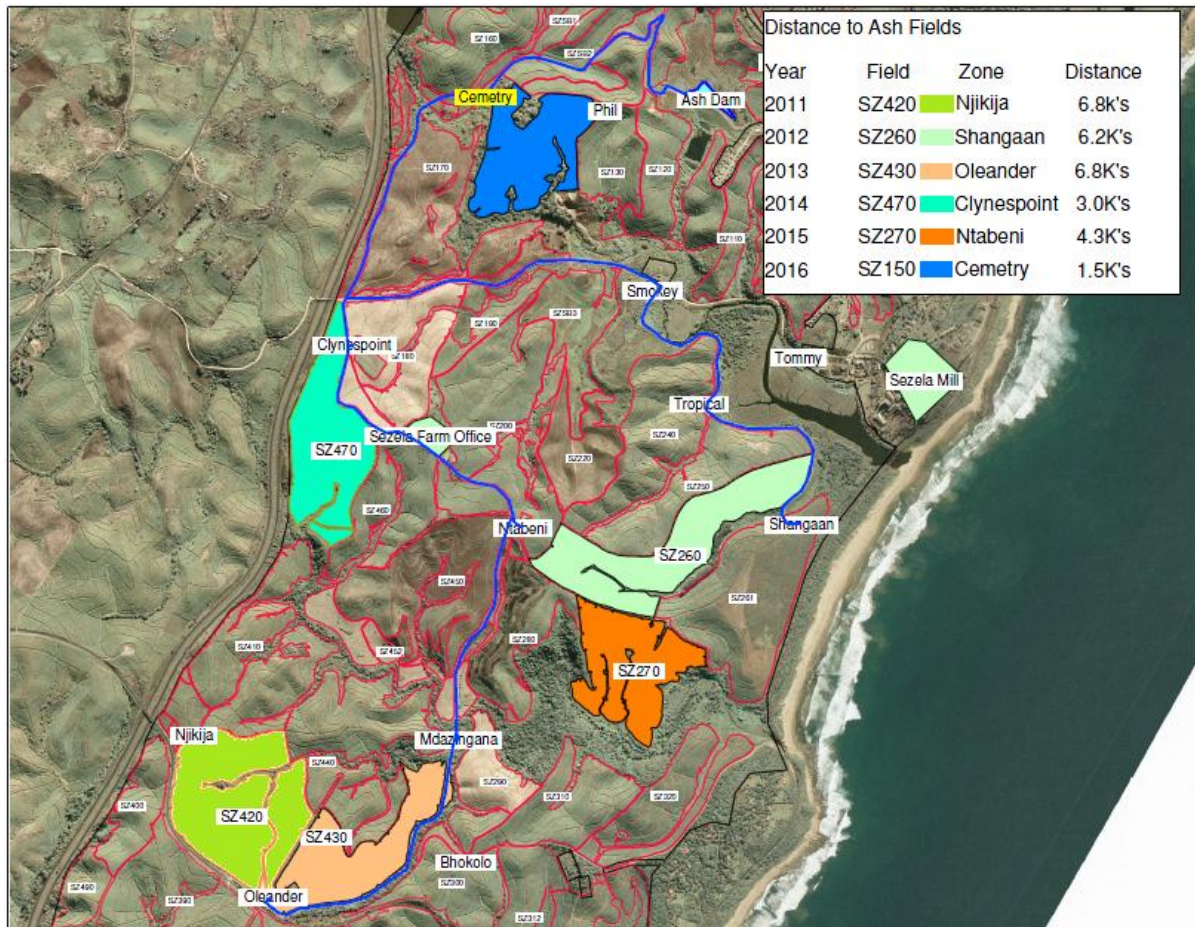


Figure 1: Locations of farms identified for ash application.

The total cost of the excavation and transport of ash to SZ130 field located almost adjacent to the water recovery plant was R420 000<sup>(5)</sup>. This included the costs incurred by the agricultural department in-field by labour and machinery. Further details on the costs are available in Appendix A.

The contracted cost estimates of the excavation and transport of 20 000 m<sup>3</sup> of ash to the identified fields are given below. Note that the costs from 2014 onwards are lower due to the shorter transport distances.

