

Ms. Alicia Govender
Savannah Environmental

Date:
17 April 2012

Enquiries:
Mr M Phalannwa
Tel +27 11 800 8607

Our Ref.: 717407

Dear Ms. Govender

BIOMASS CO-FIRING IMPACT ON WATER USE PERFORMANCE AT ARNOT POWER STATION

Arnot Power Station's current water allocation is 27 351 Ml per annum. The station has embarked on a project to determine the feasibility of co-firing biomass with coal. The calorific value of biomass (pellets) range from 18 -24 therefore there will be little or no impact on water use performance.

Yours sincerely



Motshewa Matimolane

ACTING WATER STRATEGY MANAGER: ENVIRONMENTAL AND WATER OPERATIONS

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Eskom Holdings SOC Limited Reg. No 2002/015527/06



water & forestry

Department:
Water Affairs and Forestry
REPUBLIC OF SOUTH AFRICA

DW 1

Private Bag X313, Pretoria, 0001, Sedibeng Building, 185 Schoeman Street, Pretoria
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LICENCE IN TERMS OF CHAPTER 4 OF THE NATIONAL WATER ACT, 1998 (ACT NO. 36 OF 1998) (THE ACT)

I, *Deborah Gabaakelwe Mochotlhi*, in my capacity as Chief Director: Water Use in the Department of Water Affairs and Forestry and acting under authority of the power delegated to me by the Minister of Water Affairs and Forestry, hereby authorize the following water uses in respect of this licence.

SIGNED: 

DATE: 13/02/2008

LICENCE No 24023398

1. Water User

Eskom Holdings Ltd: Arnot Power Station

Postal Address of applicant: Private Bag X 2
Rietkuil
1097

2. Water Uses

This licence is issued for:

- a) Storing of water as defined in section 21(b) of the Act;
- b) Impeding or diverting the flow of water in a watercourse as defined in section 21(c) of the Act;
- c) Discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit as defined in section 21(f) of the Act;
- d) Disposing of waste in a manner which may detrimentally impact on water resources as defined in section 21(g) of the Act;

subject to conditions set out in Appendices I, II, III, IV and V hereto.

3. (a) **Properties on which the uses will be exercised**

Farm Rietkuil 491 JS, Portions 24, 26 and 28

(b) **Registered owner of the properties**

Eskom Holdings Limited

4. (a) **Licence Period**

This licence is for a period of twenty (20) years as from the date of issuance.

(b) **Review Period**

As provided for under section 49 of the Act, this license shall be reviewed every three (3) years from the date of issuance.

5. **Definitions**

Any word or term defined under the National Water Act, 1998, shall have the same meaning as defined in the National Water Act, 1998, unless otherwise specifically stated.

“Chief Director” means the Regional Head: Mpumalanga, Department of Water Affairs and Forestry, Private Bag X11259, NELSPRUIT, 1200.

“Report” means the *Generation Primary Energy: Water: Arnot Power Station Water Use Licence Application*: Report No SWPS/025/04 dated October 2004 as well as all related documentation.

APPENDIX I

CONDITIONS FOR ALL WATER USES

1. The responsibility for complying with the provisions of the licence is vested in the licensee and may not be ceded to any other person or body.
2. This licence is subject to all the provisions in the National Water Act, 1998.
3. The licence shall not be construed as exempting the licensee from compliance with the provisions of the National Environmental Management Act, 1998 (Act 107 of 1998), the Health Act, 2003 (Act 61 of 2003), the Environment Conservation Act, 1989 (Act 73 of 1989), the Occupational Health and Safety Act, 1993 (Act 85 of 1993) or any other applicable Act, Ordinance, Regulation or By-law.
4. Any incident that causes or may cause water pollution shall immediately be reported to the Chief Director or his representative within 24 hours.
5. The licensee shall immediately inform the Chief Director of any change in name, address, premises and or legal status.
6. This licence and the amendment of this licence is also subject to all the applicable procedural requirements and other applicable provisions of the Act, as amended from time to time.
7. This licence supersedes the permit exemption 350B dated 16 May 1987 issued in terms of section 21(4) of the repealed Water Act, 1956 for the discharge of 240 000 m³ treated sewage effluent into the Rietkuil Spruit.

APPENDIX II

Water Use Section 21(b) of the Act: Storage of water

1. RAW WATER RESERVOIRS

- 1.1 This licence authorises the storage of a maximum quantity of 454 000 (four hundred and fifty four thousand) cubic metres (m³) of raw water in two raw water reservoirs for the "service water" range.
- 1.2 The licensee shall not be indemnified from any detrimental effect that the reservoirs may have on other properties. The Department does not accept any responsibility or liability for any damages or losses that may be suffered by any other party as a result of the construction and utilisation of the reservoirs.
- 1.3 Suitable measuring structures shall be constructed to measure the flow entering and leaving the reservoirs and this information must be available on request.
- 1.4 The as-built plans and specifications of the reservoirs shall be submitted to the Chief Director for his/her records.
- 1.5 The licensee shall not be exempted from compliance with the provisions of the Regulations published under Government Notice R1560 of 25 July 1986, read with Chapter 12 of the Act.

APPENDIX III

Water Use Section 21(c) of the Act: Impeding and diverting the flow of water in a watercourse

1. IMPEDING AND DIVERTING THE FLOW OF WATER IN RIETKUIL SPRUIT

1.1 The licence authorises the diversion of the Rietkuil Spruit on the licensee's property in Middelburg District, located within the Upper Olifants Water Management Area.

