RE: **DTAE - REQUEST FOR ADDITIONAL INFORMATION**
REQUEST DATE: **01/06/07**
REQUEST NUMBER: **028**

The following notes have been prepared by Poyry Forest Industries in response to the above request.

Poyry's Response
In response for the request for additional information on the chemical plant, please find attached the following clarifications. However please note that chemical plant Alternative 2 refers to the methanol based process as well as peroxide based process. In your document only peroxide is referred to.

1. Table 3-30 of Appendix 7 of the DIIS is titled "Comparison Table of Chemicals Produced On-Site and Imported for the Alternatives Considered" and refers to the production and consumption of chemicals to and from the site. The table does not list or show the quantities of chemicals that will be stored on site.

   Although it is not shown on the chemical plant schematics, any alternative which involves the manufacture of chlorate for export will involve the storage of crystal chlorate on site. The merchant capacity is 49,000 tonnes per annum, and the amount stored on site will be a maximum of 2000 tonnes.

2. Since the final commercial decision on the chemical plant supplier (with the associated implications re detailed technical design etc) has yet to be made, the emissions described in the DIIS cover any one of the scenarios under consideration and therefore represent a worst case scenario. The assessment process should focus on the emission levels presented on the premise that any design alterations must still result in emissions that fall within the levels covered here.

   Gaseous Emissions
   The integrated chemical plant sources are as described in the Draft IIS under Volume 7, Annex VI – Gaseous Emissions.

   For a non-integrated chemical plant (comprising chlorate plant and chlorine dioxide plant using either methanol or peroxide as the reducing agent), atmospheric emissions occur from the following 3 points:

   I. From Chlorate Reactor Gas Scrubber:
   II. Hydrogen bleed from the chlorate plant: normally this is taken to the lime kiln the amount of chlorine leaving with the hydrogen to atmosphere correspond to the percentage time during which hydrogen will not be received by the pulp mill
   III. Chlorine Dioxide Scrubber:

Chlorate Reactor Gas Scrubber	average	maximum continuous
scrubber gas flow, nm3/s	0.278	0.278
emission rate, g Cl2/s	0.0007	0.0011
Hydrogen Scrubber	**average**	**maximum continuous**
scrubber gas flow, nm3/s	0.084	0.129
Cl2, g/s	0.0013	0.002
ClO2 Scrubber	**average**	**maximum continuous**
scrubber gas flow, nm3/s	1.697	2.611
ClO2, g/s	0.027	0.027

Liquid Emissions

All liquid emissions from the chemical plant report to the Waste Water Treatment Plant (WWTP) and have been included in the Draft IIS coverage of the WWTP at Volume 7, Annexes III and IV.

For a non-integrated chemical plant (comprising chlorate plant and chlorine dioxide plant using either methanol or peroxide as the reducing agent), the liquid emissions occur from the following sources:

Waste water (less than 40 m3/h) is produced at the Sodium chlorate and Chlorine dioxide production units, from the following sources:

- Wash water.
- Waste water consisting of neutral sodium sulphate from the chlorine dioxide plant (approximately 45 t/d).
- Waste water from the ion exchanger in the brine preparation section as a neutral regeneration solution. The main content in the ion exchanger regeneration water are: Na, Mg, K, Ca, Cl.

Solid Emissions

At the time of preparing the DIIS it was assumed that all potential solid wastes from the integrated chemical plant would report to the WWTP as outlined in the DIIS. This remains the case unless the option to produce solid sodium chlorate for sales to external parties is progressed.

If the production of merchant sodium chlorate is progressed it is now 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 are described in the Supplementary Information to the Draft IIS in Mr Edward J Bechberger's Expert Witness Statement at Pages 8, 9 – Conclusion No. 6. This information and statement is equally applicable to a non-integrated chemical plant (comprising chlorate plant and chlorine dioxide plant using either methanol or peroxide as the reducing agent). That statement has been re-issued below.

