



SCA Hygiene Products UK Ltd

Environmental Management System

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Table S1.3 Improvement Programme Requirements. Reference 3 & 5

Revision 0

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The revised Oakenholt Mill permit BV37151L contains the following improvement programme requirements:

“The operator shall submit a summary report following a review of the design and operation of the effluent plant. The review shall assess the suitability of the ETP plant for the current effluent loading and shall identify improvements to the current operation with timescales for implementation.”

“The operator shall provide a report detailing improvements to the performance of the effluent treatment process to achieve a reduction in the BOD of the effluent at emission point W1 to below 25mg/l. The timescales for the identified improvements to be implemented shall be agreed with the Agency and the improvements shall be implemented within the agreed timescales.”

Due date 29/8/13 but extension agreed with A. Soper.

1. Oakenholt Effluent Plant

The Oakenholt effluent plant consists of the following:

Effluent from around the site flows into a central sump. The effluent is then pumped into an up-flow biological reactor. This is a tower filled with media to provide a large surface area for the bacteria. Compressed air is pumped into the reactor at different levels to provide the required oxygen levels. The media is held in place by an open grid at the top of the tower. Retention time in the tower is around 7 hours.

The treated effluent then overflows the Reactor and is fed directly to a settlement tank (FST) where the effluent is separated from the bio-sludge (Retention time 4 hours). The sludge is removed to a sludge tank followed by a centrifuge for thickening to 18%. The effluent is then cooled via a cooling tower or fresh water heat exchanger prior to discharge to the river.

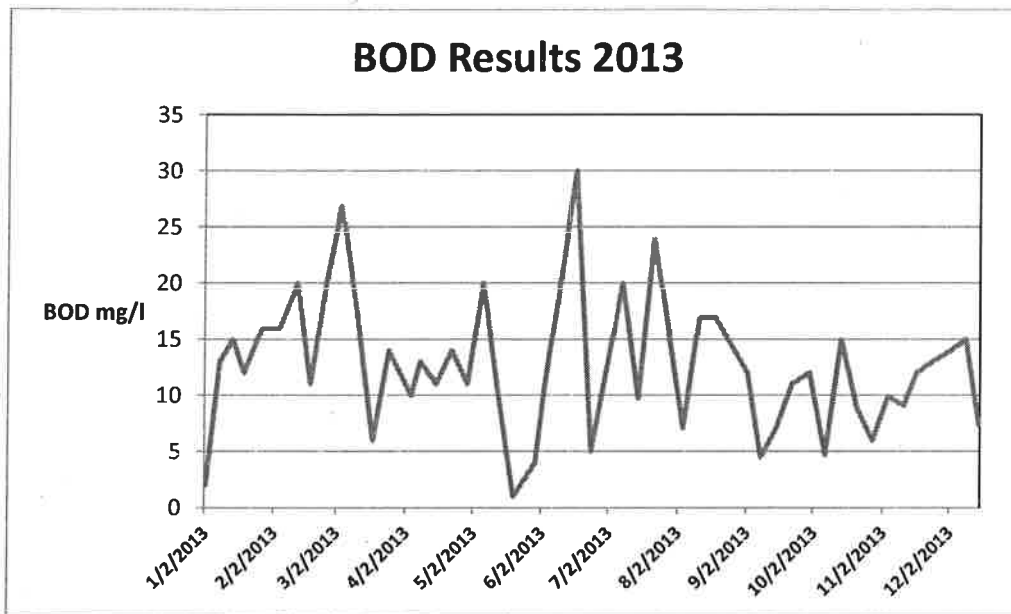
The following graphs show the current performance of the effluent plant for the main parameters of BOD, COD, suspended Solids and flow.

