AECOM

Westside Regional Wastewater Treatment Plant Odour Assessment

Project number: 60667097

December 7, 2021

FINAL

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1. Introduction

The Regional District of Central Okanagan (RDCO) operates the Westside Regional Wastewater Treatment Plant (WRWTP) located on Gellatly Road in the City of West Kelowna. The RDCO has recently received an increased number of odour complaints. The perception of odour is complex and can be influenced by a variety of variables including foul air constituents, whether it is constant or fluctuating, concentration, and sensitivity of the person perceiving the odour. In contrast, treatment of foul air is relatively straight-forward and there are several approaches for scrubbing odour.

In order to understand the odour complaints in the vicinity of the WRWTP, identifying the source or sources of the complaints is an important first step. Given the complex interaction of odour within a sewer system, it's possible that the perceived odours originate from both the collection system and WRWTP. Five raw wastewater pipelines come together in the vicinity of the WRWTP, including forcemains and gravity trunks, and small lift stations can also be significant sources of odour due to low flows and high retention times.

The objective of this study is to investigate potential sources of odour in the vicinity of the WRWTP and establish a mitigation plan. The mitigation plan may include specific recommendations to treat foul air emissions; operational changes or process upgrades to remove the conditions that cause odour; and further follow-up testing to fill gaps.

2. Background

In preparation for conducting the odour investigation, the RDCO compiled a log of odour complaints beginning June 2021 of residents living in the vicinity of the WRWTP (refer to **Appendix A**). The complaints log documents from three neighbourhoods in the vicinity of the WRWTP that have registered odour complaints:

- Whitworth Road Area (2495 to 2589)
- Canyon Ridge Development (4035 Gellatly Road)
- Flying Horse Drive Development (4074 Gellatly Road)

Characterization of the odours generally perceived as a strong sewage-like smell.

Odour Generation

Odours associated with domestic wastewater are typically caused by constituents originating in the wastewater, as well as by-products of decomposition that are emitted during the collection and treatment stages. While fresh raw wastewater has disagreeable odour, wastewater that has undergone anaerobic decomposition typically has a strong objectionable odour. In the absence of air (i.e., anaerobic conditions), bacterial reduction of sulphur compounds produces odourants with very low detection thresholds, including hydrogen sulphide (H_2S). These gaseous compounds have low solubility in water and are easily released into the headspace of a sewer pipe or manhole. Based on characterizations of the odours documented in the complaints log, reduced sulphur compounds are suspected to be the main source of foul air affecting residents in the area.

H_2S is typically used as a surrogate for measuring odour in wastewater systems because it has very low detection threshold at 3 parts per billion (ppb). In addition, instruments are commonly available to measure H_2S. Measurement of the full spectrum of reduced sulphur compounds necessitates a gas chromatograph (GC), a specialized instrument typically found in commercial labs or universities. For the

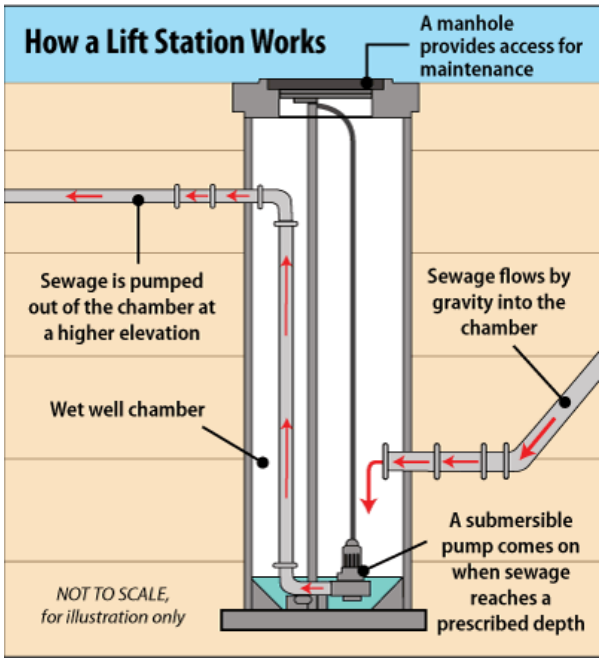
purposes of this assessment, H_2S measurements will be used to identify odour sources. If additional detailed assessment is required sampling and testing for reduced sulphur compounds may be recommended in the future.

H_2S can be generated in the wastewater collection system as well as at the wastewater treatment plant.