1.2 The geographic location of the diversion shall be:

	Longitude	Latitude
Start of diversion	25° 95' 092''S	29° 82' 549''E
End of diversion	25° 96' 479''S	29° 82' 549''E

- 1.3 The licensee shall carry out and complete all the activities according to the following:
- report(s) submitted to the Department or the Responsible Authority;
 - the conditions of this licence; and
 - any other written direction issued by the Chief Director in relation to this licence.
- 1.4 The licensee shall submit a set of as-built drawings (not schematic layouts) to the Chief Director: Mpumalanga of all the river diversion, river road crossing and weirs.
- 1.5 The conditions of the authorisation shall be brought to the attention of all persons (employees, sub-consultants, contractors c.t.c) associated with the undertaking of this activity and the applicant shall take such measures that are necessary to bind such persons to the conditions of this licence.
- 1.6 Construction activities shall not take place within the 1:100 year flood line or within a horizontal distance of 100 metres from any watercourse, estuary, borehole or well, whichever is the greatest, unless authorised by this licence (as part of the activities described in the report(s) (referred to in condition 1.2) submitted to the Department).
- 1.7 Compensation measures for damages to or mitigation measures shall be recommended if avoidance or minimisation of the impacts of the proposed development is not possible or if mitigation measures fail to adequately protect the in stream and riparian habitat.
- 1.8 Erosion prevention mechanisms shall be employed to ensure the sustainability of all structures.
- 1.9 The licensee shall ensure that structures such as the river diversion, river road crossings, weirs and the culverts shall not be damaged excessively by floods exceeding the magnitude of floods occurring on average once in every 100 years.
- 1.10 The natural migration of aquatic biota and upstream movement of fish shall not be disturbed.
- 1.11 Storm water leaving the licensee premises shall in no way be contaminated by any substance, whether such substance is a solid, liquid, vapour or gas or a combination thereof which is produced, used, stored, dumped or spilled on the premises.
- 1.12 The licensee shall ensure that the quality of the water to downstream water users does not deteriorate because of the existence of the river diversion, weirs, culverts and associated maintenance activities.

APPENDIX IV

Water Use Section 21(f) of the Act: Discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit

1. DISCHARGE OF WATER CONTAINING WASTE INTO THE RIETKUIL SPRUIT

1.1 Quantity of Water Containing Waste

- 1.1.1 This licence authorises the discharge to the Rietkuil Spruit of a maximum quantity of 240 000 (two hundred and forty thousand) cubic metres (m³) per annum of treated sewage effluent based on an average dry weather flow of 667 m³ on any given day.
- 1.1.2 The licensee is hereby authorised to recycle 1000 (one thousand) cubic metres (m³) per day of treated effluent from the pump house for make-up water in the ashing system.

1.2 Quality of Water Containing Waste

- 1.2.1 The quality of the wastewater discharged into the Rietkuil Spruit shall not exceed the following values or range as specified in Table 1.2:

Table 1.2: Water Quality limits for Rietkuil Spruit

SUBSTANCE/PARAMETER	LIMIT
pH	5.5 – 9.5
Electrical Conductivity (EC)	Not by more than 75 mS/m above that of the intake water
Nitrate (as N)	10 mg/l
Ammonia (as N)	1.0 mg/l
Chemical Oxygen Demand as COD	75 mg/l
Faecal Coliform Units (FCU)	0 per 100 ml
E Coli	0 per 100 ml
Total Coliform	0 per 100 ml
Orthophosphate (as P)	1.5 mg/l
Suspended Solids	10 mg/l
Chloride	250 mg/l

2. MONITORING

2.1 Quantity

- 2.1.1 The quantity of waste discharged into the Rietkuil Spruit shall be metered and recorded daily.
- 2.1.2 Monitoring for quantity of water containing waste shall be done at the monitoring point described in condition 3.1.1.
- 2.1.3 Flow metering, recording and integrating devices shall be maintained in a sound state of repair and calibrated by a competent person at intervals of not more than two years. Calibration certificates shall be available for inspection by the Chief Director or his representative upon request.

2.2 Quality of water containing waste

2.2.1 The quality of the waste shall be monitored by taking grab samples monthly at the monitoring point described in condition 3.2.1. Each sample shall be analysed according to condition 4 for the following variables:

<input type="checkbox"/> pH,	
<input type="checkbox"/> Electrical Conductivity (as EC)	in mS/m
<input type="checkbox"/> Chemical Oxygen Demand	in mg/l
<input type="checkbox"/> Ammonia (as N)	in mg/l
<input type="checkbox"/> Orthophosphate (as P)	in mg/l
<input type="checkbox"/> Nitrate (as N)	in mg/l
<input type="checkbox"/> Chloride (as Cl)	in mg/l
<input type="checkbox"/> Suspended Solids	in mg/l
<input type="checkbox"/> Faecal Coliforms	in counts/100ml
<input type="checkbox"/> Total Coliform	in counts/100ml
<input type="checkbox"/> E Coli	in counts/100ml

and/or any other variable as may be required from time to time by the Chief Director.

2.2.2 The date, time and monitoring point in respect of each sample taken shall be recorded together with the results of the analysis.

3. MONITORING POINTS

Monitoring for quality and flow shall only be carried out at the monitoring point/s listed below:

3.1 Monitoring point for flow:-

3.1.1 At the inlet to the sewage treatment plant.

3.2 Monitoring points for quality:-

3.2.1 At the outlet of the sewage treatment plant where the water containing waste is discharged into the Rietkuil Spruit.

3.3 Impact monitoring on the Rietkuil Spruit:-

Monitoring point	Co-ordinates	
Discharge point of the sewage works	25° 95' 644''S	29° 79' 019''E
Downstream of the sewage works	25° 56' 22.9''S	29° 46' 002''E
Upstream of the sewage works	25° 96' 310''S	29° 79' 640''E

3.4 The monitoring points shall not be changed without prior notification to and written approval by the Chief Director.

4. METHODS OF ANALYSIS

4.1 Analysis shall be carried out in accordance with methods prescribed by and obtainable from the South African Bureau of Standards (SABS), in terms of the Standards Act, 1982 (Act 30 of 1982).

- 4.2 The methods of analysis shall not be changed without prior notification to and written approval by the Chief Director or his/her delegated nominee.

