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PROPOSED BRINE TREATMENT WORKS AT TUTUKA POWER STATION, MPUMALANGA: ENVIRONMENTAL IMPACT ASSESSMENT

FOCUS GROUP MEETING NOTES

DATE	*TIME*	*VENUE*
21 July 2010	11h00 - 12h15	Thuthukani Community Centre, Thuthukani

PRESENT:

No.	Name	Organisation
1	Neels Vermaak	Department of Water Affairs
2	Bhekinkosi Mndawe	Department of Economic Development, Environment & Tourism: Environmental Impact Management
3	Tebogo Mogakabe	Department of Agriculture, Rural Development and Land Administration
4	Sechaba Mosia	Ward Councillor
5	Ryno Lacock	Eskom Tutuka Power Station
6	Mike van der Walt	Eskom Tutuka Power Station
7	Lenny Govender	Eskom
8	Egard Janse van Rensburg	Eskom Tutuka Power Station
9	Tobile Bokwe	Eskom
10	William Mogwase	Eskom
11	Louise Corbett	Aurecon
12	Brett Lawson	Aurecon

NOTES FROM FORMAL PRESENTATION:

Mr Brett Lawson (BL) opened the meeting and welcomed all those attending. BL introduced the project team and explained the purpose of the meeting.

Mr Ryno Lacock (RL) explained the project context and motivation and provided an overview of the proposed project. RL noted that a detailed groundwater study of the pollution beneath the ash dump indicated that it would not be possible to abstract the contamination as was proposed initially. Furthermore, the study showed that the pollution plume was not moving and that it was mostly concentrated under the area of the ash dump being irrigated with brine i.e. when irrigation with brine was stopped the pollution had started to dissipate. Other solutions to the contamination were being proposed such as formalising the dirty water drains further, continued monitoring, etc. RL noted that due to the urgency of the proposed brine concentration plant, this component of the project was continuing under the current Environmental Impact Assessment (EIA) process, whilst further investigations would inform the groundwater component. RL explained that the New Denmark Colliery would be initiating an EIA process shortly for the disposal of the concentrated brine in evaporation ponds. RL also noted that an expansion of a brine evaporation process, for which exemption had not been granted, would commence under a separate EIA process as air quality data and studies were required. Registered Interested and Affected Parties would be notified of developments in this process in the future.

Ms Tebogo Mogakabe (TM) queried whether water was used in the evaporation process to remove emissions. RL explained that it was not, but that water was used in other power stations for flue gas desulphurisation to remove sulphur oxides.

TM questioned if bag filters were used for the removal of particulate matter. RL noted that Tutuka Power Station used electrostatic precipitators for the removal of particulate matter and that there was a proposal to change these to bag filters in the future. This did not however form part of the current process.

Mr Neels Vermaak (NV) queried where the brine evaporation ponds would be located. RL explained that these would be located on the western side of the power station's air strip.

Miss Louise Corbett (LC) described the EIA process for the proposed brine treatment works and that there was currently the opportunity to comment on the Draft Environmental Impact Assessment Report (EIAR). LC provided a summary of the proposed project alternatives and potential impacts identified and assessed. These potential impacts are listed below:

- Operational phase impacts:
    - Impact on groundwater resources;
    - Visual impact;
    - Noise impact; and
    - Impact on economy.
- Construction phase impacts:
    - Composite assessment.

An opportunity for general discussion was allowed. However no specific questions were raised.

BL explained the way forward in terms of the EIA process, noting the closing date for public responses at the end of the first week in August, and the subsequent submission of the finalised EIAR to the authorities.

RL thanked everyone for their time and closed the meeting at 12:15.

Proposed Brine Treatment Works at Tutuka Power Station, Mpumalanga

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Agenda

11:00	Welcome, introduction & objectives (BL)
11:10	Overview of the proposed project (Eskom)
11:45	Environmental Impact Assessment (LC)
11:50	Presentation of Draft Environmental Impact Assessment Report (EIAR)(LC)
12:30	Discussion
12:55	Way forward (BL)
13:00	Closure (Eskom)

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WELCOME & INTRODUCTION

Brett Lawson

Introductions

- Mr Ryno Lacock (Eskom)
- Mr Tobile Bokwe (Eskom)
- Mr Egard Janse van Rensburg (Eskom)
- Mr Brett Lawson (Aurecon)
- Miss Louise Corbett (Aurecon)

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Meeting Guidelines

- Language
- Record of the Meeting
- Timing
- Respect others
  - Turn off cellphone
  - Speakers must be recognised by facilitator before speaking
  - Say your name before you speak
  - Agree to disagree

