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By email: Michael.Bonanno@globalrenewables.com.au

ODOUR ASSESSMENT OF A NEW PEF DRYER CONNECTED TO THE EXISTING BIOFILTER SYSTEM AT THE EASTERN CREEK UR-3R FACILITY

Dear Michael,

As discussed, The Odour Unit Pty Ltd (TOU) has undertaken a review study on the implications of a Process Engineered Fuel (PEF) Dryer at the Global Renewables (GRL) Eastern Creek UR-3R Facility (the UR-3R Facility). The study entailed the following:

- A review of the current conditions that the biofilter system is operated. This is considered a baseline for the review and required half a day site visit at the UR-3R Facility. During this visit, a series of physical measurements and two odour samples (at different times) were collected of the biofilter common inlet airstream. In addition, discussions with relevant technical personnel were also be carried out, where necessary;
- A review of the expected exhaust airstream quality from the PEF Dryer including all relevant technical documentation; and
- A review of the expected mixed biofilter inlet airstream quality if the PEF Dryer is connected to the existing biofilter system, and an evaluation the need for cooling/humidification of the airstream to ensure it is suitable for biofiltration.

This letter has been prepared as supporting information for a Development Application for the installation of the PEF Dryer.

Existing Biofilter System

The existing Biofilter System receives air from the following key sources:

- Composting Hall Ventilation Aeration;
- Percolation Ventilation Fan; and
- Refinery Dust Fan.

The air emissions from the above sources converge to a common air mixing chamber before treatment by the Biofilter System. The biofilter specifications and performance are as follows:

- 2,650 m², 25 m wide and 106 meters long;
- Medium depth is approximately 2.2 m 2.5 m;
- Open bed configuration;
- Plenum air floor system configuration is Atlantis Mesh mounted on Besser blocks. The Atlantis Mesh has a service temperature of -10 to 110°C (see appended supplier specifications);
- Empty Bed Residence Time (EBRT) of 75 seconds;
- Medium is crushed wood/oversized green waste fractions; and
- Greater than 95% odour removal to less than 400 odour units (concentration), from the results of 2014 and 2015 testing by TOU.

<u>Analysis</u>

A review of relevant documentation was carried out, based the following:

- The information for the drying operation system has been supplied by Andritz;
- The feed input mass rate for the drum drying process is 17,000 kg/hr;
- The dried product mass rate is 12,229 kg/hr;
- An expected PEF dryer exhaust temperature and airflow rate of 96°C and 29,500 m³/hr respectively.; and
- The increase in the airflow to the biofilter from current conditions is 10.5%.

Based on the above facts, a scenario analysis was undertaken, examining a range of possible Dryer air quality conditions that could prevail, as a means of gauging the potential impacts this additional air loading would have on the inlet airstream quality to the biofilter, and on the performance of the biofilter. This included variations to the temperature and humidity of the airstream from the PEF dryer and the subsequent consequences for the existing biofilter system.

The technical results of this analysis are contained in a detailed report letter issued on 9 May 2015. They have not been reproduced here. A summary of the findings follows.

Summary of findings

Based on the detailed analysis the following comments can be made:

- 1. The **biofilter capacity** is more than capable of accommodating the increased airflow from the dryer. The expected future EBRT for the biofilter (68 secs) is well in excess of TOU's normal design value of 35-40 secs. Currently the biofilter's odour removal performance is excellent (392 ou average for August 2014 testing). The untreated odour concentration, (11,100 ou average) determined from the April 2015 testing, showed that the biofilter is not limited by the odour 'mass' loading and will therefore handle the proposed increased volume and odour loadings.
- 2. The **ammonia loadings** on the biofilter are moderate by biofilter standards (32-55 ppm) but are not adversely affecting odour removal performance (304-558 ou in August 2014). Unless there is likely to be a large increase in ammonia levels from the dryer, ammonia will not be a significant issue.
- 3. This assessment has determined that temperature increases from the operation of the dryer will range from 6°C -7°C above current inlet air temperatures to the biofilter, depending on the moisture content in the dryer air stream. At the expected 20% relative humidity in the dryer airstream, a dry bulb temperature of 43°C is indicated. This is acceptable for this type of biofilter. Higher temperatures (up to 49°C) are possible under some extreme scenarios but these would not necessarily adversely affect performance, but could result in a 30-40% decrease in the life of the biofilter medium. The potential of adiabatic spray cooling of the dryer airstream should be investigated for these scenarios. The current visual 'steamy' emission from the biofilter under cooler conditions may be more pronounced with the dryer addition.
- 4. The **relative humidity** of the mixed airstream into the biofilter is likely to decrease by 8-10% from existing levels to levels to as low as 72% (based on 21 Nov 2014 data and 20% RH in the dryer air). On this basis spray cooling would appear to be advantageous for both cooling and increasing RH into the biofilter.
- 5. Given that the PEF Circuit will draw its cooling air from inside a new building for which no air extraction or treatment is deemed necessary (see previous TOU letter to GRL dated 7 April 2014), and based on a building volume of 42,000 m³ (one-third of which is the dryer/shredder room), the dryer airflow (29,500 m³/hr) will result in an air exchange rate of 2/hr for the dryer room. This should ensure that any related or unrelated **fugitive odour emissions** into the room are captured and treated in the biofilter. Ideally, the air inlet into the dryer room.

should be drawn from the OGM section of the building, providing beneficial positive extraction from that area.

6. Intermittent smoke generation is common in many dryer systems. TOU's experience is that not all of the smoke will be removed in the biofilter. However the visual effect of any smoke emission from the biofilter is unlikely to be significant given that the dryer air is only a small part of the total flow, and smoke occurrences will be rare. No impacts on treated odour levels are envisaged.

The overall finding from this assessment is that the existing biofilter system is capable of receiving and treating the increased loading from the proposed PEF system, without any detrimental effects on odour removal performance.

A secondary benefit of the new dryer system will be the ventilation and treatment of the otherwise untreated air in the OGM/Dryer building.

Please contact either Terry or Michael if you have any queries.

Terry Schulz Managing Director

Michael Assal Senior Engineer