

PULP MILL CHEMICAL PLANT

The following is provided in response to a request for additional information from the Tasmanian Government – DTAE. More specifically this document addresses items 1, 2, 3, and 4 of request # 035 dated 19/07/07. Item 5 is addressed separately.

Chemical Plant Technology

A description of the chemical plant technology, while not specifically required to address the information request, is included here as additional background information for the department on the process Gunns will employ to produce the chlorine dioxide required for bleaching.

Gunns has decided to utilise the non integrated chemical plant. This will involve the following plant:

- A chlorate plant in which sodium chlorate is produced from sodium chloride via an electrolysis process.
- A chlorine dioxide generator where sodium chlorate is reacted with sulphuric acid and methanol to produce aqueous chlorine dioxide.

Gunns has decided on the non integrated process on the basis that it has been recognized as accepted modern technology (AMT) by all the parties associated with the pulp mill assessment process. At some later stage after the pulp mill has been approved, constructed and operating and the integrated chemical plant technology is also recognized as AMT by all parties Gunns may seek approval to upgrade its chemical plant to employ the integrated process.

Emissions - items 1 & 2

Atmospheric Emissions:

The names for the designated atmospheric emissions points are dependent to some degree on the vendors naming of equipment. The vendor has not yet been selected and therefore the actual naming of those emissions points can be subject to change. However they can be considered as follows:

Chlorate Reactor Gas Scrubber
Hydrogen Bleed
Chlorine Dioxide Scrubber

The anticipated atmospheric emissions are less than the following conservative average and maximum values from the non-integrated chemical plant.

NaClO₃ reactor gas scrubber: takes the gases from all tanks in the chlorate plant:

Chlorate Reactor Gas Scrubber	average	maximum continuous
scrubber gas flow, nm3/h dry	1200	1200
outlet concentration, mg Cl2/nm3 dry	2	10
emission rate, g Cl2/s	0.0007	0.003

Hydrogen bleed: Since hydrogen will be taken back to the kiln there will, under normal operations, no hydrogen bleed to the atmosphere. Only when the lime kiln is out of operation will the hydrogen be vented to atmosphere and when this occurs it is a minor emission of chlorine. The concentration of chlorine in the hydrogen is on the ppb-level.

Hydrogen Bleed	average	maximum continuous
scrubber gas flow, nm3/h dry	310	310
outlet concentration, mg Cl2/nm3 dry	0	2
emission rate, g Cl2/s	0.00000	0.00017

ClO2 scrubber:

ClO2 Scrubber	average	maximum continuous
scrubber gas flow, nm3/h dry	1200	1200
outlet concentration, mg Cl2/nm3 dry	10	30
emission rate, g Cl2/s	0.00333	0.01000

Dust Emissions:

Vent gas from the chlorate handling is treated in a scrubber to eliminate chlorate dust. Another gas stream, coming from the dewatering filter, is passing a demister, which take away chlorate containing water droplets. The emission of chlorate will be a maximum 200 kg per year

Solid Waste:

For the base case (i.e. no merchant chlorate plant) all potential solid wastes from the non-integrated chemical plant report to the waste water treatment plant.

For the merchant sodium chlorate plant case as stated in the witness statements and supplementary evidence, it is planned to separate some of the solid waste from the chlorate plant and transport it with other solid wastes (from sources other than the chemical plant) to a licensed waste facility. The volumes involved and the expected composition of this material is as follows:

Base Case: solid waster amount = 0 tonnes/annum

Merchant Case: solid waste amount = 132 tonnes/annum

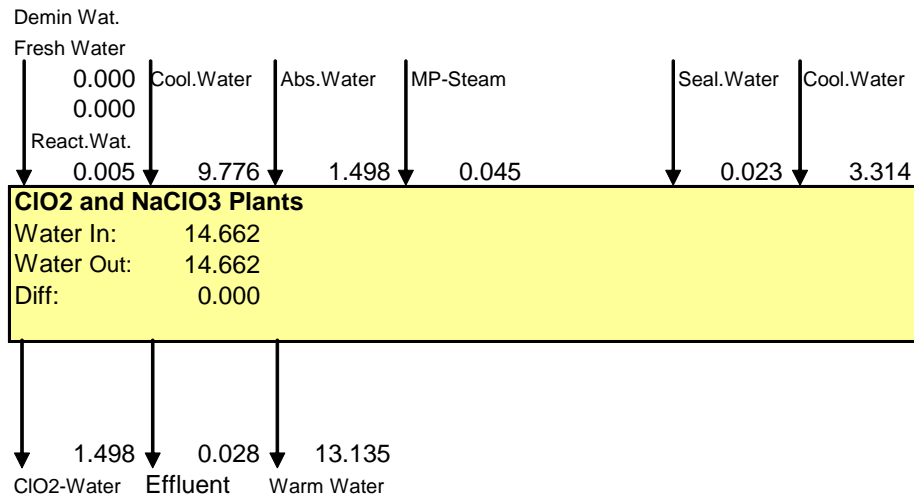
Component	Weight (%)
Calcium sulphate - $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$	48
Water - free - H_2O	32
Cellulose Filter Aid	5.8
Sodium Chlorate NaClO_3	5.3
Calcium Carbonate CaCO_3	5.1
Sodium Chloride NaCl	1.8
Magnesium Hydroxide $\text{Mg}(\text{OH})_2$	0.99
Iron Hydroxide - $\text{Fe}(\text{OH})_2$	0.89
Calcium Chromate $\text{CaCrO}_4 \cdot 2\text{H}_2\text{O}$	0.39