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Objectives

- Provide brief description of project
- Present contents of Draft EIAR
  - Impacts identified and assessed
  - Mitigation measures recommended to reduce negative and improve positive impacts
- Provide opportunity for public comment on Draft EIAR

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OVERVIEW OF THE PROPOSED PROJECT

Eskom

Eskom

TUTUKA POWER STATION

BRINE SOLUTION

Forum : Brine Project EIA Focus Meeting

Date : 21 July 2010

CONTENTS

1. BRIEF OVERVIEW

- New Denmark Colliery needs to remove high volumes of water from the mine every day to prevent flooding.
- Tutuka Power Station receives this water, cleans it up with a reverse osmosis (RO) plant and then uses the cleaned water in its process.
- The RO plant produces 3Ml of brine (salt solution) per day, that needs to be disposed of in an environmentally friendly manner.
- Brine is currently disposed of by evaporation through the boilers and dust suppression on the ash dump.
- Previous and current over spraying of brine on the ash dump contributed to a plume of contaminated ground water sitting underneath the ash dump.
- In order to make Brine disposal feasible, it needs to be reduced in volume (concentrated).

2. ORIGINAL PROPOSED SOLUTION

- Construct a brine concentration plant to reduce the excess brine from 3 Ml/day to 1 Ml/day.
- Construct a ground water treatment plant at the ash dump area to recover and treat the underground water pollution plume.
- Optimise the boiler brine evaporation process as an interim solution to evaporate approximately 0,54 Ml/day.

3. CURRENT PROPOSED SOLUTION

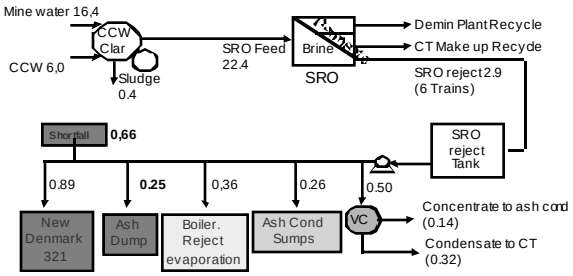
- Construct a brine concentration plant to reduce the excess brine from 3 Ml/day to 1 Ml/day.
- Perform more bore hole water monitoring at the ash dump. Stop over spraying. Reposition drainage systems.
- Optimise the boiler brine evaporation process as an interim solution to evaporate approximately 0,54 Ml/day. Conduct a separate EIA stream to obtain permission for this interim and back-up solution.

4. BACKGROUND

- Mine discharged underground water into natural environment until 1989.
- Mine had the option to stop discharge or close down.
- In response, mine water recovery to Tutuka was initiated at 1,5 Ml/day.
- In 1991, the EDR desalination plant was extended to 6 trains, 12 Ml/day and the recovery from the mine increased to 3,5 Ml/day.
- In 1998, the EDR plant was replaced with a Spiral-wound Reverse Osmoses (SRO) plant with 12,5 Ml/day and the mine recovery increased to 8 Ml/d.
- Mine water influx increased as surface area of the mine increased.
- SRO plant extended to 25 Ml/day in 2006.
- In 2006, a directive was obtained from DWAF to store 0,89 Ml/day brine in an underground compartment 321E.
- This directive expired in November 2009.

BACKGROUND CONT…

- Currently, Tutuka receives about 16.4Ml/day "mine water" from New Denmark mine. The water is treated via the Tutuka Spiral-wound Reverse Osmosis (SRO) plant. The clean water is used by the power plant, and the 3 Ml/day brine that is produced, is currently disposed of as is shown below.



BACKGROUND CONT…

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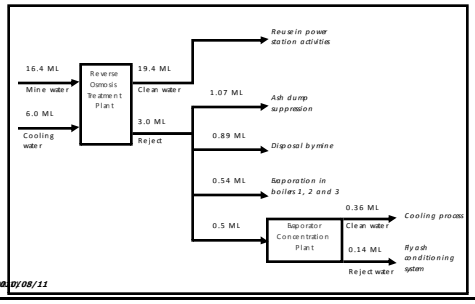


BACKGROUND CONT…

Current Spiral Wound Reverse Osmosis Plant (SRO)

BACKGROUND CONT…..

