



# PROPOSED BRINE AND GROUNDWATER WORKS AT TUTUKA POWER STATION, MPUMALANGA: ENVIRONMENTAL IMPACT ASSESSMENT

## PUBLIC MEETING NOTES

*DATE*  
24 March 2010

*TIME*  
18h00 - 20h00

*VENUE*  
Thuthukani Community Centre, Thuthukani

### PRESENT:

No.	Name	Organisation
1	William Ntuli	Thuthukani Community Forum
2	Sibongile Nyemba	Thuthukani Community Forum
3	Siphamandla Mavimbela	Thuthukani Community Forum
4	Godfrey Thema	New Denmark Colliery
5	Ryno Lacock	Eskom Tutuka Power Station
6	Egard Janse van Rensburg	Eskom Tutuka Power Station
7	Tobile Bokwe	Eskom
8	Ashwin West	Aurecon
9	Louise Corbett	Aurecon
10	Brett Lawson	Aurecon

### NOTES FROM FORMAL PRESENTATION:

Mr Ashwin West (AW) opened the meeting and welcomed all those attending. AW 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.

Miss Louise Corbett (LC) described the approach to the EIA process for the proposed project and the public participation process undertaken to date. LC provided a summary of the proposed alternatives and potential impacts identified to date and how these aspects would be dealt with in the EIA Phase. These potential impacts are listed below:

- Operational phase impacts (biophysical):
  - Impact on the terrestrial fauna & flora;
  - Impact on aquatic fauna & flora; &
  - Impact on groundwater resources.
- Operational phase impacts (social):
  - Visual impact;
  - Impact on heritage resources; &
  - Noise impact.

A general discussion was held at the end of the presentation. Please refer to Appendix A for a copy of the presentation from the meeting. Notes of the general discussion are provided below.

<b>NO.</b>	<b>NOTES FROM GENERAL DISCUSSION</b>
1	Godfrey Thema (GT) queried whether the groundwater treatment plant would be mobile.  RL responded that this was not currently proposed, however it was anticipated that the plant would be easy to move around, should this be required.
2	GT asked what the expected concentration of the 1 megalitre of concentrated brine would be.  RL explained that this was not currently known, however it was expected that it would be approximately three times the current concentration of the treated brine.

AW thanked everyone for their time and closed the meeting at 19h30.

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# **ANNEXURE A**

## **Presentation**

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Proposed Brine and Groundwater  
Treatment Works at Tutuka Power  
Station, Mpumalanga



## Agenda

17:00	Open House
18:00	Welcome, introduction & objectives (AW)
18:10	Overview of the proposed project (Eskom)
18:45	Environmental Impact Assessment (LC)
18:50	Presentation of Draft Scoping Report (LC)
19:30	Discussion on Draft Scoping Report
19:55 – 20:00	Way forward (AW)



## WELCOME & INTRODUCTION

Ashwin West



## Introductions

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



## 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



## Objectives

- Provide brief description of project
- Present contents of Draft Scoping Report (DSR)
- Provide opportunity for public comment on DSR



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# OVERVIEW OF THE PROPOSED PROJECT

**Eskom**



**Eskom**



## TUTUKA POWER STATION BRINE SOLUTION

**Forum : Brine Project EIA Focus Meeting**

**Date : 24 March 2010**

**CONTENTS**

**Eskom**

1. Resolution
2. Background
3. Current Problems
4. Alternative Solutions Considered
5. Proposed Solutions
6. Scope of Work
7. Project Benefits
8. Questions



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**1. RESOLUTION**

**Eskom**

- Construct a brine concentration plant to reduce the excess brine from 3 MI/day to 1 MI/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 MI/day.

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**2. BACKGROUND**

**Eskom**

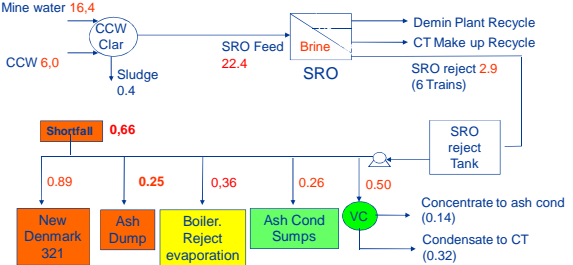
- Mine discharged underground water into natural environment until 1989.
- Mine had the option to stop discharge or close down.
- In response, mine water recovery to Tutuka was initiated at 1,5 MI/day.
- In 1991, the EDR desalination plant was extended to 6 trains, 12 MI/day and the recovery from the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

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**BACKGROUND CONT...**

**Eskom**

- Currently, Tutuka receives about 16.4MI/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 MI/day brine that is produced, is currently disposed of as is shown below.