Odour Generation and Emissions in the Collection System

The anaerobic conditions that promote the formation of reduced sulphur compounds are typically associated with closed pipe systems like forcemains and siphons but can also occur in lift stations. Wastewater lift stations typically comprise of a submersible pump inside a wet well (tank). Wastewater flows by gravity into the wet well and the pump turns on when a pre-determined water level is reached. The wastewater is then pumped into a forcemain which provides ideal anaerobic conditions for wastewater decomposition. For smaller lift stations where flow rates are low, the pumps may operate infrequently (i.e., 2-3 times per day) which causes low turn-over rates and long detention times that can lead to high rate of reduced sulphur compounds in both the wet well and the forcemain.

Figure 2-1: Typical Municipal Wastewater Lift Station Schematic

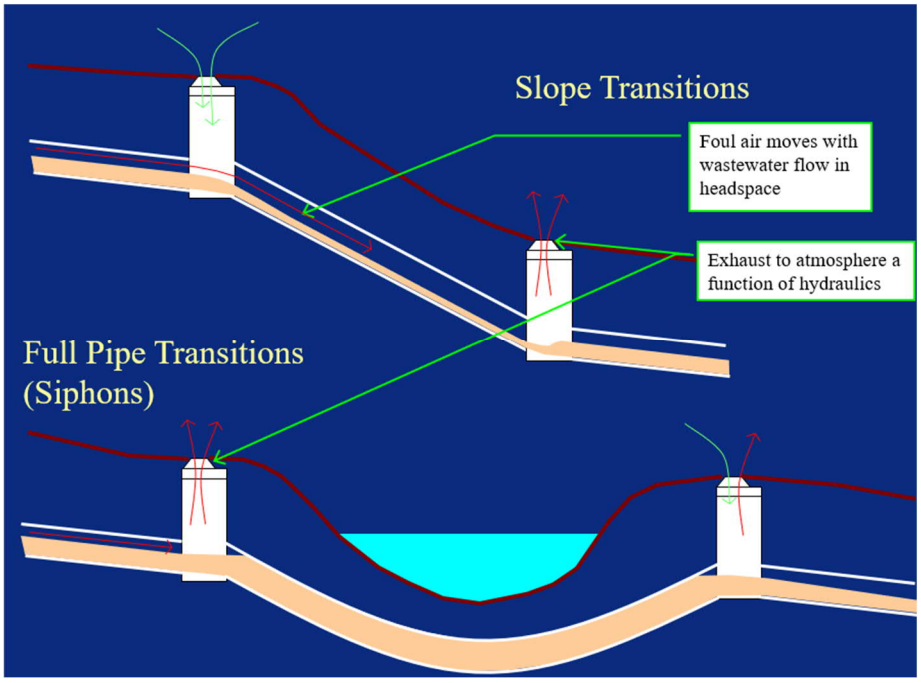


Once the reduced sulphur compounds have been formed in the water column, they occur as gases and are only slightly soluble and heavier than air. Any agitation will release the odours into the pipe or lift station headspace and since the gases are heavier than air they will tend to follow the water surface flow. The flow dynamics in the collection system will determine the degree to which these gases are forced above-ground as a detectable an odour. Flow transitions are known mechanisms for release and transmission of reduced sulphur compounds and can include the following:

1. Steep to shallow slope pipe transitions – air in the headspace is accelerated through the steep pipe section and is forced out the manhole at the change to a shallow slope.
2. Partially full gravity pipe to full pipe transitions – foul air carried in the headspace of a partially full pipe is forced out the manhole at a transition to full pipe such as a siphon.
3. Forcemain transitions to gravity flow – turbulence associated with flow surges at pump start-up will release gases into the headspace of the gravity section and force foul air above-ground through the receiving manhole.

4. Lift station operation – gasses are released through turbulence and air displacement associated with wastewater entering the lift station or through the action of pumping. As the lift station tank fills, wastewater displaces volume which forces foul air to be vented to the surface.

Figure 2-2: Illustration of Common Flow Transitions In Sewers That Cause Foul Air Emissions at the Surface



Odour Generation and Emissions in the Wastewater Treatment Process

Processes at the WRWTP can cause the release or generation of odours from the wastewater. In particular, the inlet end of the facility where raw sewage is collected, processes that have high retention time in the mainstream, and sludge/solids management processes typically have the highest potential for odours to be generated and emitted.

The headworks facility receives raw sewage from the collection system, including odourous air, and comprises of mechanical screening and grit removal systems that separate, dewater and store inert solids from the wastewater stream. The primary clarification system consists of tanks with large surface areas to maximize the flotation and settlement of solids which can lead to the emission and generation of H_2S. Sludge fermenters also have high potential for odour generation as it receives, thickens and stores primary sludge under anaerobic conditions for a controlled period. In addition, there are various conveyance structures and mechanical handling systems that can release odour into the atmosphere through agitation of the various liquid and solids streams.