- The mine has obtained an extension of the directive from DWAF to store brine (0.89Ml/day) in an underground mine compartment (compartment 321E).
- This final extension expires in October 2011.
- It is expected that compartment 321E will be filled to capacity soon, and that it will decant cleaner contaminated water into other parts of the mine.
- Contractually, the handling of water in the mine is the liability of New Denmark Colliery. Eskom is liable for the associated costs.
- An additional issue relates to ash dump dust suppression using brine.
- This was caused by a combination of factors:
  - Use of brine as a water saving measure instead of raw water.
  - Excessive dust suppression on the ash dump (to get rid of excess brine).
- This practice has created an underground water pollution plume.
- Eskom has to comply with the National Water Act (Act 36 of 1998) Section 19, Prevention and Remedying Effects of Pollution.

5. CURRENT PROBLEMS

- The power station currently produces 3Ml of brine per day.
- Approx 2,11 Ml/day of this brine is handled at Tutuka Power Station.
- The remaining 0,89 Ml/day of brine, is pumped back to the mine and stored in underground compartment 321E.
- A pollution plume has developed at the ash dump due to excessive dust suppression using the excess brine water.
- DWAF granted Anglo Coal an extension to discharge brine into compartment 321E.
- This directive expires 31 October 2011 and cannot be extended.

6. ALTERNATIVE SOLUTIONS CONSIDERED

Alternative considered	Factors considered
Do nothing (continue as is)	Not an option, Eskom will be contravening the National Water Act (Act 36 of 1998) and the new Waste Management Act.
Convert the existing dry ash dump operation to a wet ash dam operation, creating a brine sink.	Historically, Eskom has dealt with the treatment of the underground mine water and NDC has dealt with the disposal of the reject. It would not be logical to change ashing technology as the dry ashing plant have been maximised for operational efficiency. Dry ashing plant would have to be modified or replaced to allow for wet ashing. This is the most costly option and will also put the liability of the long term storage of brine (as part of the wet ash) on Eskom.
Brine concentration Plant with Evaporator Crystalliser	Historically, Eskom has dealt with the treatment of the underground mine water and NDC has dealt with the disposal of the reject. Costly option and the liability for the final brines storage.
Brine concentration Plant with Four Evaporation Ponds Phased Approach	Historically, Eskom has dealt with the treatment of the underground mine water and NDC has dealt with the disposal of the reject. Costly option and the liability for the final brines storage then lies with Eskom.

7. PROPOSED SOLUTIONS

- Install a new brine concentration plant to reduce the brine from 3Ml/day to 1 Ml/day of concentrated brine to make the quantities more manageable for disposal to the mine.
- Optimise the boiler brine evaporation to dispose brine as a short term solution
- Not to install a ground water treatment plant to recover and treat the underground pollution plume at the ash dump. Studies indicated that the bore hole aquifer yield would not be sufficient to cause a huge draw down cone. More studies would be required to determine the pollution plume recovery method.
- Eskom is jointly working with Anglo Coal to find solutions to dispose or store the concentrated brine on a permanent basis.

PROPOSED SOLUTION

- Construct a brine concentration plant to reduce the excess brine from 3 Ml/day to 1 Ml/day. Assist Anglo Coal to find long term solutions for disposal of concentrated brine.
- Perform more bore hole water monitoring at the ash dump. Stop over spraying. Reposition drainage systems.
- Optimise the boiler brine evaporation process as an interim solution to evaporate approximately 0,54 Ml/day. Conduct a separate EIA stream to obtain permission for this interim and back-up solution.

PROPOSED SOLUTIONS CONT...

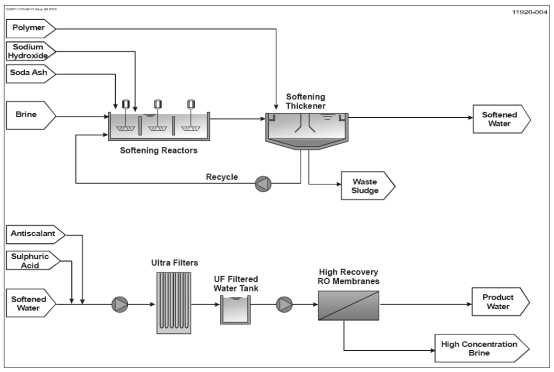
Integrated Brine Treatment Solution

Eskom	Mine
• Brine Concentration Plant • Brine Evaporation in Boilers	• Evaporation Ponds

8. SCOPE OF WORK

1. **Construct a brine concentration plant** which will consist of pre-treatment, filtration and high-pressure secondary desalination to achieve maximum recovery of the feed brine.
   - The brine concentration plant shall consist of pre-treatment by softening prior to the secondary RO plant.
   - The sludge from this process shall be discharged to the existing clarifier blow down sumps.
   - The softened brine shall be processed through ultra filtration membranes and solids will be removed.
   - The ultra filtration product shall be further dosed with an anti-scalant to limit scaling.
   - High pressure RO feed pumps shall be used to overcome the osmotic pressure of the brine and produce permeate.
   - This permeate shall be reused as cooling tower make-up at Tutuka.
   - The brine concentration plant recovery rate is 66%

SCOPE OF WORK CONT... (BRINE CONCENTRATION PLANT)



SCOPE OF WORK CONT… (BRINE CONCENTRATION PLANT)

Capacity of brine concentration plant.