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## BACKGROUND CONT...



### Current Spiral Wound Reverse Osmosis Plant (SRO)



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## BACKGROUND CONT.....



- The mine has obtained an extension of the directive from DWAF to store brine (0.89M/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.

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## 3. CURRENT PROBLEMS



- The power station currently produces 3Ml of brine per day.
- Approx 2,1 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.



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## 4. 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 brine 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 brine storage then lies with Eskom.

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## 5. PROPOSED SOLUTIONS

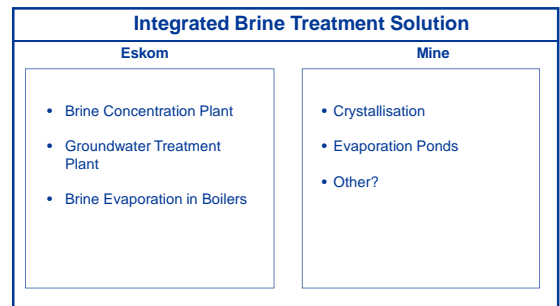


- Install a new brine concentration plant to reduce the brine from 3Ml/day to 1 Ml/day of concentrated brine to make the quantities more manageable for disposal to the mine.
- Optimise the boiler brine evaporation to dispose brine as a short term solution.
- Install a ground water treatment plant to recover and treat the underground pollution plume at the ash dump.
- Eskom is jointly working with Anglo Coal to find solutions to dispose or store the concentrated brine on a permanent basis.

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## 5. PROPOSED SOLUTIONS CONT...



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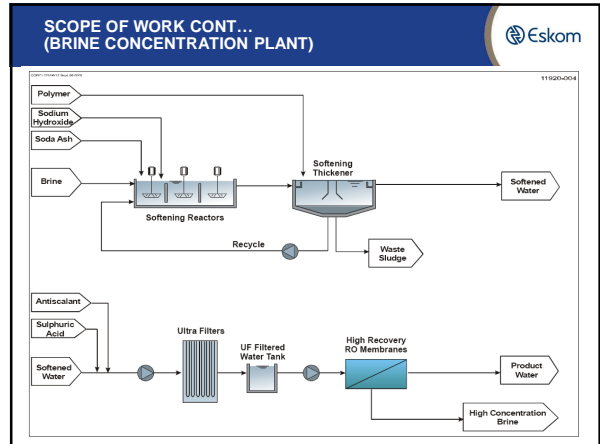
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**6. SCOPE OF WORK**

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)**

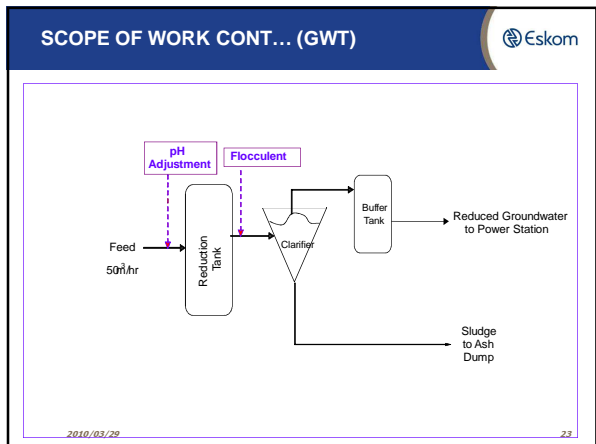
**Capacity of brine concentration plant.**

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.**

- Construct a ground water treatment plant at the ash dump to recover and treat the pollution plume.
- Drill, case and install bore hole pumps.
- Install a water treatment plant at the ash dump where the heavy metals will be removed.
- The sludge from the clarifiers will be disposed of at the ash dump due to common properties.
- The recovered water will be pumped back to the Power Station for treatment.
- The feed to this plant is 50 m3/hr and waste sludge flow is expected to be 1 m3/hr.