Liquid Emissions:

The liquid effluent is shown in the following water balances:

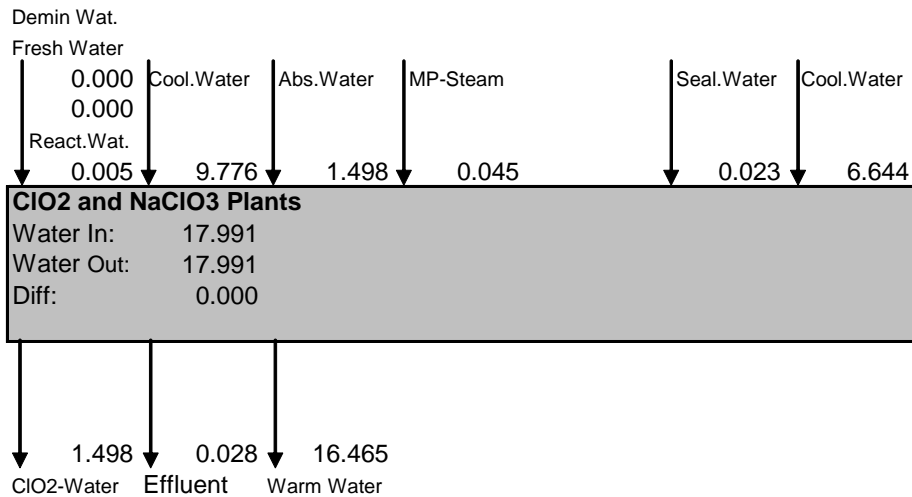
Water Balance: Base Case – non integrated chemical plant

CIO2 Plant			
CIO2 Consumption, t ClO2/d			47.6
Vents from scrubbers			0.002
Reaction Water, m3/Adt			0.005
Reactor Cooling Water, m3/Adt		250	3.783
ClO2 Absorption Water, m3/Adt			1.50
Steam to Steam Ejectors of Absorption Water Chiller (Delta t; 15 C), t/ADt			0.045
Cooling Water to Absorption Water Chiller, m3/Adt			5.993
Sealing Water to ClO2 Plant, m3/Adt			0.023
Total Water to ClO2-Plant, m3/ADt			14.662
Warm Water to Cooling Tower, m3/Adt	Delta t, C	18	13.135
Water with ClO2 to bleach plant, m3/Adt			1.498
Sealing Water and Process Cooling Water to Drain, m3/Adt			0.028
TSS, kg/Adt			0.00
BOD5, kg/Adt			0.00
COD, kg/Adt			0.00
Sodium Chlorate Plant			
Na-Chlorate Demand in ClO2 Plant, t NaClO3/d			83.81
Cl2 Demand, t/d			54.59
Water with NaClO3 to ClO2 Plant, m3/Adt			0.00
NaClO3 Plant Cooling Water, m3/ADt	Delta t, C	18	3.31
Floor Canal Effluent, m3/Adt (incl. In ClO2-plant balance)			0.00



Water Balance: Merchant Plant – non integrated chemical plant

CIO2 Plant			
CIO2 Consumption, t ClO2/d			47.6
Vents from scrubbers			0.002
Reaction Water, m3/Adt			0.005
Reactor Cooling Water, m3/Adt		250	3.783
ClO2 Absorption Water, m3/Adt			1.50
Steam to Steam Ejectors of Absorption Water Chiller (Delta t; 15 C), t/ADt			0.045
Cooling Water to Absorption Water Chiller, m3/Adt			5.993
Sealing Water to ClO2 Plant, m3/Adt			0.023
Total Water to ClO2-Plant, m3/ADt			17.991
Warm Water to Cooling Tower, m3/Adt	Delta t, C	18	16.465
Water with ClO2 to bleach plant, m3/Adt			1.498
Sealing Water and Process Cooling Water to Drain, m3/Adt			0.028
TSS, kg/Adt			0.00
BOD5, kg/Adt			0.00
COD, kg/Adt			0.00
Sodium Chlorate Plant			
Na-Chlorate Demand in ClO2 Plant, t NaClO3/d			200
Cl2 Demand, t/d			54.59
Water with NaClO3 to ClO2 Plant, m3/Adt			0.00
NaClO3 Plant Cooling Water, m3/ADt	Delta t, C	18	6.64
Floor Canal Effluent, m3/Adt (incl. In ClO2-plant balance)			0.00



Production Levels – item 3

Base Case:

Chlorine dioxide plant capacity	45 t ClO ₂ /day
Sodium Chlorate plant capacity	76.5t NaClO ₃ /day

Merchant Case:

Chlorine dioxide plant capacity	45 t ClO ₂ /day
Sodium Chlorate plant capacity	200 t NaClO ₃ /day

Effluent Treatment Plant Emissions – item 4

DTAE have requested clarification concerning the clarifiers in the effluent treatment plant as air emission points.

In the DIIS it has been stated that diffuse TRS emissions occur from the effluent treatment plant. In a pulp mill the main source of TRS emissions from an effluent treatment plant is the cooling tower. In Gunns case the major diffuse emission from the effluent treatment plant cooling tower has been eliminated by using indirect coolers to cool the effluent before treatment instead of a direct cooling tower. The clarifiers and basins in the effluent treatment plant are open to the atmosphere. The minor emissions that can occur from these sources have been identified and included in the modelling of the TRS emissions from the pulp mill.