MONITORING RETURNS N. WALLS

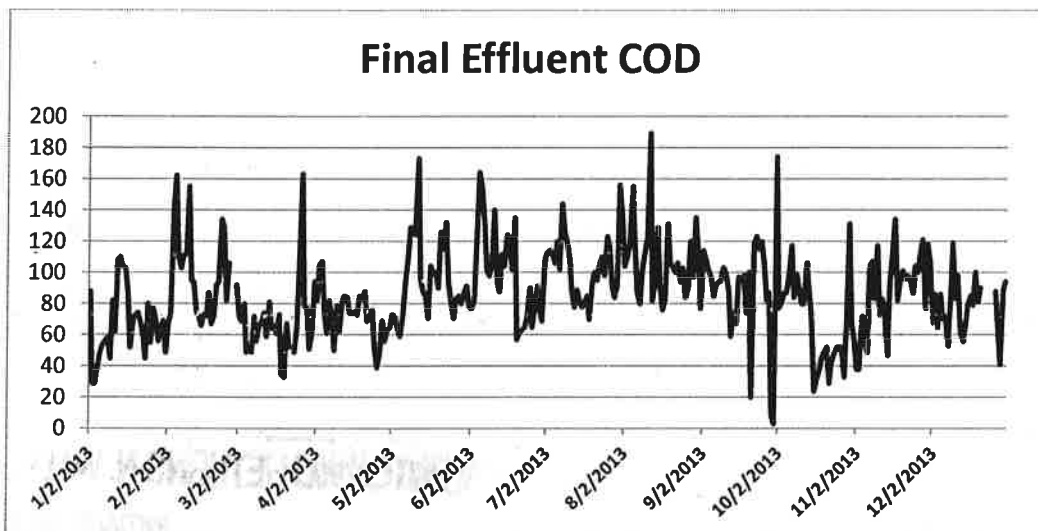
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CHECKED vs AUTHORITY	JS	26/2/14
TRACKING	JB	EDRM 26.2.14
OK FOR PUBLIC REGISTER	JS	26/2/14
INFO FOR REGULATORS	JB	EDRM

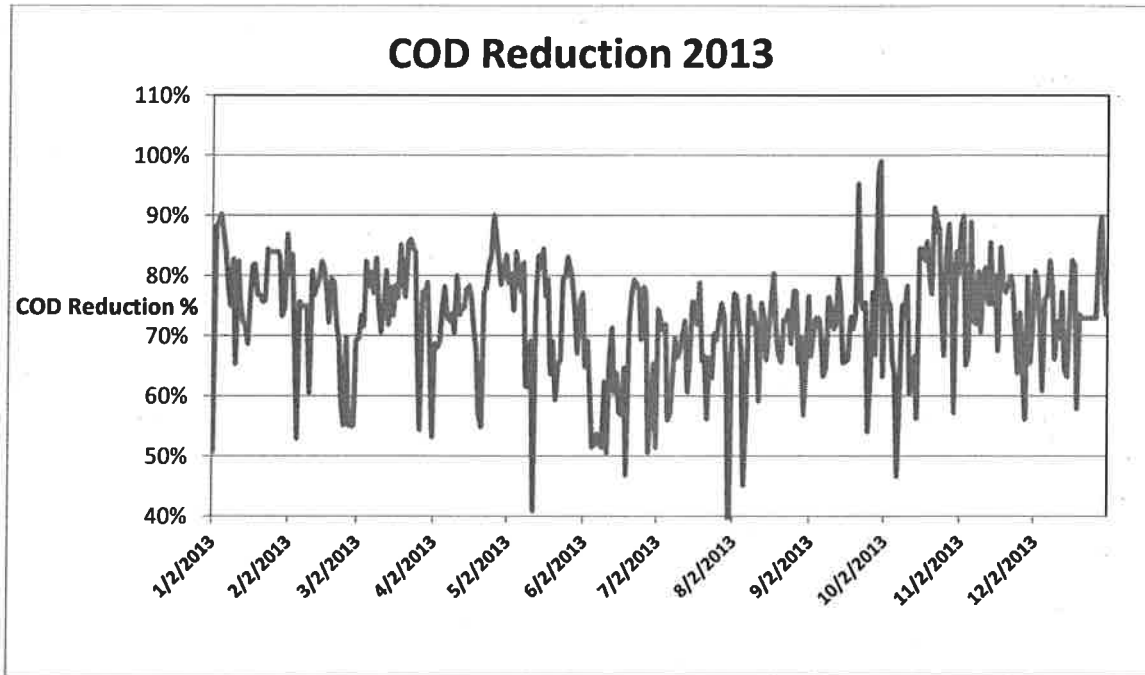


1. BOD Results – these are measured weekly by an outside laboratory. The current permit limit is 50 mg/l. The 2013 average is 12.6 mg/l with the level being above the EA target limit of 25 mg/l on 2 occasions. The specific BOD level is 0.1 Kg/tonne. The new BREF does not provide any BATAEL range for BOD.