The ventilation system at the WRWTP was designed to minimize odour emissions through isolation, collection, and treatment of foul air from various high odour potential areas. The most odourous treatment processes, such as raw wastewater screening, solids bins (dewatered screenings and grit), and sludge dewatering, are enclosed in buildings with ventilation systems that exhaust all room air to the biofilter for treatment. Process tanks and channels that have high odour potential are covered and the headspaces ventilated and conveyed to the biofilter.

Use of biofilters is a common approach for treating foul air extracted from wastewater treatment processes. The WRWTP utilizes a single biofilter consisting of a bed of organic, wood media through which the foul air is distributed. Provided there is sufficient moisture, a variety of bacteria grow on the organic media which oxidize a large spectrum of foul air constituents. Due to the low pH environment, organic, woody media breaks down and replacement is typically necessary every 3 to 5 years. The

scrubbed air stream released from the biofilters is typically characterized as having a non-offensive, organic earthy smell.

Break-through of foul air can occur if the biofilter media dry's out or by short-circuiting the media (e.g. leakage). The WRWTP utilizes sprinklers along the perimeter of the biofilter to maintain constant moisture of the media.

Standards for Odour Control in Wastewater Treatment Plants

There are limited regulatory requirements regarding odour. The *BC Ambient Air Quality Objectives* provides airshed quality criteria for total reduced sulphur compounds measured as H_2S. Under these objectives, the 1-hour average H_2S target is 5 ppb. The 24-hour objective is 2 ppb. The *BC Ambient Air Quality Objectives* are not legally binding but can serve a guide for planning and testing.

Under Bylaw No. 0249, the City of West Kelowna specifies an odour criterion of 0.0 odour units for design of its sewer facilities where they occur close to houses, parks or walkways.

In addition, under the WRWTP Operational Certificate the Regional District could be directed by the Director to undertake remedial measures to address objectionable odours from the collection system or treatment plant.

3. Data Collection & Findings

Measurement of H_2S was used as a basis for establishing odour generation in the collection system and treatment plant. In addition, site visits were made to characterize odour intensity. The measurements and site visits were completed from mid-September through to mid-October, 2021. This period captures the declining portion of the seasonal peak. Although timing of the testing did not coincide with the mid-summer period when most of the complaints were received, the data collected provides a good starting point for identification of sources and developing a plan for future work. Charts of the Odalog data can be found in Appendix B.

H_2S monitoring data and site observations collected over the study period are documented in this section.

Hydrogen Sulphide Monitoring

Odalog instruments were used to collect H_2S data at locations in the collection system in the Whitworth Road and Canyon Ridge areas to assess potential sources of odour. The Odalog instrument is designed to continuously monitor H_2S gas concentrations for approximately 7-10 days (or up to 30 days depending on the model) and can detect within a range of 0.1 to 50 ppm.

For low-level H_2S monitoring from the biofilter and around the wastewater treatment plant site, data collected using a Jerome meter was used. The Jerome meter can measure concentrations as low as 0.003 ppm which is below the concentration most people perceive H_2S.

Whitworth Road Area

H_2S loggers were installed at three locations on the wastewater collection system in the vicinity of Whitworth Road (**Figure 3-1**). The locations included:

1. Headspace of the Pebble Beach Lift Station
2. Manhole at the end of the Pebble Beach Lift Station forcemain where it transitions to gravity flow
3. Headspace of the Hazelnut Park Lift Station

The wastewater collection and pumping system on Whitworth Road is owned and operated by the City of West Kelowna.

Figure 3-1: Location of H_2S Monitoring in Whitworth Road Area

The data output for each of the 3 sites is provided as graphs and included in **Appendix B**. The monitoring shows that all 3 sites exhibit transient emissions of high concentrations of H_2S in the lift station and pipe headspace.

The H_2S concentration in the Pebble Beach Lift Station is associated with the pumps starting up and is likely caused by turbulence. Based on information provided by the City of West Kelowna, who operates the lift station, the pumps typically operate 1-2 times per day. As a consequence, wastewater entering the station may stagnate for up to 24 hours, allowing for anaerobic conditions which promote nuisance odour generation. At pump start-up, the H_2S measured logger was 2 -13 ppm and typically abated after 9 -21 minutes. The lift station does not appear to have a ventilation exhaust or scrubber to manage the foul air generation. There is a possibility that odours generated in the station could be migrating up the gravity sewer trunk (i.e. returning to 2589 Whitworth Road). A ventilation fan and scrubber should be considered as an option to mitigate odours released to the atmosphere from the lift station headspace.