2011	R1 144 912	2014	R683 293
2012	R1 259 403	2015	R854 116
2013	R1 385 343	2016	R798 600

A typical increase of 10% per season was used for the estimations. The costs include the hire of an excavator and six tipper trucks over a period of 45 working days, as well as the site supervision and diesel required. The estimate of the daily volumes of ash being removed from site is 480 m<sup>3</sup>.

The typical nutritional requirements for cane in the Sezela area per harvest are 140 kg/ha nitrogen (N), 20 kg/ha phosphorous (P) and 180 kg/ha potassium (K). With the huge tonnages of ash being applied to the fields these fertiliser requirements are being met in excess. The value of the fertiliser can be calculated from the amount of ash applied per hectare. Further details are given in Appendix A.

It can be shown that when applying 1000 m<sup>3</sup> of ash per hectare of field, a theoretical value of R59 000 fertiliser/ha is introduced to the soil. This value is, however, somewhat misleading as it cannot be seen as a saving because the normal fertiliser application programme is still being followed. The ash is simply an additional bonus to the crop, yet savings can and should be made.

A problem faced by the farmer is that the application of ash is uneven because of the hilly nature of the topography on coastal cane fields. Large portions of the fields may thus be left with insufficient nutrients, which is why the risk of completely abandoning the current fertiliser programme is too high. However, savings could be made by not top-dressing the fields in the conventional manner. Typical fertiliser top-dressing is NPK 1-0-1 (48%), and it can be shown that a saving of R2425/ha could be made when replacing this top-dressing application completely with the application of ash. See Appendix A for further details.

### **Legal framework for the use of ash as a fertiliser**

After investigations into the use of ash post disposal it was found that, in terms of the National Environmental Management: Waste Act, 2008 (NEMWA), the ash in the top dam of the water recovery plant is classified as 'waste' because it is material 'that is surplus, unwanted, rejected, discarded, abandoned or disposed of.' This classification as such does not take into account the makeup of the material. If the ash is to be used as a fertiliser in its current classification, an application will be required for a Waste Management Licence (WML) in terms of NEMWA. An independent Environmental Assessment Practitioner (EAP) will be required to carry out an environmental impact assessment (EIA) as set out in the National Environmental Management Act, 1998 regulations. A further requirement from NEMWA for a WML is if the monthly tonnages used exceed 10 tons of waste, which is the case for Sezela mill. Even though the application of the material onto fields has been shown to benefit the soil in terms of nutrient content, legally the classification needs to be correct before the process can become standard practice.

The documentation required for an application to the Registrar (Act 36 of 1947) Department of Agriculture, Forestry and Fisheries (DAFF) includes an application letter which outlines the production process for the ash specifically, an official application form from the Department of Agriculture as shown in Appendix B, and an additional application form for registration as a 'Group 2' fertiliser (Appendix C). The Group 2 classification deals with materials which might have low major nutrient content (NPK) yet are still able to benefit the soil. These materials are known as 'soil ameliorants' and the ash fits into this category.

An alternative option would be to classify the ash as a product rather than a waste stream by having it classified as a fertiliser in conjunction with DAFF. The registration of a product stream as a fertiliser is governed by the Fertiliser, Farm Feed, Agricultural Remedies and Stock Remedies Act 36 of 1946. The application for this registration needs to be made to the Registrar, where the effectiveness and suitability of the product for its purpose will be determined. If the ash is successfully classified as a fertiliser, the WML and EIA will not be required.

### **Alternative options for boiler ash disposal**

An ash beach clarifier could be installed to reclaim water from the boiler sluicing systems. The clarifier separates suspended solids from water in much the same manner as solids are separated in a settling dam. Water is able to pass through the tiny pores present in a bed of sediment whilst solids are trapped. The water is then filtered out and returned to the boiler. The ash is continuously removed via a slatted chain which feeds it onto a discharge conveyor belt. The ash from the system is loaded onto trucks and then transported to an ash dump. Although the plant does not require a large area, as is the case with Sezela's water recovery plant, transport costs are nevertheless still high and a suitable location needs to be identified for the ash dump. Existing systems in the Illovo Group have shown some reliability issues. In 2010, estimates for new ash beach clarifiers at Illovo-owned mills priced the systems at between R9 800 000 and R11 000 000 for complete installation.