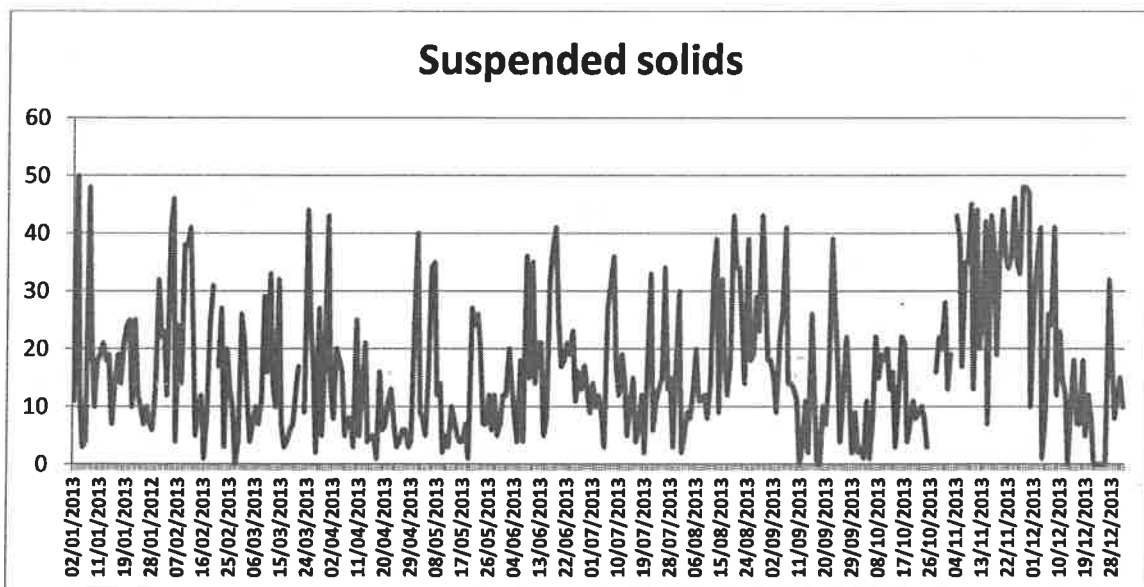


2. COD Results – The graphs below show both the final effluent COD and the COD removal across the plant. The average is 86 mg/litre with a removal efficiency of 73%. The average COD/tonne (0.765) is in the mid range of the new BREF due to the low water usage on site.



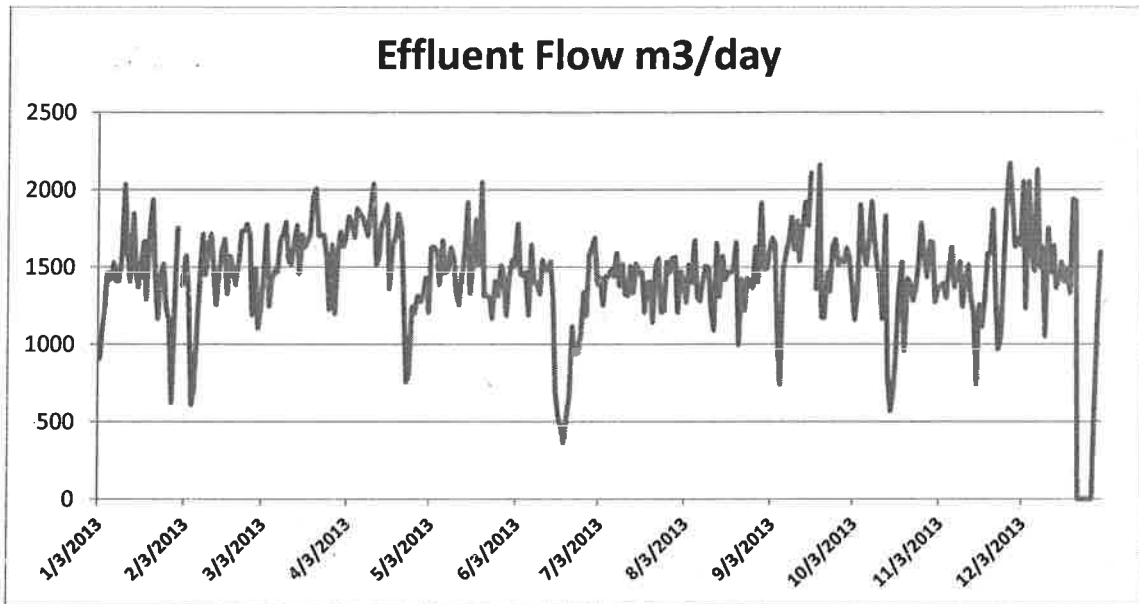


3. Suspended solids – Average Suspended Solids discharge for 2013 was 17 mg/litre. The current permit limit is 50 mg/litre. The average TSS/tonne is 0.05.