The Pebble Beach Lift Station pumps into a 200 mm diameter forcemain which discharges to the gravity sewer on Whitworth Road, a distance of 54 metres. The volume of the forcemain is 1.7 m^3 which further increases the stagnation time of the wastewater by 6 – 12 hours, assuming a typical wastewater generation rates of 300 L/person/day. When the Pebble Beach pumps turn on, the H_2S concentration in the discharged manhole headspace spikes to a peak of 10 – 45 ppm with a detectable concentration (i.e., greater than 0.1 ppm) lingering for 5 to 70 minutes.

The Whitworth Road gravity sewer drains to the Hazelnut Park Lift Station. The headspace H_2S in the Hazelnut Park Lift Station exhibits transitory peaks of 3 – 16 ppm which may be associated with turbulence from pump operation or surges of flow from the Pebble Beach Lift Station. The waves of H_2S recorded in the Hazelnut Park Lift Station headspace can persist for hours.

The long residence time of the wastewater in the Pebble Beach Lift Station and forcemain appears to be contributing to the high levels of H_2S measured in the downstream sewer head space and remedial solutions should be investigated. As an interim measure, it may be possible to reduce residence time by adding a water source to the station inflow. The additional water would cause the lift station to cycle more frequently.

The Hazelnut Park Lift Station was designed with a ventilation pipe and is fitted with a carbon canister to mitigate odour. However, the size of carbon scrubber may be too small to control the odour generated and H_2S monitoring of the vent should be conducted to assess its efficacy.

Canyon Ridge Development and Flying Horse Drive Areas

H_2S loggers were installed at three locations in the wastewater collection system in the vicinity of the Canyon Ridge development and Flying Horse Drive areas. The three sites include:

1. Manhole located just upstream of the inverted siphon below Powers Creek on the Westbank Trunk
2. Manhole located at the transition of the East Trunk Lift Station forcemain to gravity flow
3. Manhole in the Canyon Ridge development near lower end of complex

Figure 3-2: Location of H_2S Monitoring in the Canyon Ridge Area

Data from the H_2S logger installed upstream of the creek siphon and at the East Trunk Lift Station forcemain transition show high concentrations in the headspace which varies based on a diurnal pattern. In effect, the headspace in these sewers are potentially a constant source of odours in the area and likely contributes to the complaints documented in the vicinity of the fish ladders. It is expected that the Gellatly Road trunk exacerbates the potential for odour emissions given the transition from a steep slope to shallow slope pipe near the entrance to the WRWTP.

An H_2S logger was installed in a manhole at the bottom of the Canyon Ridge development, near where 2 residents have registered odour complaints. Two significant bursts of H_2S were measured on October 10 and 11, one of which lasted for 3 hours and registered a peak H_2S of 2.9 ppm. Additional monitoring is required to determine if these events were anomalous or are a regular occurrence. The bursts of H_2S are sufficiently large to be potential sources of odour.

Westside Regional Wastewater Treatment Plant

Through the month of September, measurements of H_2S were made in the vicinity of unit processes that have the potential to emit odours. For these spot measurements, a Jerome meter was used which has a much lower detection threshold than the Odalog instruments. Sites that were tested include the primary effluent (PE) channel, edge of biofilter and near the entrance to the room housing the grit removal

process (**Figure 3-1**). Elevated H_2S measurements were recorded near the PE channels and shown in **Table 3-1**.

H_2S sampling at the south end of the biofilter indicates the occasional elevated spikes up to 0.110 ppm which is within the range of human detection. If local dispersion does not provide sufficient dilution, the elevated H_2S could be contributing to complaints given the large volume of air moving through the biofilter. In addition, the Jerome readings at the biofilter were taken only at the south end of biofilter to reflect the direction nearest Whitworth Road. In the future, Jerome readings should be made as close to the centre of the pile as possible to eliminate the influence of wind direction on air sampling results.

Table 3-1: H_2S Monitoring Data at WRWTP Using Jerome Meter

Date	PE Channel by Shop door	PE Channel by Bio 2 & 3	South End of Biofilter	Grit Room Doors	Time of Sampling
	ppm	ppm	ppm	ppm	time
2021-09-01	0.090	0.120	0.001	0.002	15:00
2021-09-02	0.000	0.038	0.001	0.000	9:30
2021-09-03	0.150	0.092	0.003	0.001	11:00
2021-09-04	0.280	0.016	0.110	0.012	13:20
2021-09-05	0.440	0.003	0.013	0.017	14:45
2021-09-07	0.002	0.090	0.008	0.002	11:30
2021-09-08	0.001	0.300	0.025	0.002	13:30
2021-09-09	0.001	0.043	0.004	0.003	12:50
2021-09-11	0.053	0.003	0.041	0.008	9:20
2021-09-13	0.007	0.067	0.010	0.001	13:30
2021-09-14	0.001	0.530	–	–	14:25
2021-09-15	0.003	0.008	0.006	0.000	12:20
2021-09-16	0.005	0.077	0.021	0.002	14:27
2021-09-18	0.400	0.003	0.008	0.001	14:30
2021-09-19	0.004	0.001	0.013	0.016	14:00
2021-09-20	0.043	0.012	0.110	0.021	10:15
2021-09-21	0.290	0.160	0.002	0.009	13:30
2021-09-22	0.350	0.080	0.020	0.008	14:30
2021-09-23	0.400	0.009	0.001	0.007	11:15
2021-09-27	0.960	0.070	0.008	0.002	14:30
2021-09-28	0.120	0.098	–	–	13:50
2021-09-29	0.130	0.006	0.000	0.002	10:30