A second option for water reclamation could be the installation of a smuts clarifier and belt filter combination. Sluicing water is screened before passing into the smuts clarifier where solids-settling is aided by the use of flocculants. The sludge or sediment from the bottom of the clarifier is then pumped to a belt filter where a vacuum is used to remove moisture from the ash. The ash is thus made denser, which enables it to be conveyed and reduces the transport costs for the removal of the ash from site. The full installation cost of such a system is estimated to be around R9 500 000. The maintenance costs for the systems are estimated at 1% of capital cost per season for the clarifier and 8% for the belt filter<sup>(7)</sup>.

Finally, a sample of the ash was taken to a cement factory where it was analysed for possible use in the manufacture of cement. The option of finding an industry that would be able to use the ash as one of its raw materials is an attractive one, as it could possibly eliminate the transport costs incurred by Illovo with the current methods of ash disposal. The analysis of the ash showed that it was too fine for use in cement manufacture, and the organic material content was too high. Further investigations need to be carried out not only into possible clients for ash, but into the possibility of improving or separating the ash into specific grades which could make the product more attractive. Appendix A lists some general requirements and characteristics for sand in the production of cement.

On the legal side, a WML is required if more than 10 tons of ash is removed from the site per month for use in any type of block manufacturing. A mining permit will not be required as the ash is not considered to be a mineral in terms of the Mineral and Petroleum Resources Development Act, 2002.

## Conclusion

Sezela's water recovery plant is slowly reaching the end of its original operational design life. The surrounding topography and the design of the dam mean that once the dam wall has been raised by a further 15 m it will have to be decommissioned and set aside for rehabilitation. At this time Sezela would need to invest large amounts of capital to install a completely new system to reclaim boiler sluicing and scrubbing water and dispose of the boiler ash.

To apply ash from the water recovery plant onto cane fields located in the close vicinity, a number of legal issues need to be addressed. Sezela is currently in the process of reclassifying the ash as a Group 2 fertiliser and will receive feedback on the application within the next few months. Pot trials might be a further requirement to establish the correct in-field application rates of ash.

From the financial perspective, were the dam wall to be raised in 2012 and then again in 2015 it would cost the company R4 950 000. The excavation and transport of ash to nearby cane fields as well as the agricultural costs involved up to and including the 2015 off-crop period would amount to a total of R4 900 000. This is based on the assumption that the costs incurred in-field will also increase by 10% each year. Should the top-dressing fertiliser application be replaced by the application of ash to the fields, and should the price of the NPK 1-0-1 (48%) also increase by 10% per year, a saving of R350 000 could be made. The total costs of excavating ash out of the dam to be used as fertiliser on cane fields thus drops to R4 550 000.

The excavation of ash from the dam has the potential to increase the operational life of the water recovery plant. If the excavation process is well managed and controlled, no damage should be inflicted on the dam wall. It would be advisable to closely monitor the condition and performance of the dam should the excavation process fall under a permanent off-crop schedule.

## Recommendations

The ash from the water recovery plant will be analysed by the Registrar for its possible classification as a fertiliser, as set out by the Fertiliser, Farm Feed, Agricultural Remedies and Stock Remedies Act, 36 of 1946. If the analysis proves successful it is recommended to apply the ash to nearby cane fields and to stop the application of a top-dressing to those particular fields. Furthermore, work should be carried out to improve the application of the ash to the fields so that further savings could be generated from the high nutrient value of the product. The registration of Sezela's ash will not automatically register the ash from other Illovo mills, as all systems are somewhat different concerning the fuels burnt. It could, however, be the first step in creating a sustainable boiler ash disposal system for the Illovo Group.

It is also recommended to further investigate the possibilities of improving the quality of the ash from the mill to increase its value to industries that could use it as a raw material.

The water recovery plant should thus continue be used to recycle boiler scrubber and sluicing water, while the accumulation of ash sediment should be stopped.

## REFERENCES

Typical referencing will not be used here, as the majority of the information was collected from internal Group documentation. The citations given in the text are merely for clarity on the accuracy of the presented information.