"In the case of the two merchant sodium chlorate plants the estimated total mud produced is expected to be 8 kg/tonne of merchant sodium chlorate produced, based on a merchant capacity of 30,000 tonnes per year this would equate to 240 tonnes per year (this can vary depending on the quality of the salt). The mud is from two sources: first from the salt used to produce the brine needed (this is estimated at 3.6 kg/tonne or 108 tonnes per year) and the second from treatment of the mother liquor in the plant to remove mainly sulphate that builds up in the liquor circuit (estimated at 4.4 kg/tonne or 132 tonnes per year).

The brine mud 108 tonnes per year can be separated and handled in a similar manner to the brine sludge from the chlor-alkali plant.

The mud produced from the chlorate mother liquor is more complex since it is formed as a result of the build-up of sulphates in the mother liquor. Calcium chloride ($CaCl_2$) is added to the sodium chlorate ($NaCl0_3$) solution to form calcium sulphate ($CaSO_4$). Perchlorates are removed by adding potassium chloride (KCl) to form less soluble potassium perchlorate ($KClO_4$), The mud slurry will be directed into the mud filter press for dewatering and the solid waste transported with the other solid wastes to a licensed Waste Facility. The expected composition of the combined solid wastes from the brine, acid wash, mother liquor treatment and mother liquor filter is given in the table below.

Approximately once a month the solid wastes will be transported in a specially fitted and appropriately licensed truck.

Expected Initial Composition of the Combined Treatment Solids

Component[A]	Sodium Chlorate Weight (%)[B]
Calcium Sulphate - $CaSO_4 2H_2O$	48.00
Water - Free - H2O	32.00
Cellulose Filter Acid	5.80
Sodium Chlorate $NaCl0_3$	5.30
Calcium Carbonate CaCO3	5.10
Sodium Chloride NaCl	1.80
Magnesium Hydroxide $Mg(OH)_2$	0.99
Iron (III) Hydroxide - $Fe(OH)_2$	0.89
Calcium Chromate - $CaCrO_4 2H_2O$	0.39

A: After 2-5 years of operation, a second treatment process for perchlorate removal from mother liquor will be started and the combined treatment solids will contain about 5% $KClO_4$ as well.

B: The composition may vary significantly with variations in raw materials and the sequencing of the various treatment processes. The composition shown is an approximation based on the other plants."

3. In the non-integrated chemical plant concept, the liquid effluent stream from the chlorine scrubber system on the chlorate plant is recycled back to the salt dissolver in the brine preparation section.

4. Although not specifically called a hypo scrubber system, the non-integrated chemical plant does contain a scrubber system comprising two hydrogen scrubbers using alkaline solution as outlined in section 3.8.3 of Vol. 6 of the DIIS. If there is chlorine is present in the gas the resulting solution when scrubbed with caustic forms a hypo solution.

5. Effluent liquor from the chlorine dioxide vent scrubber is pumped to the Sulphate dissolving tank of the chlorine dioxide plant. In the Sulphate dissolving tank it is mixed with the sodium Sulphate from the Sulphate filter and pumped to the pulp mill in order to replace the sodium and sulphur losses. If there is an excess of sodium sulphate (i.e. more than the pulp mills sodium and sulphur requirements), it is sent to the sewer as waste water.

6. Destination of tank vents are as follows:

   For the non-integrated system all tanks where either chlorine dioxide or chlorine gas may be present are scrubbed. Depending on the vendor, these tanks have different names. The concept is as follows:

   <u>Chlorate Production:</u>

   Electrolytic buffer and storage tanks: gases are scrubber in a separate scrubber
   Chlorate reactor tanks: gases are scrubber in the hydrogen scrubber system

   <u>Chlorine Dioxide Production:</u>

   The following tanks are scrubbed in the chlorine dioxide scrubber:

   Generator dump tank
   Saltcake dissolving tanks
   Chlorine dioxide storage tanks