Site Visits

Site visits were made on two occasions. The first was on the evening of September 23, 2021 when AECOM staff inspected the area below Canyon Ridge and met with residents at Pebble Beach. A second visit was made on October 4, 2021 to conduct a detailed walk-through of the WRWTP.

Gellatly Road and Whitworth Road Walk-Through

During the September 23 visit, the areas around the sewer transitions along Gellatly Road were inspected. A strong raw wastewater odour was perceptible within approximately 15 metres of the manhole where the East Trunk Lift Station forcemain transitions to gravity flow.

The manhole at the upstream end of the Powers Creek siphon had nearly no discernable odour at the ground surface.

AECOM staff met with residents near the entrance of Pebble Beach. Near the end of this meeting, a faint but recurring wastewater odour was perceived on Whitworth Road. A light wind appeared to be blowing from the north-east.

Tour of Wastewater Treatment Plant

A detailed tour of the WRWTP was conducted on October 4, 2021 to identify potential odour emissions based on AECOM staff perception which could complement the H_2S data and point to possible improvements. The specific locations where sources of odour were detected and potential improvements are described below and summarized in **Figure 3-3**.

1. Influent Gate – raw sewage odour was detectable with 1-2 metres of the influent gate chamber which could be addressed through extension of the foul air collection system.
2. Dewatering Building Air Handling Unit – exhaust air from a small air handling unit on the dewatering building had a perceptible odour which should be reviewed for integrating the air stream into the foul air collection system.
3. Primary Effluent Channel – the primary effluent channel, particularly alongside Bioreactors 1 and 2, emits a detectable odour which could be addressed through addition of foul air extraction (Bioreactors 3, 4, 5, and 6 are already equipped with foul air extraction).
4. Biofilter – a faint, transient odour was detected down wind of the biofilter which may indicate odour break-through. In addition, foul air may be short-circuiting through the lock-block joints containing the media. An odour survey of the lock-block joints using the Jerome meter should be conducted and gaps sealed if required.