- (1) Bagasse residue ash % boiler fuel from laboratory analyses for year end 2010 season.
- (2) Technical information on water recovery plant and costing from BH Downie (consulting Pr Eng) and L Pratt (Site Civils Manager).
- (3) Coal % ash from analyses done by consulting laboratory on monthly basis.
- (4) All agricultural information from Sezela agricultural department, E Bruggermann (Site Agric Manager).
- (5) Budgets for excavation work from L Pratt (Site Civils Manager).
- (6) All legal information received from T Costa (Director, Norton Rose South Africa).
- (7) Information on ash beach clarifiers, smut clarifier and belt filter from Illovo Sugar tender enquiries.

## APPENDIX A

### Ash Analysis

#### *Tons ash from coal*

$$22\,177 \text{ tons coal burnt} \times 13.77 \text{ average ash percentage} \\ = 3053 \text{ tons ash from coal}$$

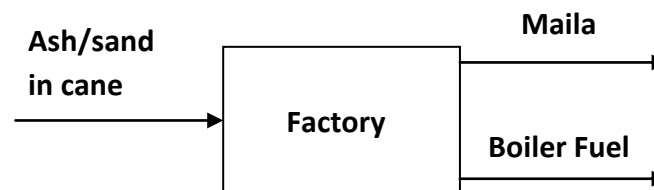
Ash percentages averaged from supplier analyses on coal batches and coal tonnages from belt weigher.

#### *Tons ash from residue measured (belt weigher and laboratory figures)*

$$78 \text{ t/h ave residue} \times 24 \text{ h} \times 217 \text{ days in season} \times 5.04\% \text{ ave ash} \\ = 20\,473.7 \text{ t sand in residue}$$

The tons residue figure is taken from a belt weigher average and the ash percentage from the mill laboratory season average. An error may exist on belt weigher mass due to limited calibration during season. The residue is sampled for ash only once per day.

#### *Tons ash from residue mass balance*



$$1\,596\,545 \text{ t cane} \times 0.97 \text{ ash \% cane} = 15\,486.49 \text{ t ash in cane}$$

$$15\,997.32 \text{ tons maila} \times ((100 - 1.5\% \text{ sucrose} - 68\% \text{ moisture})/100 \times 70/100 \text{ sand \% solids}) \\ = 3415.43 \text{ t sand in maila}$$

$$\therefore 15\,486.49 \text{ t ash in cane} - 3415.43 \text{ t sand in maila} = 12\,071.06 \text{ t sand in residue}$$

The tons ash in cane figure is used to give the maximum possible ash figure, consisting mainly of sand. The ash % cane figure is the seasonal average for 2010/11 analysed by the South African Sugar Association (SASA) Cane Testing Service (CTS) from the direct analysis of cane. There is an assumption that no sand is lost during processing except to maila.

A large variance exists between the two methods, with one giving a total tonnage of ash to the water recovery plant as 23 526.7 tons (measured) and the other only 15 124.06 tons (CTS). The higher amount ties up with the tonnages of ash removed from the dam during the 2011 off-crop period. Errors exist in both methods used to estimate the tonnages of ash sent to the water recovery plant and one should thus use a conservative estimate.

### Cost breakdown for moving ash to fields

Job description	Cost (Rand)	
Excavate sediment to agricultural tractors, including variations	285 522.03	R300/h
In-field labour	6 936.72	A1s + B2s
Diesel cost: Excavator	41 587.52	6152 L @ R6.76
Tractor	10 248.16	1516 L @ R6.76
Spreading of ash via bulldozers	74 121.60	R88.24/h
<b>Total</b>	<b>418 416.03</b>	

### Fertiliser recommendation based on ash applied

From the nutritional analysis given in Table 1 in the text, the mass of each chemical applied per hectare of field can be worked out. The agricultural availability of the nutrients to the crop is 50% in the first season and the rest in the subsequent year. The total kilograms applied per hectare can then be used to work out the savings according to the typical prices paid per kg nitrogen, phosphorous and potassium (NPK).