5. REPORTING

- 5.1 The information required in terms of condition 3 of Appendix IV shall be submitted monthly to the Chief Director, under reference 16/2/7/B100/B40/X1, within one month of the close of the period concerned.

6. STORM WATER DISPOSAL

- 6.1 Storm water leaving the licensee's premises shall in no way be contaminated by any substance, whether such substance is a solid, liquid, vapour or gas or a combination thereof which is produced, used, stored, dumped or spilled on the premises.
- 6.2 Storm water shall be diverted away from the plant area through the storm water control works of adequate capacity.
- 6.3 All storm water control works shall be constructed, operated and maintained in a sustainable manner.
- 6.4 The licensee shall implement a storm water management system based on the minimisation of dirty water areas and the maximisation of clean water areas to ensure that as much as possible unpolluted storm water runoff passes through to the receiving water environment.

7. OPERATION OF THE SEWAGE PURIFICATION WORKS

- 7.1 The sewage purification works shall be supervised and controlled by a suitably qualified and experienced employee of the licensee who shall have under his control an adequate number of operators who have been classified in terms of Regulation 2834 in terms of Section 26 of the National Water Act, 1998 (Act 36 of 1998), read in conjunction with section 12A of the repealed Water Act, 1956 (Act 54 of 1956) to ensure proper functioning of the works and the processes at all times.
- 7.2 Suitably qualified and experienced mechanical and electrical artisans shall be available to be called in for inspection and maintenance of the works.
- 7.3 No other waste, which may deleteriously affect the efficient functioning of the works, shall be received in the sewage purification works.

8. FENCING, NOTICES AND DRAINS

- 8.1 The site of the sewage purification works shall be adequately fenced to prevent the entry of animals and unauthorised persons.
- 8.2 Notices manufactured of durable weatherproof material prohibiting unauthorised entry and warning against the use of water containing waste for drinking and washing purposes shall be displayed at prominent places along the fence and at entrance gates. Such notices shall be worded in the official languages applicable in the area.

- 8.3 Cut-off drains shall be provided around the sewage purification works to prevent flooding of the works. These drains shall be so designed to contain the maximum runoff, which could be expected over a period of 24 hours with a frequency of once in every 20 years.

9. SOLIDS DISPOSAL

- 9.1 Sewage sludge and other solid waste shall be handled, stored, transported, utilised or disposed of in such a manner as not to cause any odour, flies or other nuisance, any health hazard or secondary pollution. Sewage sludge shall be disposed of according to the first edition document titled "*Guidelines for the Utilisation and Disposal of Wastewater Sludge*" Volume 2 of 5 dated March 2006 by the Department of Water Affairs and Forestry in collaboration with other Departments to the satisfaction of the Chief Director and in accordance with the requirements of section 20(1) of the Environmental Conservation Act, Act 73 of 1989.
- 9.2 Sewage sludge or any solid sewage waste shall be alienated for utilisation or disposal thereof, only in terms of a written agreement and provided that the responsibility for complying with the requirements contained in this licence is accepted by the licensee and such other party, jointly and separately.

10. PIPELINES

- 10.1 The pipelines used for the conveyance of water containing waste shall be painted in a conspicuous colour or manufactured of a coloured material distinctly different from the colour of the pipelines in which drinking water is flowing to avoid the possibility of any cross-connections of the different pipelines.
- 10.2 All stop-valves and taps on the pipelines conveying the waste shall be of a type that can be opened and closed by means of a loose wrench. This wrench must be in the safekeeping of a responsible member of the staff to prevent unauthorised use thereof.
- 10.3 Notices manufactured of a durable weatherproof material warning against the use of effluent for drinking and washing purposes shall be displayed at prominent places where the water containing waste is being reused and at all taps. Such notices shall be worded in the official languages applicable in the area.

11. MALFUNCTIONS

- 11.1 Accurate and up-to-date records shall be kept of all system malfunctions that may result in effluent disposal not in accordance with the requirements of this licence. The records shall be available for inspection by the Chief Director upon request. Such malfunctions must be tabulated under the following headings with a full explanation of all the contributory circumstances;

- 11.1.1 operating errors;
- 11.1.2 mechanical failures (including design, installation or maintenance);
- 11.1.3 environmental factors (e.g. flood);
- 11.1.4 loss of supply services (e.g. power failure); and
- 11.1.5 other causes.

12. EXTERNAL AUDITS

- 12.1 An external auditor shall perform auditing of the performance of the works on a two yearly basis.
- 12.2 The reports compiled by the auditor shall be submitted to Chief Director by end of March in the year following the audit.

13. POLLUTION

- 13.1 No intractable or toxic waste shall be allowed to find its way into the sewage purification works and/or be discharged with the final water containing waste. The licensee shall take all steps possible to prevent discharge of any substance into the sewers, which could have a deleterious effect on the operation of the works and/or final water containing waste.
- 13.2 Any incident that causes or may cause water pollution shall immediately be reported to the Chief Director or his/her representative.

14. ZONING

- 14.1 The licence is only valid if the local authority or other responsible body has given written approval for the site such as suitable zoning and other concessions with regard to the use of the site.
- 14.2 The licensee shall establish suitable zoning and/ or written agreements with the adjacent landowners, to establish and maintain an un-built area or "buffer zone" of 500 metres between the sewage purification works and any future residential area.