**SCOPE OF WORK CONT... (BOILER INJECTION)**

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

This is the subject of a separate exemption application.

## 7. PROJECT BENEFITS

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- The brine volume will be reduced from 3 MI/day to 1 MI/day.
- 2 MI/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 1MI/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.
- The underground pollution plume at the ash dump will be cleaned up.

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## QUESTIONS ?

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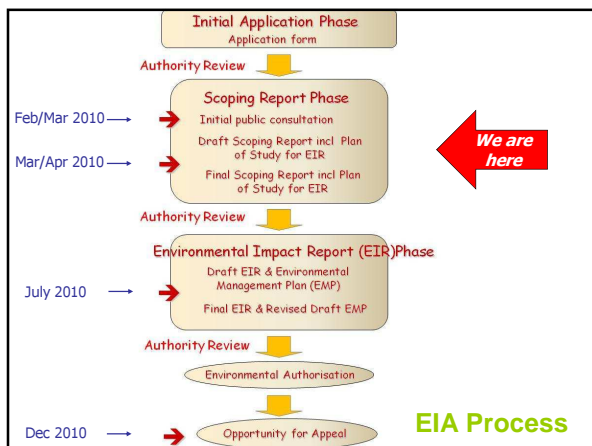
## ENVIRONMENTAL IMPACT ASSESSMENT (EIA) PROCESS

Louise Corbett

### Purpose of the EIA

- To satisfy requirements of:
  - National Environmental Management Act
  - National Environmental Management: Waste Act
  - National Heritage Resources 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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## DRAFT SCOPING REPORT

Louise Corbett

Report No: 1181700004

**ENVIRONMENTAL IMPACT ASSESSMENT: PROPOSED BRINE AND GROUNDWATER TREATMENT WORKS AT THE TUTUKA POWER STATION, MPUMALANGA**

Draft Scoping Report  
(SA-MEM/001/2010/100-01-1/2010/00000004)

March 2010

aurecon CONSULTANT

Eskom APPLICANT



### Purpose of the Scoping Phase

- Identify alternatives & potential impacts requiring more detailed investigation in the EIA Phase
- Based on:
  - Literature review
  - Professional input (technical & environmental)
  - Public input
- Forms basis for Plan of Study for EIA



### Availability of the Scoping Report

- Available, from 10 March 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 Africa-Middle East & public participation links)
- Registered I&APs notified & sent Summary Document on 10 March 2010



### Comment on DSR

- Captured at Focus Group & Public Meetings & on Response Forms
- All comments responded to in Comments & Response Report
- Scoping Report & Plan of Study for EIA revised in light of comment, where necessary
- All comments will be included in Final Scoping Report submitted to DEA
- DEA may require additional changes to Plan of Study for EIA



### Alternatives

*Alternative:*

*'a possible course of action, in place of another, that would meet the same purpose and need'*

Ref: DEAT, 2004



### Alternatives cont.

- Legal requirement for EIA to consider alternatives
- 3 types of alternatives considered in the Scoping Phase:
  - Activity alternatives
  - Location alternatives
  - Site layout alternatives
- Activity alternatives:
  - Concentration of reject via a reject concentration plant;
  - "No-go" alternative to reject concentration plant;
  - Treatment of polluted groundwater via a groundwater treatment plant; &
  - "No-go" alternative to the groundwater treatment plant.

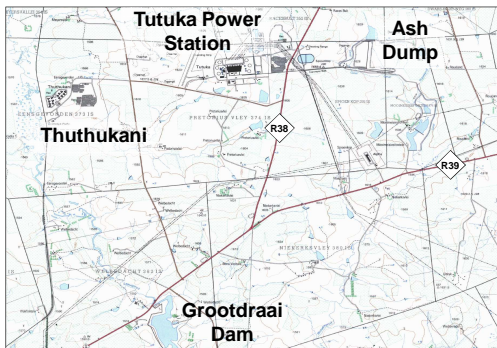


### Alternatives cont.

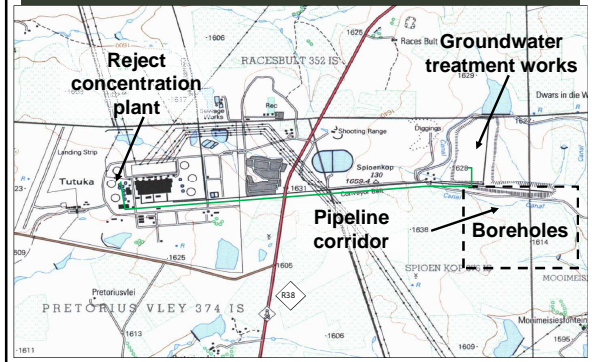
- Location alternatives:
  - Two locations for proposed reject plant; &
  - One location for proposed groundwater plant.
- Site layout alternatives :
  - One layout per location.



