

## MEMORANDUM

<b>ATTN:</b> Harry Ventriss	<b>CC:</b> Sarah Scott
<b>COMPANY:</b> Strategen	<b>FROM:</b> Mark Bailey
<b>PROJECT NO.:</b>	<b>DATE:</b> 24 October 2008
<b>SUBJECT:</b> Griffin Outfall: Updated assessment for reduced flows (down to 0.7 ML/d from 10 ML/d)	

Harry,

It is understood that although Griffin Energy is seeking approval to construct a 10 ML/d outfall, there is currently only a need for Griffin to obtain approval to discharge 0.7 ML/d into this outfall. The additional capacity will be constructed as Griffin is aware of possible future discharge requirements from the region and will allow access to the pipeline on a commercial basis and subject to environmental water quality limits being met before discharge.

This memo sets out information additional to the Oceanica report "*Bluewater Power Station Expansion Proposal Environmental Support Studies – Saline Discharge Pipeline and Marine Outfall Study, July 2008. Report No. 627/01*".

### **Change to initial dilution**

The flow for which approval is being sought is now 0.7 ML/d at a salinity of 9170 mg/L, compared to a flow of 10 ML/d at salinity 3000 mg/L. The revised flow and salinity has been modelled for discharge into seawater with salinity of 36,000 mg/L using VPLUMES with zero current (i.e. the most conservative case possible) and in order to maintain the design exit velocity it is assumed that 28 of the 30 ports will be blanked off at this stage. It was found that changing the salinity from 3000 mg/L to 9170 mg/L did not materially affect the initial dilution, with a slight decrease in dilution from 1:175 to 1:168, this is because the density difference between the plume at 9,170 mg/L and seawater at 36,000 mg/L is still large and the high exit velocities have been maintained.

### **Conformance with EPA criteria and Proposed Licence conditions**

#### **Salinity**

Other models (by Consulting Environmental Engineers and APASA) found that a 1:150 – 1:190 fold dilution of a 3000 mg/L 10 ML/d discharge in ambient waters of 36 ppt equates to a salinity of 35.8 ppt on completion of initial dilution, or a difference of 0.2 ppt from ambient. The EPA High Ecological Protection guideline for salinity is 0.8 ppt (EPA 2005) and this will be easily met with a more saline discharge as the difference is further reduced.

#### **Other water quality parameters**

Given that in future, additional flows may be added to the pipeline at varying salinities and temperatures, it is suggested that a conservative approach where the predicted worst case 1:150-fold initial dilution is used to devise licence limits for discharges to the Griffin Pipe. The proposed limits are shown in Table 1, these limits are based on meeting High Ecological Protection EQG (EPA 2005) for 10 ML/d flow after 1:150 dilution with

seawater, the exceptions are mercury and cadmium, where Low Ecological Protection EQG need to be met in undiluted wastewater as these contaminants are known bio-accumulators (EPA 2005). Because of the way the proposed licence limits have been calculated, with the exception of Cd and Hg, the concentration after dilution with seawater will equal the relevant EPA High Protection Guideline.

**Table 1 Proposed discharge licence limits based on worst case 1:150 initial dilution offshore**

Parameter	Proposed License limits	Seawater background#	Concentration after initial dilution	EPA guideline (High Ecological Protection EQG with exception of Cd and HG where Low Ecological Protection EQG need to be met in discharge stream) (mg/L)
TDS (mg/L)	9170.0	36000		
pH (units)	6.5	8.2		
Ammonia N (mg/L)	13.2	0.003	0.091	0.091
Phosphate	2.0		0.0133	
Nitrate N (mg/L)	5.0	0.002	0.0353	
Arsenic (mg/L)	0.08	0.0018	0.0023	0.0023
Cadmium (mg/L)##	0.00070	0.000005	0.00024	0.036
Chromium VI (mg/L)	0.64	0.00015	0.0044	0.0044
Cobalt (mg/L)	0.15	0.00001	0.001	0.001
Copper (mg/L)*	0.12	0.00053	0.0013	0.00130
Lead (mg/L)	0.66	0.00001	0.0044	0.0044
Mercury (mg/L)##	0.0014	0.0000014	0.000011	0.0014
Nickel (mg/L)	0.16	0.006	0.007	0.007
Silver (mg/L)	0.21	0.0000007	0.0014	0.0014
Vanadium (mg/L)	14.7	0.0019	0.1	0.1
Zinc (mg/L)	2.2	0.0002	0.015	0.015

# Seawater from DEP (2005) where available otherwise literature values used.

##Bioaccumulators need to be met in discharge

Please do not hesitate to contact me if you have any queries on the above,

Regards

Mark Bailey

DEP 2005, *Background quality for coastal marine waters of Perth, Western Australia*. Technical Series 117, March 2005.

EPA 2005, *Environmental quality criteria reference document for Cockburn Sound (2003-2004): A supporting document to the draft Environmental Protection (Cockburn Sound) Policy 2005*, Prepared by Environmental Protection Authority, Report no. 20, Perth, Western Australia, January 2005.