APPENDIX V

Water Use Section 21(g) of the Act: Disposing of waste in a manner which may detrimentally impact on water resources

1. CONSTRUCTION AND OPERATION

- 1.1 The licensee shall carry out and complete all the activities, including the construction and operation of the Ash Dam Complex, return water / pollution control dams, station drains and the stormwater management system according to the Report and design plan as amended from time to time.
- 1.2 The construction of the aforementioned facilities shall be carried out under the supervision of a professional Civil Engineer, registered under the Engineering Profession of South Africa Act, 1990 (Act 114 of 1990), as approved by the designer.
- 1.3 Within 30 days after the completion of the activities referred to in condition 1.1, in accordance with the relevant provisions of this licence, the licensee shall in writing, under reference 16/2/7/B100/B40/1 inform the Chief Director: Mpumalanga thereof. This shall be accompanied by a signature of approval from the designer referred to in condition 1.2 that the construction was done according to the design plans referred to in the Report.
- 1.4 The licensee shall ensure that the disposal of the fine and coarse ash and the operation and maintenance of the disposal systems are done in accordance with:-
 - 1.4.1 the provisions as contained in the Report;
 - 1.4.2 the approved Operational Plans;
 - 1.4.3 the conditions of this licence;
 - 1.4.4 any written operational procedures or amendments to the Operational Plan, submitted by the licensee and approved by the Chief Director; and
 - 1.4.5 any other written direction issued by the Chief Director to the licensee.

2. QUANTITIES

- 2.1 The licensee is authorised to dispose of:-
 - 2.2.1 a maximum quantity of 59 000 (fifty nine thousand) cubic metres (m³) per annum of domestic effluent, on to the Maturation Ponds;
 - 2.2.2 a maximum quantity of 1 698 155 (one million six hundred and ninety eight thousand one hundred and fifty five) tons per annum of fly and coarse ash, on to the Ash Dam Complex;
 - 2.2.3 a maximum of 45 000 (forty five thousand) cubic metres (m³) per day, of water containing waste on to the Station Drain Dams;
 - 2.2.4 a maximum of 18 000 (eighteen thousand) cubic metres (m³) per annum of ash water, on to the Ash Water Dams for reuse;
 - 2.2.5 a maximum of 3 000 (three thousand) cubic metres (m³) of seepage from the ash dam on to the Seepage Dam;
 - 2.2.6 a maximum quantity of 50 000 (fifty thousand) cubic metres (m³) per annum of runoff from the stockpiles, on to the Coal Stockpile Pollution Control Dams;
 - 2.2.7 a maximum quantity of 268 359 (two hundred and sixty eight thousand three hundred and fifty nine) cubic metres (m³) per annum of return water from the Ash Dam Complex shall be re-used for ashing and dusting;

- 2.2.8 a maximum quantity of 4 000 (four thousand) cubic metres (m³) per annum, of water containing waste shall be disposed of on to the Top Station Drains Dam North.
- 2.3 The licensee is authorised to contain a maximum of 1 598 154 (one million five hundred and ninety eight thousand one hundred and fifty four) cubic metres (m³) per annum of water containing waste in six (6) waste water dams for reuse.
- 2.4 The quantity of the waste authorised to be disposed of in terms of this licence shall not be exceeded without prior authorisation by the Minister or his delegated nominee.

3. QUALITY OF WASTE WATER TO BE DISPOSED

- 3.1 The quality of water containing waste disposed of into the Ash Return Water Dam (ARWD) and Ash Water Seepage Dam shall not exceed the following limits as specified in Table 3.1:

Table 3.1: Ash Return water quality for typical power station:

VARIABLE	RETURN WATER QUALITY	UNIT
pH	6.5 – 11.5	pH Units
Sulphate as SO ₄	1500	mg/ℓ
Calcium as Ca	280	mg/ℓ
Sodium as Na	10	mg/ℓ
Nitrate as NO ₃ -N	<10	mg/ℓ
Chloride as Cl	100	mg/ℓ
Ec	300	mS/m
Fe	20	mg/ℓ
TDS	2500	mg/ℓ
Mn	15	mg/ℓ
Mg	50	mg/ℓ
Total Alkalinity	150	mg/ℓ

- 3.2 The quality of water containing waste disposed of into the Stockpile Area Water Pollution Control Dam shall not exceed the following limit as specified in Table 3.2:

Table 3.2: Stockpile Area water pollution control dam

VARIABLE	RETURN WATER QUALITY	UNIT
pH	6.5 – 8.5	pH Units
Sulphate as SO ₄	750	mg/ℓ
Calcium as Ca	70	mg/ℓ
Sodium as Na	150	mg/ℓ
Nitrate as NO ₃ -N	<10	mg/ℓ
Chloride as Cl	50	mg/ℓ
Ec	170	mS/m
Fe	3.0	mg/ℓ
TDS	1000	mg/ℓ
Mn	1.5	mg/ℓ
Mg	25	mg/ℓ
PO ₄	1.0	mg/ℓ
Total Alkalinity	150	mg/ℓ

- 3.3 The quality of water containing waste disposed of into the Station Drain Dam shall not exceed the following limits as specified in Table 3.3:

Table 3.3: Station Drain Dam

VARIABLE	RETURN WATER QUALITY	UNIT
pH	6.5 – 8.5	pH Units
Sulphate as SO ₄	500	mg/ℓ
Calcium as Ca	100	mg/ℓ
Sodium as Na	75	mg/ℓ
Nitrate as NO ₃ -N	5	mg/ℓ
Chloride as Cl	70	mg/ℓ
Ec	150	mS/m
Fe	1.0	mg/ℓ
TDS	1000	mg/ℓ
Mn	1.0	mg/ℓ
Mg	50	mg/ℓ
PO ₄	0.1	mg/ℓ
Total Alkalinity	100	mg/ℓ

4. MONITORING

4.1 Monitoring of Treated Water

4.1 The licensee shall monitor the water quality of the treated water quality by means of grab sampling of the following key variables:

- pH,
- Electrical Conductivity (as EC) in mS/m
- Chemical Oxygen Demand in mg/l
- Ammonia (as N) in mg/l
- Orthophosphate (as P) in mg/l
- Nitrate (as N) in mg/l
- Chloride (as Cl) in mg/l
- Suspended solids in mg/l
- Faecal Coliforms in counts/100ml
- Total Coliform in counts/100ml
- E Coliform in counts/100ml

4.1.1 The licensee shall take two grab samples per day of the potable water transferred to each of the potable water reservoirs.