Streams	Flow rate
Feed	125 m3/hr
Waste sludge	2,5 m3/hr
Product water	80,85 m3/hr
High concentrated brine	41,65 m3/hr

SCOPE OF WORK CONT… (Ground Water Treatment plant)

2. Underground pollution plume reduction.

- Further studies would be required on the pollution plume recovery technology and the feasibility for this pollution plume recovery method.
- Further research work on the method used to determine the Cr+6 in the bore hole water samples.
- Upgrade the ash dump storm water drainage systems.
- Perform frequent water analysis on the ash dump bore holes.

BORE HOLE MAP AT THE ASH DUMP

SCOPE OF WORK CONT… (BOILER EVAPORATION)

3. Optimise the boiler brine evaporation where approximately 0,54 Ml/day of brine can be evaporated inside the boilers.

- This is subject to a separate EIA report.
- Environmental Impact Analysis in progress (waste incineration?).

9. PROJECT BENEFITS

- The brine volume will be reduced from 3 Ml/day to 1 Ml/day.
- 2 Ml/day of product water can be used as cooling tower make-up.
- Raw water saving from the Grootdraai dam would be 730 000 000 litres/annum.
- The mine storage requirements will reduce to 1Ml/day of concentrated brine.
- Dust suppression with brine will cease.
- Dirty water from the ash dump dirty dam can be used as a cleaner option for ash dump dust suppression.

QUESTIONS ?

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ENVIRONMENTAL IMPACT ASSESSMENT (EIA) PROCESS

Louise Corbett

Scope of the EIA

- Groundwater component no longer part of the EIA, will be further investigated
- Brine evaporation requires further investigation, will be subject to own EIA process
- This EIAR therefore only brine concentration component

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Purpose of the EIA

- To satisfy requirements of:
  - National Environmental Management Act
  - National Environmental Management: Waste Act
- To identify potential environmental impacts (social & biophysical) & determine their likely significance
- To allow for public involvement
- To inform Eskom's decision-making
- To inform Environmental Authority's Decision

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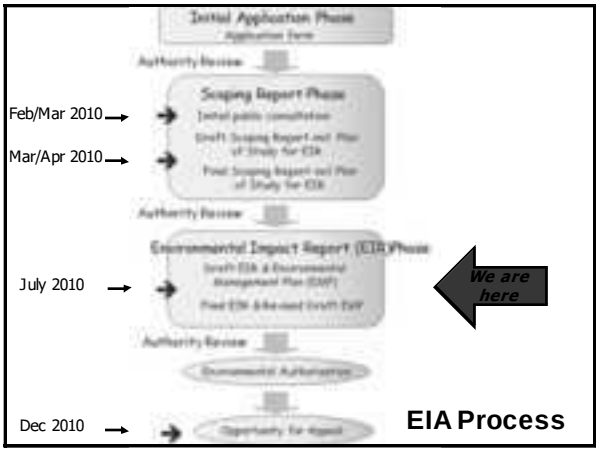

EIA Process

Comment on Draft EIAR

- Draft EIR:
  - Identifies and assesses impacts
  - Recommends mitigation measures to improve positive & reduce negative impacts
- Available, from 6 July 2010, at
  - Standerton & Thuthukani Public Libraries
  - Security centres at Tutuka Power Station
- Available on the Internet:
  - http://www.eskom.co.za/eia
  - http://www.aurecongroup.com (follow the South Africa & public participation links)

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Comment on Draft EIAR cont.

- Comment period until 7 August 2010
- All comments responded to in Comments & Response Report
- EIAR revised in light of comment, where necessary
- All comments will be included in Final EIAR submitted to DEA
- 21 day period on the Final EIR
  - These comments would be collated and forwarded directly to DEA

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DRAFT EIAR

Louise Corbett

Alternatives cont.

