RENDERTECH

CLIENT: TAYLOR PRESTON LTD

ODOUR CONTROL DESIGN REVIEW

File: 2087-B-03-TaylorPrestonOdourControl
Date: 26 Apr 2017

Taylor Preston requested that Rendertech carry out a design review of their plant's odour control system.

The design review is a condition of their recently issued consent. The site work for the review was carried out by Graeme Don on the 14th March 2017.

System Description

The odour control system comprises a point source extract system (PSES) that connects to items of equipment in the rendering, white fats and wastewater treatment plants. The stream from the rendering is condensed and cooled in a shell and tube condenser. The combined streams (rendering, white fats and wastewater) are ducted to a humidifier / washer and then to the AgResearch design biofilter for treatment prior to discharge to atmosphere.
Please refer to the schematic drawing 1458-M-012A showing the current system.

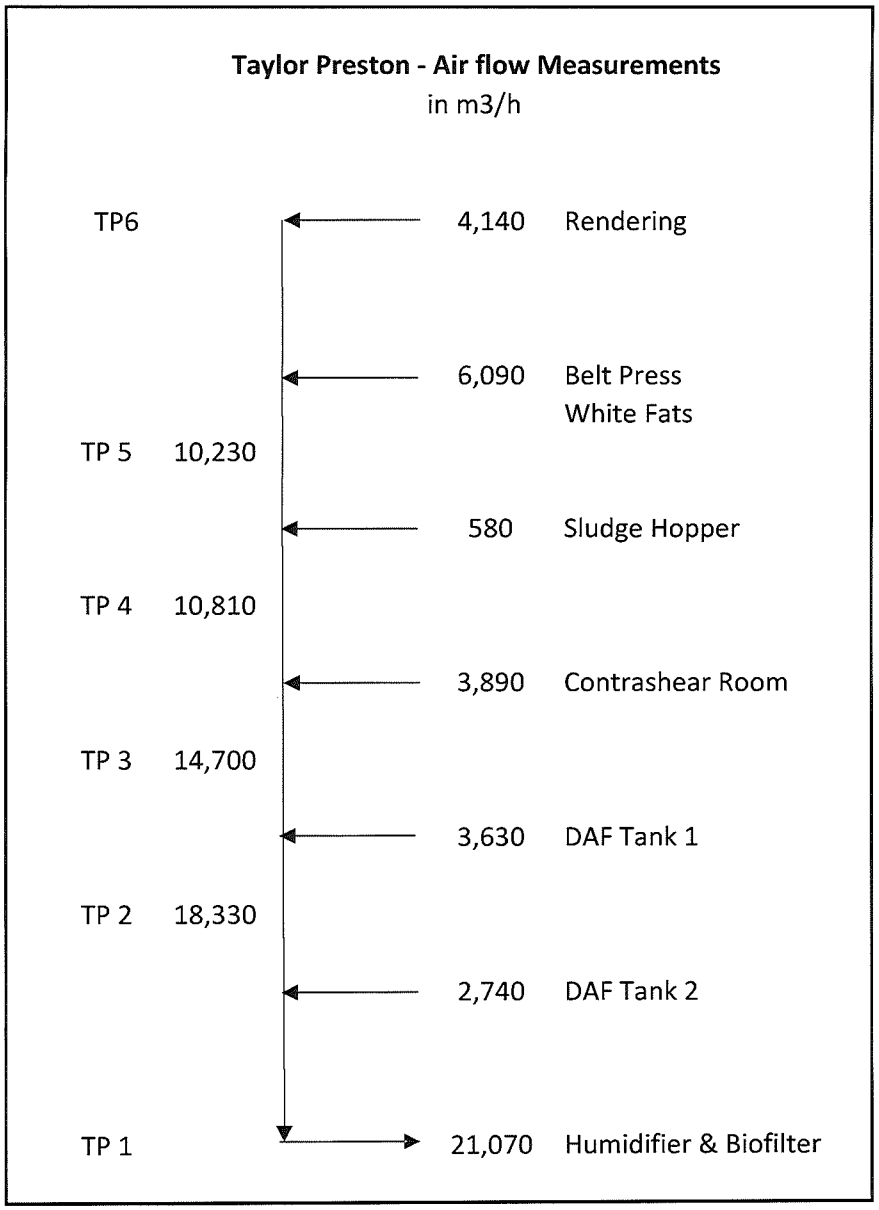
Summary of Findings

Generally the system is working well and extraction rates close to the original design. There have been some extra equipment installed in the plant that require connection to the PSES. There are also modifications that can be made at the DAF covers to reduce air flows and provide capacity for the additional connections. Specific changes and resulting indicative air flow changes are as follows:-

Connect Sludge Decanter	+ 300m^3/h
Connect to condensate drain	+ 150m^3/h
General increase at rendering	+ 300m^3/h
Improve enclosure at Belt Press	- 3,000m^3/h
Connect Wool Hydrolyser	+ 800m^3/h
Improve enclosure of Sludge Hopper	no change
Improve enclosure of DAF Tanks	- 2,000m^3/h
Net Change	- 3,450m^3/h

Air Flow Measurements

Air flow measurements were made using a pitot tube at 7 locations throughout the plant. The measured air flows are shown on the following diagram.