Typical cost/kg nutrient:

N	P	K
R10.87	R23.36	R20.94

$$\text{Ash kg/ha} \times \text{N/P/K\%} \times \text{Dry material \%} \times 50\% \times \text{Cost/kg} \\ = \text{Theoretical nutrient saving}$$

For an ash application of 1 000 000 kg/ha, a total of 166.6 kg/ha nitrogen will be available to the soil, 1624.4 kg/ha phosphorous and 916.3 kg/ha potassium. The costs of purchasing these nutrients per hectare are as follows:

N	P	K	Total
R1811	R37 945	R19 187	R58 943

### Top-dressing

NPK 1-0-1 (48%) is applied at a rate of 500 kg/ha, and costs R4850 per ton or R2425 per application per hectare. The total savings which could have been made from the application of ash onto Sezela farm field SZ130, which is 24 ha in area, would have been R58 200.

## Layout alterations to water recovery plant wall

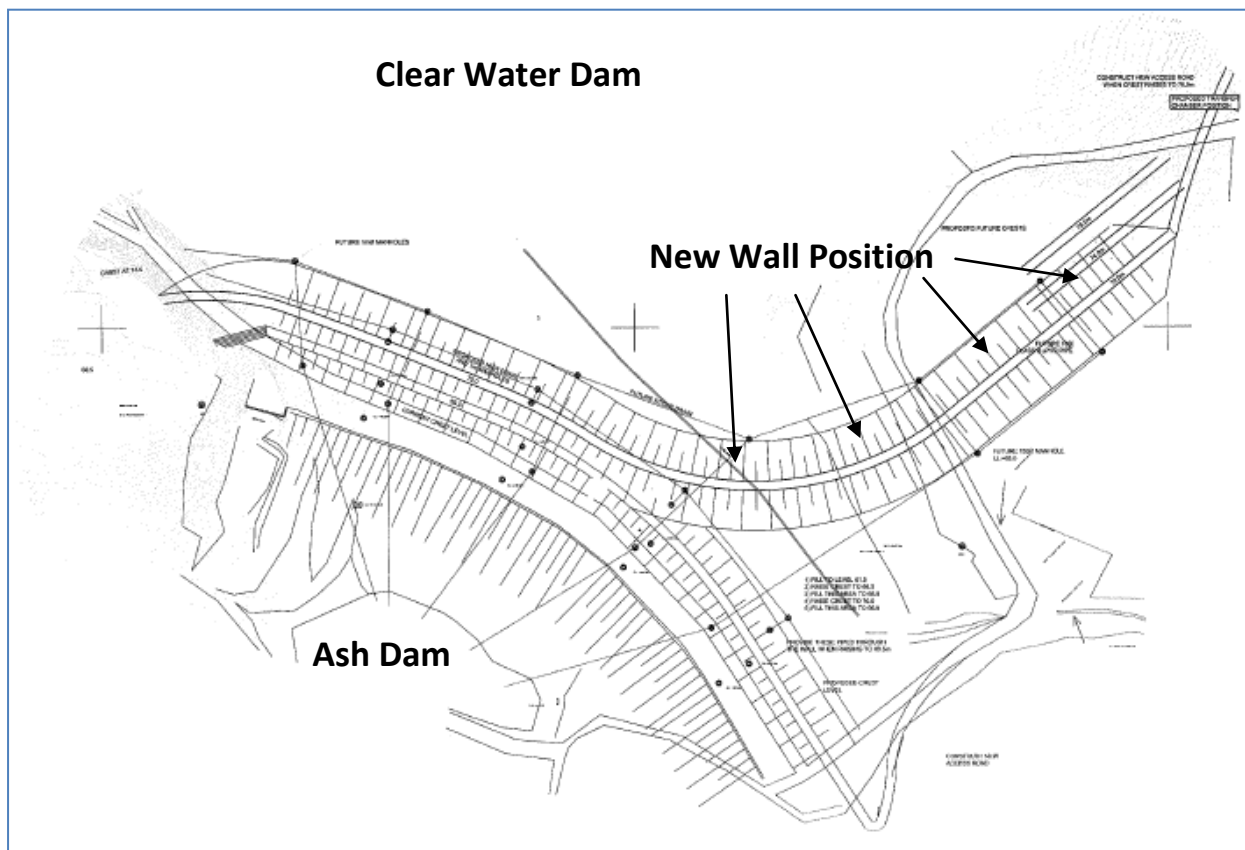


Figure 2: New envisaged ash dam wall layout.