- *Alternative: 'a possible course of action, in place of another, that would meet the same purpose and need'* (DEAT, 2004)
- Legal requirement for EIA to consider alternatives
- Activity alternatives identified in the Scoping Phase:
  - Concentration of reject via a reject concentration plant;
  - "No-go" alternative to reject concentration plant;
- Location alternatives identified:
  - Three locations for proposed reject concentration plant.
- Groundwater alternatives no longer being investigated in this EIA

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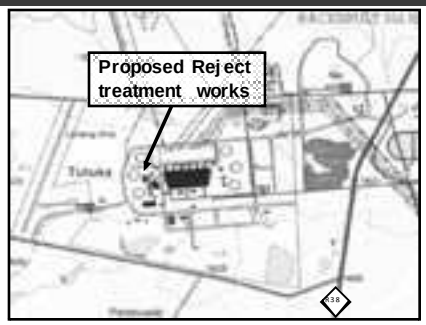
Site location



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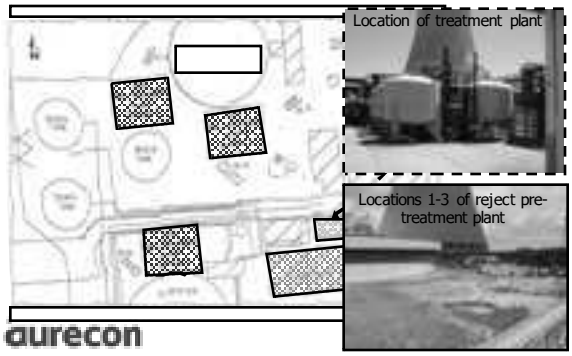
Reject concentration plant alternative locations



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Summary of key findings

	IMPACT	Reject Concentration Plant		"No-go" alternative	
		No Mit	With Mit	No Mit	With Mit
	OPERATIONAL PHASE IMPACTS				
1	Impact on **GROUNDWATER RESOURCES**	M+	N/A	M	L
2	Impact on **VISUAL AESTHETICS**	VL	VL	N/A	N/A
3	Impact on **ECONOMY**	N/A	N/A	M	N
4	Impact on **NOISE**	N	N	N/A	N/A
	CONSTRUCTION PHASE IMPACTS				
5	Composite assessment	L	VL-L	N/A	N/A

KEY

H	High Significance
M-H	Medium to High Significance
M	Medium Significance
L-M	Low to Medium Signficance
L	Low Significance
VL-L	Very Low to Low Significance

VL	Very Low Significance
N	Neutral Significance
H+	High positive significance
M+	Medium positive significance
L+	Low positive significance

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Groundwater resources

- Context
  - Contamination of groundwater under ash dump through over-irrigation
- Potential impact
  - No-go: continuing contamination of water resource and possibly affecting surface water eg Wolwespruit, Grootdraai dam
- Mitigation measures
  - Stop irrigating brine on ash dump

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Visual aesthetics

- Context
  - Power station on a high point in surrounding area
  - Vegetation low & offers little cover
- Potential impact
  - Proposed project: Visible from surrounding area
    - No sensitive receptors nearby
    - Small and blends in with power station complex
- Mitigation measures
  - Not considered necessary

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Economy

- Context
  - Tutuka Power Station contributes a significant portion of the SA electricity supply- 10 %
- Potential impact
  - No go: Electricity supply shortage or electricity price increase
    - Mine cannot operate at full capacity as cannot accept reject. Tutuka Power Station would rely on imported coal (currently 50 % reliance) and reduce capacity, alternately buy in additional coal.
- Mitigation measures
  - Manage electricity demand to ensure no shortage

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Noise impact

- Context
  - Rural area, most noise from power station, conveyors & other power station activities
- Potential impact
  - Proposed project: Increase in noise
    - Plant housed in building
    - No nearby sensitive receptors
    - Noise indistinguishable from power station noise
- Mitigation measures
  - No mitigation necessary

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Construction impacts

- Context
  - Brownfield site, groundcover is grass, barren ground and alien species
- Potential impact
  - Proposed project: disturbance of flora, sedimentation & erosion, increase in traffic, spills of hazardous materials, noise pollution, dust
- Mitigation measures
  - Implement Environmental Management Programme to prevent and control possible impacts

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IWULA

- Required for groundwater component, not for proposed reject concentration plant
- Therefore no Integrated Water Use Licence Application will be submitted for this component

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DISCUSSION

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WAY FORWARD

Brett Lawson

Way Forward

- Provide comments on Draft EIAR
- Report will be updated & finalised
- 21 day comment period on final report & final report submitted to DEA
- DEA will either reject or approve the application
- I&APs will be notified of decision and will have opportunity to appeal

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Comment on Draft EIAR

Comments on Draft EIAR by **7 August 2010**

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CLOSURE

Ryno Lacock