4.1.2 The grab samples taken in condition 2.2 of Appendix IV shall be analysed for all constituents listed in condition 4.2.

4.2 Surface Water Quality Monitoring Network

4.2.1 The licensee shall submit within one month of the date of this licence, a surface water quality monitoring programme, with the GPS co-ordinates and the criteria used in the selection of the water monitoring points.

4.2.2 The licensee shall further submit within one month from date of issuance of this licence, the GPS co-ordinates of the point of discharge of water containing wastes into the water resource.

4.2.3 The following variables (constituents) shall be included in the surface monitoring programme:

pH	
Electrical Conductivity (EC)	
Total Dissolved Solids (TDS)	mg/ℓ
Suspended Solids (SS)	mg/ℓ
Total Alkalinity	mg/ℓ
Total Hardness	mg/ℓ
Nitrates (NO ₃)	mg/ℓ
Chloride (Cl)	mg/ℓ
Iron (Fe)	mg/ℓ
Manganese (Mn)	mg/ℓ
Sodium (Na)	mg/ℓ
Magnesium (Mg)	mg/ℓ
Calcium (Ca)	mg/ℓ
Potassium (K)	mg/ℓ
Sulphate (SO ₄)	mg/ℓ

4.2.4 The location of additional monitoring points, which may from time to time be specified by the Chief Director, shall be communicated in writing to the licensee and this communication shall be regarded as part of the licence.

4.3 Groundwater Quality Monitoring

4.3.1 The licensee shall submit within one month of the date of this licence, a ground water quality monitoring programme which must also provide the detailed criteria followed in the establishment of the groundwater monitoring point as described in Table 4.3 below.

Table 4.3: Groundwater monitoring points

LOCATION	DESCRIPTION	LONGITUDE	LATITUDE
Power Station Area	PB09	29° 79' 668"E	25° 94' 505"S
Power Station Area	PB11	29° 78' 950"E	25° 93' 750"S
Power Station Area	PB12	29° 78' 400"E	25° 94' 027"S
Power Station Area	PB25	29° 78' 540"E	25° 94' 410"S
Power Station Area	PB27	29° 79' 220"E	25° 93' 870"S
Power Station Area	PB28	29° 79' 633"E	25° 94' 790"S
Power Station Area	PB32	29° 79' 200"E	25° 94' 110"S
Power Station Area	PB33	29° 78' 803"E	25° 94' 909"S
Power Station Area	PB34	29° 79' 452"E	25° 95' 334"S
Power Station Area	PB35	29° 78' 110"E	25° 95' 520"S
Power Station Area	PB37	29° 78' 030"E	25° 95' 810"S
Power Station Area	PB39	29° 77' 920"E	25° 94' 960"S
Power Station Area	PB40	29° 77' 880"E	25° 94' 970"S
Power Station Area	PB41	29° 77' 910"E	25° 94' 990"S
Power Station Area	PB62	29° 78' 420"E	25° 93' 880"S
Domestic Water Waste Site	WB15	29° 81' 870"E	25° 95' 740"S
Domestic Water Waste Site	WB16	29° 81' 640"E	25° 95' 650"S
Domestic Water Waste Site	WB17	29° 81' 750"E	25° 95' 480"S
Sewage Plant	PB08	29° 79' 030"E	25° 95' 760"S

LOCATION	DESCRIPTION	LONGITUDE	LATITUDE
Coal Stockpile Area	CB10	29° 79' 370"E	25° 94' 200"S
Coal Stockpile Area	CB23	29° 79' 080"E	25° 93' 540"S
Coal Stockpile Area	CB24	29° 78' 850"E	25° 93' 530"S
Coal Stockpile Area	CB26	29° 79' 330"E	25° 93' 700"S
Coal Stockpile Area	CB29	29° 79' 540"E	25° 93' 520"S
Coal Stockpile Area	CB30	29° 79' 440"E	25° 93' 540"S
Coal Stockpile Area	CB31	29° 79' 390"E	25° 93' 590"S
Ashing Area	AB01	29° 79' 660"E	25° 95' 750"S
Ashing Area	AB02	29° 80' 480"E	25° 96' 300"S
Ashing Area	AB03	29° 81' 300"E	25° 96' 430"S
Ashing Area	AB04	29° 81' 800"E	25° 96' 450"S
Ashing Area	AB05	29° 81' 650"E	25° 96' 030"S
Ashing Area	AB06	29° 81' 900"E	25° 96' 200"S
Ashing Area	AB07	29° 80' 970"E	25° 95' 210"S
Ashing Area	AB13	29° 79' 640"E	25° 96' 370"S
Ashing Area	AB14	29° 81' 040"E	25° 96' 670"S
Ashing Area	AB18	29° 81' 500"E	25° 95' 100"S
Ashing Area	AB19	29° 81' 660"E	25° 95' 490"S
Ashing Area	AB20	29° 81' 450"E	25° 95' 780"S
Ashing Area	AB21	29° 82' 210"E	25° 96' 470"S
Ashing Area	AB22	29° 80' 310"E	25° 96' 150"S
Ashing Area	AB36	29° 80' 270"E	25° 96' 410"S
Ashing Area	AB38	29° 80' 210"E	25° 96' 220"S
Ashing Area	AF02	29° 81' 900"E	25° 96' 570"S