## Standards for sand in cement production

*Chlorine content (SABS 1083, SABS Method 830:1976)*

- Chloride salts increase the rate of setting (calcium chloride), increase corrosion rate with embedded steel.
- Produce efflorescence - white powdery deposit.
- Limits set by SABS Standards: 0.01 (mass % as Cl<sup>-</sup>) for concrete in pre-stressing  
0.08 for non-reinforced concrete.

*Sand (SABS 1083:1994 defined as passing through 75 µm sieve)*

- Clay causes high mix-water requirements due to large surface area, high shrinkage.
- Limits via two methods: Methyiene blue indicator and measuring particle size  
Methyiene – limit is 0.7% blue absorption.  
Size – upper limit is 2% for minus 5µm content for natural and crusher sand.

### *Grading of aggregates*

- Grading used to predict the likely performance of material when used in concrete.
- Two aggregates exist: Fine/Sand aggregate and the Coarse/Stone aggregate.
  - Boundary between the two is a 4.75 mm sieve.
  - Fines range: 4750 to 75  $\mu\text{m}$
  - Coarse range: 75 to 4.75 mm.
- Fineness Modulus (FM) used to determine whether sand is fine, medium or coarse
  - FM Fines: 1.0
  - FM Medium: <2.3
  - FM Coarse: 2.4 to 2.9

SABS 1083:1994 allows for FM range of 1.2 to 3.5.  
FM range of 2.0 to 3.0 is preferable for high quality concrete.
- Grading influences workability, cohesiveness and bleeding properties of concrete in plastic state.
  - Mainly influenced by the smaller particles, 75 to 150 to 300  $\mu\text{m}$ .

### *Low density (use Method 837:1994)*

- Includes coal/lignite and chert.
- Can tend to float to surface of concrete causing weakness.

### *Organic impurities*

- Most serious organic materials to be present are the sugars.
- Can lead to the retardation of setting and hardening of the cement paste; discolouration of the material can also occur.
- The effect of the organics on the cement is usually determined experimentally via comparisons.

**APPENDIX B**  
**DEPARTMENT OF AGRICULTURE**  
**CONFIDENTIAL**

FERTILIZERS, FARM FEEDS, AGRICULTURAL REMEDIES AND  
 STOCK REMEDIES ACT, 1947  
 Registrar: Act 36 of 1947  
 Agriculture Place, 20 Beatrix Street, Pretoria  
 Private Bag X343, Pretoria, 0001

**APPLICATION FOR REGISTRATION OF A FERTILIZER**

**TO BE COMPLETED IN DUPLICATE**

**1. Applicant**

1.1 Name of applicant: \_\_\_\_\_

1.2 Registration number of company: \_\_\_\_\_

**2. Address of applicant**

2.1 Postal address: \_\_\_\_\_

2.2 Postal code: \_\_\_\_\_

2.3 Street address: \_\_\_\_\_

\_\_\_\_\_

2.4 Dialling code: \_\_\_\_\_

Telephone number: \_\_\_\_\_

Fax number: \_\_\_\_\_

E-mail: \_\_\_\_\_

2.5	Indicate the following: Is the applicant the	Importer:
		Manufacturer:
		Seller:

**3. Manufacture and formulation (AS ABOVE)**

3.1 Name of manufacturer: \_\_\_\_\_

- 3.2 Postal address: \_\_\_\_\_
- 3.3 Postal code: \_\_\_\_\_
- 3.4 Physical address (Street address): \_\_\_\_\_  
\_\_\_\_\_
- 3.5 Dialling code: \_\_\_\_\_
- Telephone number: \_\_\_\_\_
- Fax number: \_\_\_\_\_
- E-mail: \_\_\_\_\_

(if more than one manufacturing point for this product, indicate this on a separate annexure.)

