

Odour analysis from the Christchurch Wastewater Treatment Plant

Air was sampled from locations across the plant and immediate neighbourhood on 28 April 2022. The highest levels of gases were detected at the top of the digesters which remove solid material from the wastewater stream. They are operating as normal.

Next highest levels detected were adjacent to the oxidation pond inlet.

No significant levels were detected from the trickling filters. This was not unexpected as odour from these tanks is intermittent and occurs following rainfall which dampens remaining organic material that continues decompose until the moisture level reduces. Further sampling will take place following future rain events.

The tables of results for the gas analysis are in parts per billion. As its name suggests this is a very small unit of measurement. The reasons for this which are –

- It indicates at what a low level that some of the compounds that are responsible for the smell can be detected.
- How sensitive that modern analysis equipment is.
- Monitoring at this level has enable the identification of some compounds at very low levels.

In our text we have continued to refer to parts per million as most people are familiar with this term. The numbers have been adjusted accordingly.

Gases which were detected at significant levels on that day were -

Hydrogen sulphide

This is generated when the wastewater is anaerobic, that is, there is not enough oxygen. Commonly called sewer gas or swamp gas and familiar to New Zealanders in geothermal regions. Smells like rotting eggs or Rotorua. Typical level at which it can be detected as an odour is 1 part per million

Highest levels off the digester roof – 5 parts per million

Next highest from the ponds – 0.5 parts per million

The hydrogen sulphide odours at the digester roof were 5 times the odour threshold. From this location it is dispersed into the air and rapidly diluted. The digesters were not affected by the fire and are operating as they always have.

Hydrogen sulphide from the ponds is at half the odour threshold.

Methyl mercaptan

A compound formed where organic material breaks down under anaerobic conditions – lack of oxygen. Smells like rotting cabbage. It can be smelt at very low levels and for this reason it is added to LPG to assist in detection of leaks. It can be smelt at levels as low as 0.002 parts per million.

It was detected only at the pond inlet at a level of .1ppm which is above the level at which it can be smelt.

Styrene and Xylene

These pungent compounds are produced by burning and their presence was detected at the plant and in the surrounding neighbourhood.

Methane

This gas was detected at most locations. Its presence indicates that decomposition without oxygen is taking place and though it has no smell it does indicate the possibility of other more smelly compounds being produced as set out above. It was detected in much higher levels than other compounds but the recorded levels are well below any risk of combustion.

Further sampling

Council will now continue to carry out further monitoring on a weekly basis so that it can use this information to identify strategies to reduce odours emanating from the plant. The monitoring will be taking place on a weekly basis and be timed to take into account both weather conditions and at times when odour complaints are being received from the community.

Certificate of Analysis

Te Hononga Civic Offices
53 Hereford Street, Christchurch

Lab reference: 22-0016
Submitted by: Anatoly Chernyshev

Kurt Scoringe
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Date received: 28/04/2022
Date analyzed: 28/04/2022
Report date: 29/04/2022
Order No:
Reference: Wastewater plant

Laboratory ID	22-0016-1	22-0016-2	22-0016-3	22-0016-4	22-0016-5	22-0016-6
Customer ID	Trickling filter 2	Trickling filter 1	Reception parking	Digester roof ambient	Digester roof puff	Pond inlet
Sampling time	28/04/2022, 09:45	28/04/2022, 09:45	28/04/2022, 10:05	28/04/2022, 10:15	28/04/2022, 10:15	28/04/2022, 10:30

Analyte (CAS)	Unit	22-0016-1	22-0016-2	22-0016-3	22-0016-4	22-0016-5	22-0016-6
monoterpenes	ppbv	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
decamethylcyclopentasiloxane (541-02-6)	ppbv	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
ethanol (64-17-5)	ppbv	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
heptanes	ppbv	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
hydrogen sulphide (7783-06-4)	ppbv	<LOQ	<LOQ	<LOQ	2635	5017	497
pentanes	ppbv	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
methane (74-82-8)	ppbv	2295	2043	1601	2041304	3363207	40795
methanol (67-56-1)	ppbv	<LOQ	103	99	<LOQ	<LOQ	<LOQ
methyl mercaptan (74-93-1)	ppbv	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	107
styrene (100-42-5)	ppbv	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
xylenes + ethylbenzene	ppbv	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ

Laboratory ID	22-0016-7	22-0016-8	22-0016-9	22-0016-10	22-0016-11	22-0016-12
Customer ID	Primary treatment	Primary treatment outlet	Secondary treatment	Street sample: Ruru & Cuthberts Rd.	Street sample: Cuthberts Rd., plant gates	Street sample: Breezes & Cuthberts Rd.
Sampling time	28/04/2022, 10:40	28/04/2022, 10:45	28/04/2022, 10:50	28/04/2022, 11:25	28/04/2022, 11:30	28/04/2022, 11:30

Analyte (CAS)	Unit	22-0016-7	22-0016-8	22-0016-9	22-0016-10	22-0016-11	22-0016-12
monoterpenes	ppbv	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
decamethylcyclopentasiloxane (541-02-6)	ppbv	<LOQ	132	<LOQ	<LOQ	<LOQ	<LOQ
ethanol (64-17-5)	ppbv	<LOQ	<LOQ	107	41	24	39
heptanes	ppbv	<LOQ	<LOQ	153	13	12	15
hydrogen sulphide (7783-06-4)	ppbv	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
pentanes	ppbv	<LOQ	<LOQ	927	9	6	<LOQ
methane (74-82-8)	ppbv	10571	5883	15665	2242	2416	2138
methanol (67-56-1)	ppbv	<LOQ	<LOQ	<LOQ	45	51	56
methyl mercaptan (74-93-1)	ppbv	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
styrene (100-42-5)	ppbv	<LOQ	<LOQ	1989	11	7	7
xylenes + ethylbenzene	ppbv	<LOQ	<LOQ	491	<LOQ	<LOQ	<LOQ

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Certificate of Analysis

Laboratory ID	22-0016-13	22-0016-14	22-0016-15
Customer ID	Street sample: Breezes & SH 74	Street sample: SH 74 by the dam	Metro Pl.
Sampling time	28/04/2022, 11:35	28/04/2022, 11:40	28/04/2022, 11:40

Analyte (CAS)	Unit	22-0016-13	22-0016-14	22-0016-15
monoterpenes	ppbv	<LOQ	<LOQ	1728
decamethylcyclopentasiloxane (541-02-6)	ppbv	<LOQ	<LOQ	<LOQ
ethanol (64-17-5)	ppbv	38	56	60
heptanes	ppbv	7	179	11
hydrogen sulphide (7783-06-4)	ppbv	<LOQ	48	<LOQ
pentanes	ppbv	<LOQ	689	<LOQ
methane (74-82-8)	ppbv	2411	2783	3591
methanol (67-56-1)	ppbv	51	56	49
methyl mercaptan (74-93-1)	ppbv	<LOQ	<LOQ	<LOQ
styrene (100-42-5)	ppbv	7	2058	19
xylenes + ethylbenzene	ppbv	<LOQ	491	<LOQ

Method approver:



Anatoly Chernyshev, PhD
Director

Method Summary

The samples were analysed as received using direct injection – Selected Ion Flow Tube Mass Spectrometry (SIFT-MS) in Mass Scan Mode (samples 1-9, reporting limit is 100 ppbv) and Selected Ion Mode (samples 10-15, LOQ is 5 ppbv).

Report Notes

The samples were received in acceptable condition.

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Appendix: locations of the street samples (#10-15, pink bubbles)