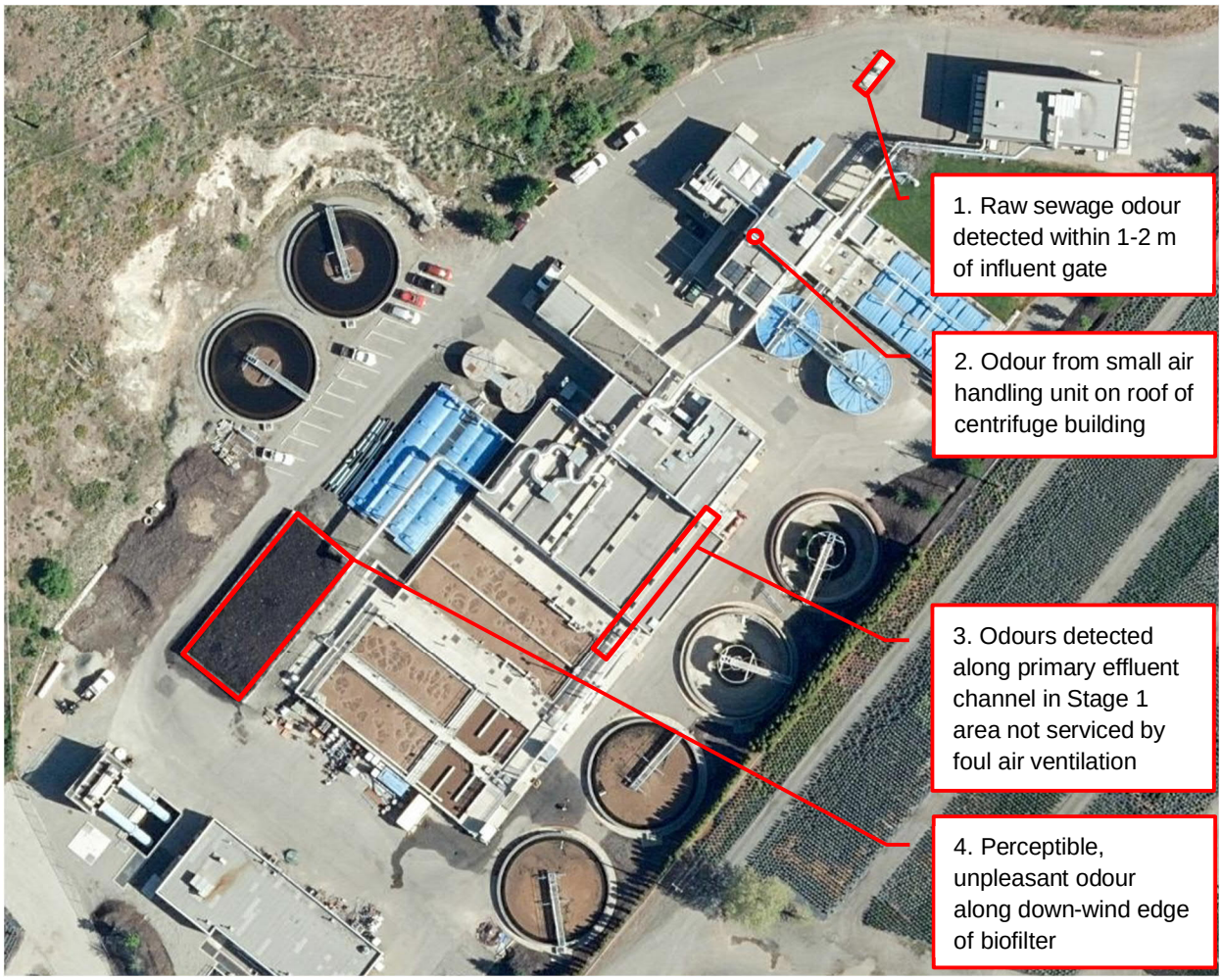
The biofilter media was replaced over the May 11 to May 17, 2021 period and it is not clear how this work has impacted treatment efficiency through the summer. Biofilters rely on developing a healthy population of various bacteria on the media to break-down the foul air constituents. The hot weather experienced through June and July may have prevented the media from staying fully saturated and did not allow the biofilter from reaching optimal performance. To address the performance issues observed, the design of the biofilter should be assessed under warm weather conditions to identify improvements. Upgrades that could provide better treatment and dispersion performance include:

- Covering the biofilter to reduce moisture loss
- Addition of an air stack to improve dispersion
- Replacing the organic media with an inorganic media
- Improvements to the humidification, pre-conditioning step
- Addition of a trickling filter, consisting of a fibreglass tank filled with plastic packing media through which the foul air is passed before entering the biofilter. The biofilter media is constantly wetted and allows sulphur-oxidizing bacteria to grow which attenuates loading to the biofilter.
- Partitioning the biofilter to allow for duty/standby operation and facilitate maintenance

Review of historical plant-wide foul air balancing does not appear to show any balancing specific to negative pressurization of the room and tank spaces. All room spaces where foul air is drawn should be

at a negative pressure relative to atmosphere to ensure odour to not escape. The next plant-wide balancing should include confirmation of room pressures and room space air-changes.

Figure 3-3: Sources of Odour Identified at the WRWTP



Weather Station Data

Weather data collected from a monitoring station located at the WRWTP was used to try to correlate the odour complaints from the specific wind direction. This approach was intended to provide another level of evidence for pin-pointing the sources of the odours. The weather station logs the daily average dominant wind direction which would indicate if the odour is originating from the WRWTP. The data may not address conveyance of odours by diffusion or density differences on windless days. More detailed weather data and modelling is required to exclude these scenarios.

Figure 3-4 provides a plot of the wind direction for the period of June 1 to October 14, 2021. The predominant wind direction during this period is from the north-west, east-north-east and west.

Figure 3-4: Dominant Daily Average Wind Direction Plot (June 1 to October 14, 2021)

