Conversion of the Ankerlig Power Station
Open Cycle Gas Turbine Units
to
Combined Cycle Units

Air Quality Impact Assessment – Summary Report

PREPARED BY:

Demos Dracoulides

CAPE TOWN
PO Box 60034, 7439 Table View, Cape
Tel: 021 556 3837 • Fax: 021 557 1078
Email: DemosD@xsinet.co.za

JOHANNESBURG
PO Box 1668, Northriding 2162
Tel:011 679 2342 • Fax:011 679 2342

SUBMITTED TO:

Savannah Environmental (Pty) Ltd

September 2008
Report No:ATNIA-220908

1. Impact Assessment and Recommendations

1.1 Air Pollution Impact Rating

Based on the impact ranking described in the impact assessment methodology, the resulting rating and significant points for the Ankerlig Power Station are as follows:

Table 0-1. Construction: Air Pollution Impact Assessment Ranking and Environmental Significance

Nature: Increase of air pollution levels and dust deposition around the power station construction area.		
	Without mitigation	**With mitigation**
Extent	Local (2)	Local (2)
Duration	Short-term (2)	Short-term (2)
Magnitude	Low-Moderate (5)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	**Low (27)**	**Low (24)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	No loss	No loss
Can impacts be mitigated?	Yes	Yes
Mitigation: Essential: Speed reduction to below 20 km/hr within and around the site. Paving of internal roads as soon as possible. Application of water suppression.		
Cumulative impacts: Cumulative impacts due to the existing power station units, industrial sources in the adjacent Atlantis Industrial area and vehicular traffic in the area.		
Residual Impacts: No residual impact after the activity ceases.		

Table 0-2. Operation: Air Pollution Impact Assessment Ranking and Environmental Significance for the Combined Cycle Power Plant Conversion

Nature: Increase of air pollution levels around the power station site.		
	With Diesel Fuel	**With Gas Fuel**
Extent	Local (2)	Local (2)
Duration	Long-term (4)	Long-term (4)
Magnitude	High impact (9)	Low to Moderate (5)
Probability	Highly probable (4)	Improbable (2)
Significance	**High (64)**	**Low (24)**

Status (positive or negative)	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	No irreplaceable loss	No irreplaceable loss
Can impacts be mitigated?	Yes	Yes
Mitigation**:** *Essential:* Increase the stack height to 60m.		
Cumulative impacts: Cumulative impacts due to existing industrial air pollution sources in the adjacent Atlantis Industrial area and vehicular traffic in the area.		
Residual Impacts: No residual impact after the activity ceases.		

Table 0-3. Acacia and Port Rex Relocation Cumulative Air Pollution Impact Assessment Ranking and Environmental Significance

Nature: Increase of the air pollution levels around the power station site.		
	Without Mitigation	**With Mitigation**
Extent	Local (2)	Local (2)
Duration	Long-term (4)	Long-term (4)
Magnitude	High impact (10)	Moderate (6)
Probability	Highly probable (4)	Probable (3)
Significance	**High (68)**	**Moderate (39)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	No irreplaceable loss	No irreplaceable loss
Can impacts be mitigated?	Yes	Yes
Mitigation: The relocated units to utilise the better quality diesel, similar to the one used by the Ankerlig units.		
Cumulative impacts: Cumulative impacts due to emissions from existing Ankerlig Power Station units, industrial air pollution sources in the adjacent Atlantis Industrial area and vehicular traffic in the area.		
Residual Impacts: No residual impact after the activity ceases.		

Note that this assessment is based on the worst-case scenario of the units operating for a continuous 24-hour period

1.2 Conclusions

Based on the air quality modelling results, the following can be concluded:

- During the construction of the combined cycle units, the impact is considered to be *Low*.
- For the operational phase, the introduction of the combined cycle units will not change the emission quantities of the air pollutants. It will reduce, however, the temperature of the exit gases.