## Site location



## Site



## Reject concentration plant alternative locations



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## Reject Evaporation

- Currently undertaken in boilers 1-3
- Proposed expansion to boilers 4-6
- Interim measure until proposed reject concentration plant in place
- Undertaking a separate exemption application
- If turned down by DEA (Waste), will include in current EIA, if possible

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## Potential impacts

- Operational phase impacts (biophysical):
  - Impact on the terrestrial fauna & flora;
  - Impact on aquatic fauna & flora; &
  - Impact on groundwater resources.
- Operational phase impacts (social):
  - Visual impact;
  - Impact on heritage resources; &
  - Noise impact.

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## Terrestrial fauna and flora

- Context
  - Endangered Soweto Highveld Grassland
  - 'Important and Necessary' areas of land in terms of Mpumalanga Biodiversity Conservation Plan
- Potential impact
  - Impact on terrestrial habitats, plants & animals (from footprints & servitudes)

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### Terrestrial fauna and flora cont.

- Recommendation
  - Terrestrial ecological impact assessment to determine impact on communities & ecosystems
  - Recommend mitigation measures
- Dr Johan du Preez, Makecha Development Associates



### Aquatic flora and fauna

- Context
  - Importance of conservation of wetland areas
- Potential impact
  - Impact on aquatic habitats, plants & animals (from footprints & servitudes)



### Aquatic flora and fauna cont.

- Recommendation
  - Aquatic ecological assessment to:
    - Delineate any wetlands & aquatic systems
    - Determine impact on communities & ecosystems
    - Recommend mitigation measures
  - Alan Cochran, Golder



### Groundwater resources

- Context
  - Contamination of groundwater under ash dump through over-irrigation
- Potential impact
  - Impact on water resource and downstream users (through Eskom's abstraction of contaminated water)



### Groundwater resources cont.

- Recommendation
  - Pollution plume modelling
  - Groundwater study to determine sustainable yield of contaminated aquifer & appropriate pumping rates
- Shaun Staats, GHT, & Mannie Levin, Aurecon



### Visual impact

- Context
  - Power station on a high point in surrounding area
  - Vegetation low & offers little cover
- Potential impact
  - Visibility from surrounding area
- Recommendation
  - EAP Assessment



## Heritage resources

- Context
  - Site historically disturbed
  - Potentially heritage material (buried)
- Potential impact
  - Destruction of heritage material during construction
- Recommendation
  - Phase 1 Heritage Assessment
  - Dr Johnny van Schalkwyk



## Noise impact

- Context
  - Rural area, most noise from power station, conveyors & other power station activities
- Potential impact
  - Increase in noise from groundwater treatment works & reject concentration plant
- Recommendation
  - EAP Assessment



## IWULA

- Listed activity in terms of National Water Act (No. 36 of 1998) - water use license required
- Aurecon undertaking Integrated Water Use Licence Application (IWULA), including:
  - Surface Hydrology Assessment
  - Geohydrology Assessment
  - Salt and Water Balance
- Will include public participation for IWULA in the future



## WAY FORWARD

Ashwin West



## Way Forward

- Provide comments on DSR
- Report will be updated & finalised
- 21 day comment period on final report & final report submitted to DEA
- DEA will either reject the application or instruct the applicant to proceed to the EIA Phase, or require amendments to the Scoping Report &/or Plan of Study for EIA before continuing



### Availability of the Scoping Report

- Available 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 Africa-Middle East & public participation links)



### Comment on Draft Scoping Report

Comments on DSR by **12 April 2010**

**Aurecon**

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Public Participation office:

Lindiwe Gaika or Karen Shippey

Technical queries about the EIA:

Louise Corbett or Ashwin West



THANK YOU