- 4.3.2 Samples from the relevant boreholes of the different sites, where the groundwater in the borehole is at an expected higher hydraulic pressure level than the hydraulic pressure level in the groundwater under the Sites, the background groundwater monitoring sites indicated on *Appendix B of the Report: Arnot Power Station Routine Monitoring Phase 44; dated November 2004* shall be considered as background monitoring.
- 4.3.3 Monitoring boreholes shall be clearly marked and numbered, and shall be equipped with lockable caps. The Department reserves the right to sample monitoring boreholes at any time and to analyse these samples, or to have samples taken and analysed.
- 4.3.4 The licensee shall maintain the groundwater quality monitoring network to the satisfaction of the Chief Director, so that unobstructed sampling, as required in terms of this licence, can be undertaken.
- 4.3.5 The Groundwater Monitoring Programme shall include water level monitoring, rainfall records, tailings deposition data, and hydrochemistry.
- 4.3.6 The hydrochemistry shall include: pH, electrical conductivity, total dissolved solids, calcium, magnesium, sodium, potassium, chloride, sulphate, nitrate, iron and manganese.
- 4.3.7 Groundwater monitoring points shall be selected to measure the following:
- Groundwater impacts (quality and levels) associated with the power station's activities;
 - The licensee shall monitor the impact of activities along geological structures that may act as preferential pathways for contaminant transport.
- 4.3.8 The licensee shall monitor the direct impact associated with the disposal of waste

- 4.3.9 The licensee shall monitor the impact of the activities on downstream groundwater users at the monitoring points.
- 4.3.10 The licensee shall provide a list of all groundwater-monitoring points within the power station's property. This list must include the following:
- (a) borehole reference;
 - (b) description of the area where they are situated (location);
 - (c) borehole co-ordinates;
 - (d) monitoring frequency; and
 - (e) variables analysed.
- 4.3.11 The frequency of sampling shall not be changed prior to notification and written approval by the Chief Director.
- 4.3.12 The licensee shall use acknowledged methods for borehole sampling and the date, time, sampler and borehole number shall be indicated for each sample.
- 4.3.13 The licensee shall make provision for the sampling of any additional monitoring requirements that might be required from time to time as specified by the Chief Director.

4.4 Investigative Monitoring

- 4.4.1 If, in the opinion of the Chief Director, water pollution may be or is occurring, or a water quality variable at any monitoring point shows an increasing trend, the licensee shall initiate an investigation into the cause of the problem or suspected problem.

4.5 Bio-monitoring Programme

- 4.5.1 Bio-monitoring shall be performed within the surface water resource to determine ecological integrity of the Rietkuil Spruit on an ongoing basis.
- 4.5.2 The sampling points shall be determined by an aquatic specialist.
- 4.5.3 Ecological measures to be used for the biological monitoring programme:
- (a) Aquatic Macro-invertebrates shall be sampled using the latest SASS (South African Scoring System) method;
 - (b) Habitat Integrity shall be assessed using the rapid method described by the Department of Water Affairs and Forestry (1999);
 - (c) Fish Assemblages Integrity (FAII);
 - (d) Riparian and Aquatic Vegetation Assessment; and
 - (e) Whole Effluent Toxicity (WET) Tests.
- 4.5.4 Any variable, frequency of monitoring or additional monitoring points as may be required from time to time by the Chief Director, shall be adhered to.

4.6 Monitoring of Impacts on Wetlands

- 4.6.1 A wetland rehabilitation and protection strategy for all wetlands on the property of the participating power station shall be initiated as detailed in condition 4.6.2.
- 4.6.2 Detail site investigation to determine the status of the wetland area and to identify the rehabilitation needs. This part shall include the following:
- (a) comparative impact extent using aerial photography;
 - (b) soil survey;
 - (c) vegetation survey;

- (d) delineation of wetland area;
- (e) determination of Present Ecological Status (PES) and Ecological Importance and Sensitivity (EIS) of the wetland area; and
- (f) identification of rehabilitation requirements to restore functionality of wetland area.

5. REPORTING AND AUDITING

- 5.1 The information required in conditions 3.1, 3.2, 3.3, 4.1, 4.2, 4.3, 4.5 4.6 and 9.1 of Appendix V shall be submitted to the Chief Director as a six monthly report due in January and July each year.
- 5.2 The licensee shall appoint an independent external auditor to conduct annual audits on compliance with the conditions of this licence. The first audit must be conducted within 3 (three) months of the date this license was issued and a report on each audit shall be submitted to the Chief Director within one month of finalisation of the report.
- 5.3 The licensee shall conduct annual internal audits on compliance with the conditions of this licence. A report on the audit shall be submitted to the Chief Director within one month of finalisation of the report, and shall be made available to the external auditor referred to in condition 5.2.

6. GENERAL IRRIGATION PRACTICES

- 6.1 Irrigation shall be practised in accordance with the guidelines prescribed in the document TT85/97 published by the Water Research Commission and titled "*Guidelines for the Utilisation and Disposal of Wastewater Sludge*" Volume 2 of 5 dated March 2006 by the Department of Water Affairs and Forestry as well as the guidelines prescribed in the document titled "*Guide: Permissible Utilisation and Disposal of Treated Sewage Effluent*", issued by the Department of Health under the reference 11/2/5/3 and dated 30 May 1978, or in accordance with the relevant regulations promulgated under section 26 of the Act.
- 6.2 Irrigation with the sludge shall be practised in a systematic manner and precautions shall be taken so as to prevent:
 - 6.2.1 water logging and pooling of waste in any location;
 - 6.2.2 pollution of underground water or surface water due to seepage or otherwise;
 - 6.2.3 fly breeding, public health hazard, odour of secondary pollution;
 - 6.2.4 runoff from the irrigation area because of wet weather or any other conditions whatsoever; and runoff from polluting water.
- 6.3 The site of the irrigation area shall be adequately fenced to prevent entry of animals and unauthorised persons.
- 6.4 Notices manufactured of durable weatherproof material prohibiting unauthorised entry and warning against the use of water containing waste for drinking and washing purposes shall be displayed at the prominent places along the fence and at the gate entrances. Such notices shall be worded in the official languages applicable in the area.