4. Flow



All the effluent parameters for 2013 were within the permit conditions and within the new BREF BATAEL levels. However considering daily performance it can be seen from the above graphs that there are peaks on some of the parameters particularly the suspended solids.

In 2011 the site commissioned a report from Farrer on options to improve the effluent treatment process. Farrer based their recommendations on the site installing a primary treatment system. The proposal from Farrer moved the plant from a 2 stage (biological and settlement) to a 3 stage (settlement, biological and floatation). The proposal did not address any flow variation issues and introduced additional chemicals into the process, which are costly and contribute to the COD.

To improve the performance of the waste water treatment the site has concentrated on operational controls to assist the effluent plant operation. There is been occasions when vegetation has grown on top of the biological reactor, which can cover 10% of the surface area. This restricts the upward flow of the effluent, reducing the reactor efficiency and potentially creating



anaerobic conditions. The growth has now been removed and cleaning routines have been introduced to keep on top of plant growth. During this warm summer period some “blue algae” appeared on the surface of the FST. The algae normally forms when there is an imbalance of the nutrients (nitrogen and phosphorus) in the effluent. Most of the nutrients come from the pulp and chemicals used in the mill. Additional effluent testing has been introduced to monitor the nutrient levels, with additional nutrients added if required.

Balancing out the flow variations throughout the plant are essential for good plant efficiency. The average flow through the plant is around 63 m³/hr with peak flow at 95m³/hr. At times of peak flow the biological reactor retention time reduces from 7 hours to 5 hours. This reduction in retention time shows up in the changing COD reduction efficiencies. Flow surges also affect the settlement in the FST. The flow surges generally occur at the start of papermachine outages, especially if both machine shut at the same time. The site is working on a communication plan between the machines to reduce this issue

One of the key operational parameters of an effluent plant is the Food to Mass ratio (F/M). The food for the bacteria is the COD. The mass is the amount of bacteria in the biological reactor. The original design of the plant would have been to a set F/M ratio. The food can't be altered, which for Oakenholt is approx. 550 Kg/day. Calculating the mass of bacteria is more difficult in an enclosed biological reactor as it involves removing and weighing some of the media. The media in the biological tower are a fairly open design. There has been improvements in media design resulting in higher surface areas, hence more bacteria. The site is investigating what effect different media design might have on the efficiency of the plant.

When compared to a conventional effluent plant, the plant at Oakenholt is missing a primary settlement stage. Although the majority of the fibre and ash is removed at the kroftas on the tissue machines some does reach the effluent plant. (On occasions when the Sludge tank overflows high concentrations of fibre and ash are pumped directly to the biological reactor.). The bacteria in the reactor will remove small quantities of fibre but not the ash. The ash will create blockages hindering the biological efficiency. The overflow from the sludge tank was due to breakdowns of the



sludge thickening equipment (centrifuge). A second centrifuge has been installed in 2013 to overcome this issue.

It is difficult to determine what plant efficiencies could be achieved with just additional operational controls although there has been an improving trend over the past 3 months and the mill will continue with these actions in 2014. The BOD levels during this period has been well below the 25 mg/litre target level. The expected COD reduction on a conventional 3 stage effluent plant should achieve a COD reduction of around 85% based on similar mills in the SCA group. Based on the COD/BOD ratio this would give an average BOD level of around 10 mg/litre. However this would involve a significant capital investment.

Oakenholt mill is meeting all the new BREF BATAEL ranges. When comparing the effluent treatment with the BAT for effluent plants in the new BREF, the plant does not meet the requirements due to the lack of a primary settlement stage. The additional equipment required would be a surge tower to even out the flows followed by a settlement system to remove solid material. The site will continue to look into this investment with the aim to meeting the BAT. In the meantime the site will continue with improving the operational controls