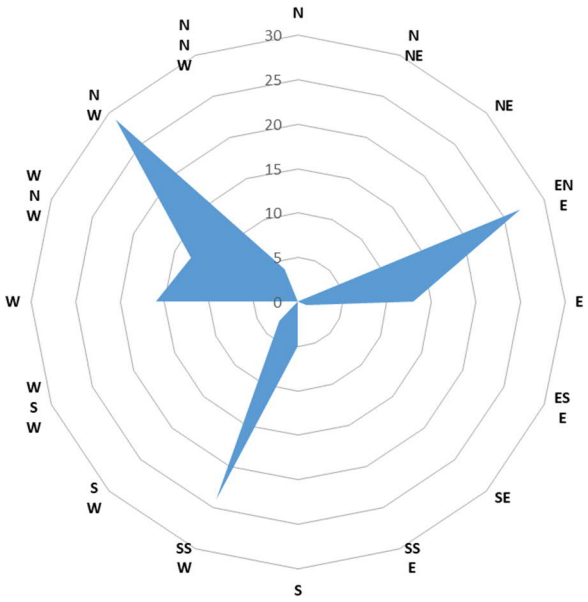
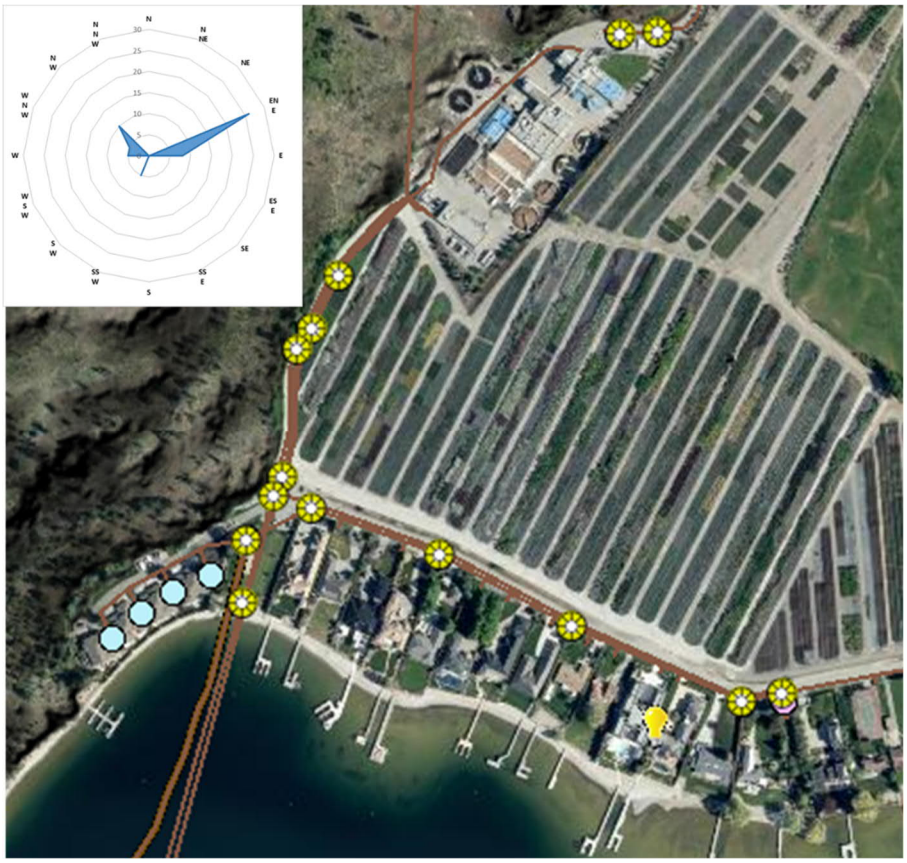


Figure 3-5: Daily Average Wind Direction on Days When Odour Complaints Were Received for Whitworth Road Area



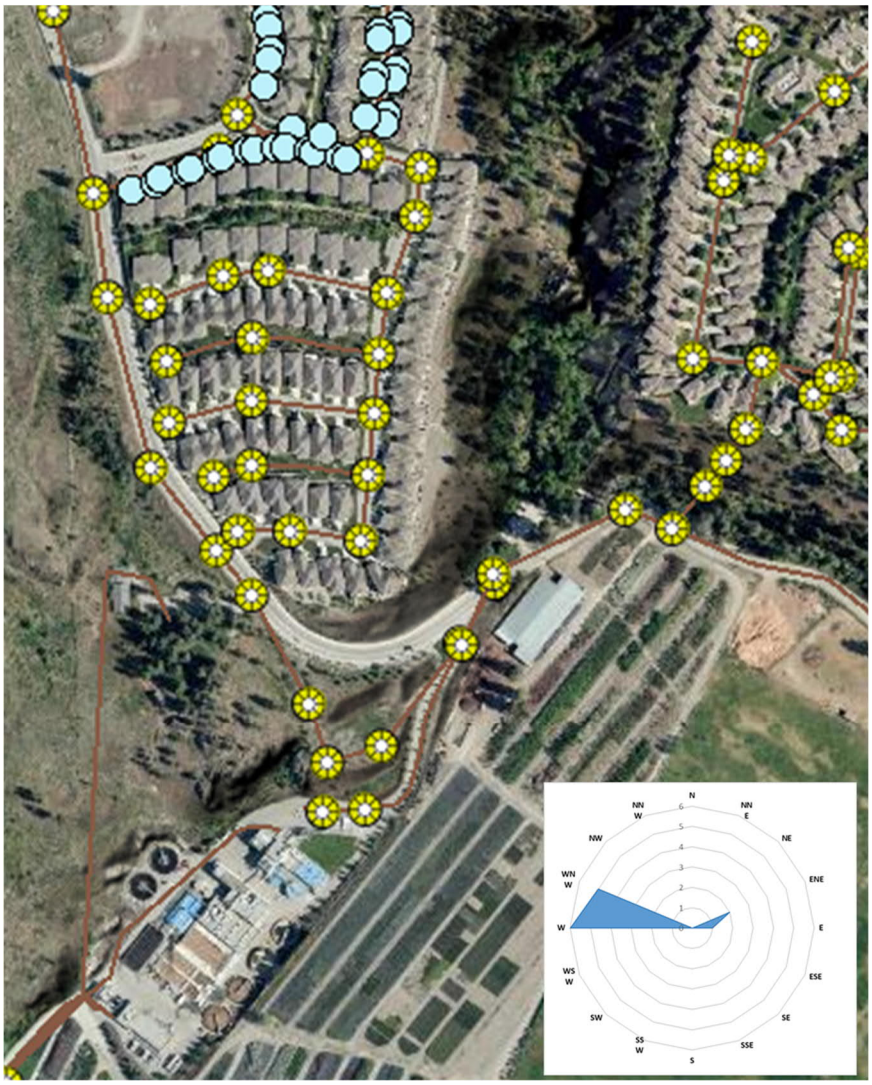
For 26 of the 59 days when odour complaints were documented for the Whitworth Road area, the predominant wind direction was from the east-north-east direction. While this implicates the WRWTP as a