7. PIPELINES

- 7.1 The pipelines used for the conveyance of water containing waste shall be painted in a conspicuous colour or manufactured of a coloured material distinctly different from the colour of the pipelines in which drinking water is flowing to avoid the possibility of any cross-connections of the different pipelines.
- 7.2 All stop-valves and taps on the pipelines conveying the waste must be of a type that can be opened and closed by means of a loose wrench. This wrench shall be in the safekeeping of a responsible member of the staff to prevent unauthorised use thereof.
- 7.3 Notices manufactured of a durable weatherproof material warning against the use of effluent for drinking and washing purposes shall be displayed at prominent places where the water containing waste is being reused and at all taps. Such notices shall be worded in the official languages applicable in the area.

8. PROTECTION OF THE WATER RESOURCE

- 8.1 The impact of the activities of the power station on the Riet Spruit and Klein Olifants River shall not exceed the following instream water quality objectives as stipulated in the surface water quality reserve for the area:

Table 8: Klein Olifants River instream water quality objectives

VARIABLE	RWQO
pH	6.5 – 8.5
Total Dissolved Solids	<373 mg/ℓ
Sulphate (SO ₄)	<70 mg/ℓ
Chloride (Cl)	<62 mg/ℓ
Sodium (Na)	<179 mg/ℓ
Magnesium (Mg)	<18 mg/ℓ
Potassium (K)	<50 mg/ℓ
Calcium (Ca)	<25 mg/ℓ
Total Inorganic Nitrate	>2 mg/ℓ
Phosphate (PO ₄)	<0,01 mg/ℓ
Ammonia (mg-N/l as NH ₃)	< 0.034 mg/ℓ
Dissolved Oxygen	>94%
Toxics	*99% ≤ TWQO 99% < CEV 100% < AEV

Where: TWQO is the Target Water Quality Range

9. INTEGRATED WATER MANAGEMENT AND REHABILITATION PLAN

- 9.1 The licensee shall develop and compile a comprehensive integrated water and waste management plan (IWWMP), rehabilitation strategy and an implementation programme. A framework with time schedules for the development of these plans shall be submitted to the Chief Director for approval within one (1) year of issuance of this licence. This plan shall include at least, but not limited to the following investigations:

- 9.1.1 a process water balance that shall include measures to minimise water consumption, waste water production, collection, containment and treatment and reuse for industrial purposes;
 - 9.1.2 storm water management plan; and
 - 9.1.3 groundwater management plan.
- 9.2 The plan referred to in 9.1 shall be updated annually and submitted to the Chief Director for approval.
- 9.3 The licensee shall make full financial provision for all the investigations, design, construction, operation and maintenance for the water treatment plant should it become a requirement as a long-term groundwater management strategy.

END OF LICENCE



water & forestry

Department:
Water Affairs and Forestry
REPUBLIC OF SOUTH AFRICA

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Tel: (012) 336-7500 Fax: (012) 323-4472/(012) 326-2715

LICENCE IN TERMS OF CHAPTER 4 OF THE NATIONAL WATER ACT, 1998 (ACT 36 OF 1998)

I, **Deborah Gabaakelwe Mochotlhi**, in my capacity as Chief Director: Water Use, in the Department of Water Affairs and Forestry (hereinafter referred to as the Department) by the powers delegated to me by the Minister of Water Affairs and Forestry, hereby authorise the following water use in respect of this licence.

Signature

Date

17/07/2009

LICENCE

1. Water User

The water user authorised in terms of this licence is:

Licensee : **ESKOM HOLDINGS LTD (VRESS)**

Postal address : P.O. Box 1091
JOHANESBURG
2000

2. Water Uses

This licence is issued for the taking of a maximum quantity of 360 300 000 m³/a from a water resource (Vaal River Eastern Sub-system (VRESS)) in terms of section 21(a) of the National Water Act, 1998 (Act 36 of 1998) (hereinafter referred to as the Act) for power generation purposes on the properties mentioned in paragraph 3(a), subject to the conditions set in paragraph 5 of this licence.

3. (a) The Properties on which the water will be taken and utilised

	Water use	Power station	Property description
1.	Section 21 (a) – Taking of water	Arnot	Portion 24 of the farm Rietkuil 491JS
2.		Hendrina	Remainder of the farm Hendrina Power Station 162IS
3.		Duvha	Remainder of the farm Duvha Power Station 337JS
4.		Komati	Remainder of the farm Komati Power Station 56IS
5.		Kriel	Remainder of the farm Kriel Power Station 65IS
6.		Matla	Remainder of the farm Matla Power Station 141IS
7.		Kendal	Portion 39 of the farm Schoongezicht 218IR
8.		Camden	Remainder of the farm Camden Power Station 329IT
9.		Majuba	Portion 33 of the farm Holfontein 80HS
10.		Tutuka	Portion 4 of the farm Pretorius Vley 374IS
11.		Bravo	Portion 1 of the farm Hartbeestfontein 537 JR
12.		UCG	Portion 33 of the farm Holfontein 80HS

(b) Allocated quantity of water:

The maximum total volume that may be utilised by each power station is as follows:

Name of point	Water Resource	Water Use	Coordinates WGS84	Volume/ year (million m ³ per annum)
Arnot	Komati GWS, Komati River	Industry	S 25.9555 E 29.7942	35,53
Hendrina	Komati GWS, Komati River		S 26.0361 E 29.5985	31,22
Duvha	Komati/Usutu-Vaal GWS, Komati River		S 25.9611 E 29.3375	49,56
Komati	Komati GWS, Komati River		S 26.0972 E 29.4666	19,86
Kriel	Usutu/Usutu-Vaal GWS		S 26.4280 E 30.3000	42,00
Matla	Usutu-Vaal GWS		S 26.2736 E 29.1361	51,89
Kendal	Usutu/Usutu-Vaal GWS		S 26.0938 E 28.9563	3,60
Camden	Usutu River GWS		S 26.6125 E 30.0861	23,86
Majuba	Slang River GWS		S 29.7886 E 28.0057	32,20

Tutuka	Usutu-Vaal GWS, Grootdraai Dam		S 26.7719 E 29.3780	49,78
Bravo	Usutu-Vaal GWS		-	12,00
UCG	Slang River GWS		S 29.7886 E 28.0057	8,80
Total volume				360,30

(c) Registered owner of the property:

ESKOM Holdings Ltd.