- During operation, the introduction of the combined cycle units will increase the ground-level concentrations if the stack heights are not increased from the existing 30m.
- Increasing the stack heights to 60m will bring the ground level concentrations to levels similar to those of the open cycle units.
- With the introduction of 60m high stacks, nitrogen dioxide was the only pollutant, exceeding its hourly guideline limit of 200 µg/m^3. The number of incidents per year, however, was below 10. The annual guideline for this pollutant was not exceeded at any of the sensitive receptors.
- The other pollutants examined, i.e. sulphur dioxide, PM_{10} and VOCs were well within their respective guidelines for all sensitive receptor locations.
- The utilisation of natural gas as fuel for the Ankerlig units (ahousl this become available) will significantly reduce the ground level concentrations of all pollutants, including nitrogen oxides to well below their respective guidelines.
- The overall impact significance for the combined cycle Ankerlig units was found to be *High*.
- The introduction of natural gas (as and when available) will reduce this impact to *Low*.
- The relocation of the Acacia and Port Rex units will have a high impact on the existing air quality of the area. The introduction of mitigation measures in terms of utilising diesel as a fuel source instead of kerosene will reduce the impact to *Moderate*.

1.3 Recommendations

During construction the following is recommended:

Emission Source	Recommended Control Methods
Material handling	Wet suppression [a] Wind speed reduction screens [b]
Truck transport	Early paving of permanent access roads [a] Speed limit implementation (app. 20 km/hr) [a] Covering of all trucks transporting materials [a] Cleaning of trucks on exit [a] Traffic over exposed areas be kept to a minimum and temporary roads be chemically stabilised via chlorides, asphalt emulsions or petroleum resins [b]
General construction and stock piles	Wet suppression [a] Minimise drop heights [a]

[a] Essential
[b] Optional

For the operational phase of the combined cycle units, the following is recommended:

- The stacks of the combined cycle units should be at least 60m high.
- Investigate additional mitigation measures for the reduction of nitrogen dioxide emissions.
- Introduce natural gas as fuel as and when available.
- For the Acacia and Port Rex relocation, utilise diesel as a fuel source, as is currently used for the Ankerlig units.

1.4 Air Pollution Management Measures

OBJECTIVE: The objective is to maintain the air quality levels around the power station site within guideline levels and minimise the impact on residential areas and communities.

Project Component/s	The components affecting the air pollution impact are the construction activities during the construction phase, and during the operational phase the emissions from the Ankerlig Power Station units. The Acacia generation units are also to be relocated on the northern side of the site.
Potential Impact	Increased air pollution levels in the surrounding areas and affected communities.
Activity/Risk Source	The activities and equipment which could impact on achieving the objective are: • Construction activities, i.e. excavating, loading and unloading of trucks, piling, material transport, general building activities, etc. • Exhaust emissions from the power stations units at a reduced temperature due to the combined cycle units.
Mitigation: Target/Objective	The measures required during the construction period are: • Wet suppression of access roads, stock piles and general construction areas. • Paving of permanent access roads. • Covering of transport trucks and cleaning them at the exit of the site. The measures required for the operational phase of the combined cycle units: • Increase the stack height to 60m.

	• Introduce natural gas as fuel as and when available. • Investigate additional mitigation measures to further reduce nitrogen dioxide emissions. For the Acacia and Port Rex relocation units: • Utilise diesel as a fuel source as is currently the case for the Ankerlig units.

Mitigation: Action/Control	Responsibility	Timeframe
Construction Phase		
Wet suppression on and off site	Site engineer/ mine employees	Throughout the construction lifespan
Early paving of permanent access roads	Site engineer	Throughout the construction lifespan
Covering of transport trucks and cleaning them on exit.	Site engineer/ mine employees	Throughout the construction lifespan
Operational Phase		
Use 60m high stacks for the combined cycle units	Design engineers / Construction engineers	Throughout the operational lifespan
Introduce natural gas as and when available	ESKOM	Throughout the operational lifespan
Proper maintenance of equipment	Site engineer/ qualified power station employees	Throughout the operational lifespan
In-stack monitoring of emissions	Systems Engineer	Throughout the operational lifespan
Monitoring of nitrogen oxides at local communities	ESKOM / local authorities	Throughout the operational lifespan

Performance Indicator	• The measured hourly and annual nitrogen dioxide levels due to the power station's operations at local communities around the power station to be in compliance with South African ambient NO_2 air quality standards.