Rendering Plant Processing

The measured flow from the rendering (downstream of the condenser) was 4,140m^3/h. This is less than the original design of 4,800m^3/h. There was some steam visible escaping from the top of the Drainer Conveyor. This was relatively minor but the damper was fully open and could be remedied by a small increase in air flow from rendering. All other connections appeared effective with no other evidence of escaping emissions from connected equipment.

Additional Connections

Sludge Decanter - the blood/sludge decanter is an addition since the plant was originally constructed and needs to be connected. During my visit there was vapour discharging from around the decanter bowl and from the liquid discharge. We recommend the liquid is discharged into a small receiving tank (similar to the main decanter) before discharge to drain. A dedicated duct, with damper, should connect the new tank to the main 250dia extract duct.

The additional connections and general increase will require around 750m^3/h of additional flow from rendering. This can be achieved by increasing the speed of the Point Source Fan from 50Hz to 60Hz. The fan has sufficient power for this speed increase but a check must be made with the supplier to ensure it is rated for the higher speed.

Rendering Plant Drains

Stormwater Drain – There was some vapour emissions from the stormwater drain located south of the evaporator plant. This should be sealed with a removable tray below the grating with a water trap to allow the stormwater to access the drain.

Condensate Drain – the condensate drain, against between the eastern external wall of the rendering building, is a source of odour and should also be sealed. The main odour is from the drier condensate which contains a high level of volatiles and can be up to 80°C. Stormwater can be diverted from this drain by changing the ground level adjacent to it. This drain will then be dedicated to the condensate and can be sealed.

Belt Press

The belt press is fitted with a canopy hood over the top which is connected to the PSES. The air flow was measured at around 6,090 m3/h. (This included the white fats but most is from the Press).
Airflow through canopy hoods needs to be high to be effective. Using recommended extract rates for hoods, with four open sides, over open tanks we calculate a required rate of over 20,000m^3/h. Therefore it is likely that the existing canopy hood is only moderately effective in capturing emissions from the press.

To achieve effective capturing, the press should be fully enclosed and air extraction made from the enclosure. An enclosure of say 6m x 6m x 4m would be well ventilated, and negative pressure maintained by an extract rate of 2,500 – 3,000m^3/h.

White Fats Room

There are three connections in the white fat room and these were working satisfactorily with no visible vapour emissions into the room. The air flow was not

measured but the damper on the combined duct from the three sources was only slightly open so likely to be minimal.

Wool Hydrolyser

The wool hydrolyser extraction currently has a dedicated fan connected and discharges direct to atmosphere through a vertical stack. This should be connected to the PSES. The fan capacity is 800m^3/h and the required extract rate is 500 – 800m^3/h.

Sludge Hopper & Loadout

The sludge hopper is connected to the PSES via a 150dia flexible duct. The measured air flow was 580m^3/h. This extract rate would be adequate if the hopper was better sealed.
The ply roof has large holes and needs to be replaced. There is also a large opening where the feed conveyor enters the hopper and this should, as far as practical, be sealed off. A damper should also be fitted to the duct.

There are also two flexible connections with isolating valves connected to the sludge discharge conveyors that are only in use during sludge loadout.

Contrashear Screen Room

This room is contains two screens at high level with solids collection hoppers below. The total building volume is approximately 150m^3 and measured extract rate 3,890m^3/h. This gives a ventilation rate of 26 air changes/hr which is adequate. The building is not well sealed so the capture rate could be enhanced by improving the sealing.

DAF Tanks 1 & 2

The tanks are fitted with enclosed covers and are connected to the PSES system. Measured flows were 3,630m^3/h and 2,740m^3/h for the one closest to the biofilter. The flow was sufficient to maintain a negative pressure and inflowing air was evident at the opening for the sludge outlet conveyor.
There is scope to improve the sealing of these tanks by enclosing the sludge discharge conveyors from both tanks. These are large openings and closing them will reduce the required extract air flow rate. It may also be possible to reduce the openings where the influent enters and the treated wastewater exits but we did not investigate this. By enclosing the sludge discharge conveyors we estimate the required extract rate will reduce to around 2,000-2,500m^3/h per tank.

Humidifier

The humidifier saturates the air prior to entering the biofilter to prevent drying of the media, particularly at the bottom. TP advised me the exiting humidity is tested from time to time and always saturated.

Biofilter Fan

This fan was running at 47Hz and drawing 71% of full load current. It is well sized for the application.

Biofilter

The back pressure through the biofilter was 120mm wg measured at the manometers at the end of the laterals. This pressure is high indicating the media has 'composted' and may soon require replacement. Referring to a report we did in August 2007, the pressure then was 80mm wg at 30,000m^3/h. Adjusting the pressure reading back to current flows (21,000m^3/h) gives an equivalent pressure drop of 40mm wg. Therefore the pressure drop has tripled since 2007.

There was evidence of leaking of untreated air where the concrete main feed pipe penetrates the timber wall and this should be repaired.

The biofilter is 36m long x 10m wide with an active media depth of 1.5m. This gives a residence time of 90sec at the measured flow rate. Applying the retention time guidelines that we use for AgResearch biofilters, for this mix of odour sources, we calculate the required retention time of 72 sec so the biofilter is well sized for the duty.

Graeme Don
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