(d) Water Resource

Vaal River Eastern Sub-system (VRESS)

4. (a) Licence Period

This licence is valid until 31 October 2025.

(b) Review Period

This licence may be reviewed at intervals of five (5) years.

5. CONDITIONS

- 5.1 The responsibility for complying with the provisions of the licence is vested in the licensee and may not be ceded to any other person or body.
- 5.2 The licence is subject to the provisions contained in the Act.
- 5.3 Any contravention of or failure to comply with any condition of a licence constitutes an offence.
- 5.4 The Minister and any person authorised by him/her in writing may at any time enter upon the premises of the licensee to perform the functions contemplated in the Act.
- 5.5 Any person who has timeously lodged a written objection against the application of the licence may appeal to the Water Tribunal and the Tribunal may confirm, amend or withdraw the licence or make any other order as it deems appropriate.
- 5.6 The licence must not be construed as exempting the licensee from compliance with any other applicable Act, Ordinance, Regulation or By-law.
- 5.7 Any incident that causes or may cause water pollution must be reported to the Chief Director: Gauteng or his/her representative.
- 5.8 The licensee must inform the Chief Director: Gauteng of any change in his/her name, address and / or premises and legal status within 60 days from the date of change.

- 5.9 The licensee must be responsible for any water use charges imposed from time to time by a responsible authority or the Department in terms of the Raw Water Pricing Strategy of the Department.
- 5.10 The water use may only be utilised on the properties mentioned in paragraph 3(a).
- 5.11 No additional storage or abstraction works by means of which water can be abstracted and/or impounded may be constructed on the property without the prior written consent of the Minister of Water Affairs and Forestry or a responsible authority.
- 5.12 This licence is subject to any ruling or apportionments by a court or the water tribunal.
- 5.13 The Department accepts no liability for any damage, loss or inconvenience, of whatever nature, suffered as a result of:-
- Shortage of water
 - Inundation or flood
 - Siltation of the river
 - Poor Water Quality
- 5.14 If a water user association is established in the area to manage the resource, membership of the licensee to this association is compulsory and rules, regulations and/or surface water management stipulation of this association must be adhered to.
- 5.15 If any of the properties mentioned in paragraph 3(a) are subdivided, sold or consolidated the Department must be notified within 60 days after the transaction took place.
- 5.16 This license and any amendment to it are also subject to all the applicable procedural requirements and other applicable provisions of the Act, as amended from time to time.
- 5.17 The licensee must inform the Department at least 90 days before the expiry date of the licence whether the licence must be considered for another term.
- 5.18 The licensee must conduct an annual internal audit on compliance with the conditions of this licence. A report on the audit must be submitted to the Chief Director: Gauteng within one month of the finalisation of the audit.
- 5.19 This licence does not imply any guarantee that the said quantities and qualities of water will be available at present or at anytime in the future.
- 5.20 All water taken from the resource must be measured as follows
- 5.21.1 The daily quantity of water must be metered or gauged and the total recorded at the last day of each month; and

- 5.21.2 The licensee must keep record of all water taken and a copy of the records must be forwarded to the Chief Director: Gauteng on or before 25 January and 25 July of each year.
- 5.21 The licensee must install and monitor appropriate water measuring devices to measure the amount of water abstracted, received and/or consumed, as applicable to the infrastructure
- 5.22 The licensee must insure that all measuring devices are properly maintained and in good working condition and must be easily accessible. This must include a programme of checking, calibrating, and/or renewal of measuring devices.
- 5.23 The licensee must establish a programme of Formal Information Management System, which maintains a data base on water supply, distribution and delivery infrastructure.
- 5.24 The licensee must establish and implement a continual process of raising awareness amongst itself, its workers and stake holders for the need to for Water Conservation and Water Demand Management.
- 5.25 The licensee must, at his own cost, install necessary pumps, abstraction equipment and water meters to regulate the abstraction of water.
- 5.26 No more water may be taken than the minimum volume required, for the purpose for which this licence is issued.
- 5.27 The licensee must provide the Chief Director: Gauteng within 6 months of the issuing of the licence and annually thereafter with an explanation, with sufficient supporting information, of the minimum volumes of water required by the power generation activities associated with this licence. The minimum water requirements must be included in each power station's water and waste management plan.
- 5.28 Due to possible over-allocation of water on the resource from which the water is obtained, when compulsory licensing is required in future, the volumes authorised in this licence may be subject to reduction in order to comply with the requirements of the Act.
- 5.29 The volumes authorised in this licence may be reduced when the licence is reviewed.
- 5.30 The licensee must continually investigate new and emerging technologies and put into practice water efficient devices or apply techniques for the re-use of water containing waste, in an endeavour to conserve water at all times.
- 5.31 No water taken may be pumped, stored, diverted, or alienated for purposes other than intended in this licence, without written approval by the minister or his/her delegated nominee.
- 5.32 The right is reserved, if a general water shortage is experienced in the area, to implement such curtailments or restrictions on the abstraction as may be deemed necessary by the Chief Director: Gauteng under the circumstances.

- 5.33 The licensee must pay water resource management charges and any other charges that the Department may levy regarding the water use authorised in this licence.
- 5.34 The licence supersedes all authorisation issued to the licensee for the taking and use for industrial purposes of water that is authorised in this licence.
- 5.35 An additional licence or licences for any other water use(s) that emanates from the power generation activities associated with this licence has to be applied for by the licensee and approved by the Department within 24 months after the date of issuance of this licence, failing this condition, this licence may be suspended.

END OF LICENCE