- 3.6 Sterilizing plant (Where applicable): \_\_\_\_\_
- Registration number: \_\_\_\_\_
- 3.7 Initials and surname(s) of person(s) responsible for formulations:  
\_\_\_\_\_
- 3.8 Qualifications: \_\_\_\_\_
- 3.9 Professional registration number: \_\_\_\_\_

**4. Particulars of product**

4.1 Trade mark (acknowledged or registered in terms of the Trade Marks Act (Act 62 of 1963) (if any): \_\_\_\_\_

4.2 Trade Name: \_\_\_\_\_

4.3 How will the product be sold:	Bulk :
	Containers :
4.4 Type and size of container	Polyprop Bag :
	Plastic Bag :
	Drum :
	Glass Bottle :
	Plastic Bottle :
	Other (specify) :

4.5 Registration number if previously registered: \_\_\_\_\_

5. **Product and formulation details**

PRODUCT:

COMPOSITION:

g/kg
N
P
K

RAW MATERIAL INFORMATION			%	PRODUCT COMPOSITION (g/kg) or (mg/kg for micro-elements)											
Constituent	Reg. Nr.	Plant nutrient content %	USED	N	P	K	S	Ca	Mg	Zn	Cu	Mu	Fe	B	Mn
BAGASH															
<b>TOTAL</b>															

6. Directions for use: All packaging, less than 20 kg or 20 litres:

\_\_\_\_\_

\_\_\_\_\_

7. Additional wording requested for use on label (if any): \_\_\_\_\_

\_\_\_\_\_

8. Claims for products other than fertilizer: \_\_\_\_\_

\_\_\_\_\_

9. Additional information attached in support of application: \_\_\_\_\_

\_\_\_\_\_

**DECLARATION**

I hereby certify that the information furnished in this application is to the best of my knowledge true, correct and complete.

\_\_\_\_\_

**SIGNATURE:** \_\_\_\_\_

**INITIALS AND SURNAME**

\_\_\_\_\_

**DATE:** \_\_\_\_\_

**CAPACITY**

(Any person who in any application makes any statement which is false in any material respect, knowing it to be false, or fails to disclose any information with intent to deceive, shall be guilty of an offence.)

<b><u>FOR OFFICE USE ONLY</u></b>	
The Registrar (Act 36 of 1947)	
The registration is recommended .....	<input type="checkbox"/>
	*Not recommended .....
	<input type="checkbox"/>
Technical Adviser .....	Date .....
*Any reason for not recommending an application for registration or any conditions that should be imposed on the registration must be attached in the form of a minute.	

**TECHNICAL ADVISER'S COMMENTS:**

APPENDIX C

FERTILIZERS, FARM FEEDS, AGRICULTURAL REMEDIES AND STOCK REMEDIES ACT, 1947
WET OP MISSTOWWE, VEEVOEDSEL, LANDBOUMIDDELS EN VEEMIDDELS, 1947
To be rendered in duplicate/Moet in duplikaat ingedien word

MISSTOWWE/FERTILIZERS

GROUP 2/GROEP 2

Application for the Registration of a Group 2 Fertilizer
Aansoek om die Registrasie van 'n Groep 2-Misstof

- 1. Name and address of applicant
Naam en adres van applikant
.....
.....
2. Is applicant responsible for the importation, manufacture, production or sale of fertilizer
Is applikant verantwoordelik vir die invoer, vervaardiging, produksie of verkoop van die misstof.
3. If manufactured or mined, place of manufacturing or mining
Indien vervaardig of ontgin, plek van vervaardiging of ontginning
.....
4. Name under which fertilizer is to be sold
Naam waaronder misstof verkoop gaan word
.....
5. Brand (if any) of fertilizer
Handelsmerk (indien daar is) van misstof
.....
6. What is the nature and chemical composition of fertilizer?
Wat is aard en chemiese samestelling van misstof?
.....
7. What directions for use are given and what claims are made in connection with fertilizer?
Watter gebruiksaanwysings word gegee en watter aansprake word in verband met misstof gemaak?
.....
.....
.....
8. State weight per cubic metre
Meld gewig per kubieke meter
.....

I do hereby apply for registration in terms of Act 36 of 1947, as amended, of the fertilizer, particulars of which are given above and I do hereby certify that these particulars are to the best of my knowledge true and correct.

Hierby doen ek aansoek om die registrasie, ooreenkomstig Wet 36 van 1947, soos gewysig, van die misstof, waarvan besonderhede hierbo aangegee is en sertifiseer ek die besonderhede na my beste wete waar en juis is.

Date/Datum ..... Signature/Handtekening.....
On behalf of /Ten behoeve van .....