source, for 20 of 59 complaints the predominant wind direction on those days was away from the Whitworth Road area.

Similarly, for the Canyon Ridge Area the wind direction on days when complaints were registered does not provide conclusive proof for the WRWTP or the sewer emissions along Gellatly Road being the source of the odours.

The wind direction data averaged over the day may be too coarse to assist identification of odour sources. The data also does not allow for assessing conveyance of odours in the evening and mornings when there is little air movement. Under these conditions, passive diffusion and density gradients may be more important for transmission. The weather station should be updated to log data over more smaller time increments (i.e., 5-10 minutes) to allow for more detailed assessment and allow for a dispersion model to be developed which accounts for possible transmission mechanisms. The dispersion model would allow for developing foul air treatment design objectives based on achieving a maximum H_2S threshold for residents in the Canyon Ridge, Flying Horse Drive and Whitworth Road subdivisions. It is further recommended that assessment of the biofilter performance be informed by the dispersion model output.

Figure 3-6: Daily Average Wind Direction on Days When Odour Complaints Were Received for Canyon Ridge Area



4. Conclusions and Recommendations

The measured H_2S data and field visits indicates that both the collection system and WRWTP have the potential for emitting odours which are impacting the Whitworth Road, Canyon Ridge and Flying Horse Drive neighborhoods. The data collected is not sufficiently detailed to attribute any of the complaints to a specific source. However, based on the assessment and data analyses the following recommendations serve as a starting point for additional data collection and mitigation:

1. Reconfigure or upgrade weather station at WRWTP to provide more detailed data output to better monitor air flow patterns (such as time increments of 5-10 minutes).

2. H_2S monitoring should be conducted through the spring and summer of year 2022 to assess performance of any upgrades to the lift stations on Gellatly Road and Whitworth Road. For the monitoring on the Whitworth Road collection system the work will need to be provided by the City of West Kelowna which owns and operates this infrastructure.

3. **Lift Stations**:

    a. The Pebble Beach Lift Station has a high potential to be a source of odours. This station lacks a vent which is a best practice for wet well design. At a minimum this station should be retrofitted prior to the summer, 2022 to include a vent and carbon scrubber. Additional solutions that should be investigated include supplying dilution water from a potable or non-potable source to reduce wastewater retention time in the wet well and forcemain. An H_2S logger should be installed at the manhole where the Pebble Beach Lift Station forcemain transitions to gravity flow to capture data continuously from June 1 to September 15, 2022 and assess performance of any upgrades.

    b. The Hazelnut Park Lift Station carbon scrubber should be assessed through H_2S monitoring and upsized if required to provide more effective odour control. After installation of the new scrubber or media, an H_2S logger should be installed on the vent and operated continuously to assess performance and to determine a media replacement schedule.

    c. The work to reduce odour emissions at the Pebble Beach and Hazelnut Park lift stations will need to be coordinated with the City of West Kelowna and designed to meet its Bylaw No. 0249.

4. **Biofilter Foul Air Management System**:

    a. The Jerome meter data and site visits indicates break-through of foul air through the biofilter at the WRWTP.

    b. Regular H_2S measurements of the biofilter performance should conducted using the Jerome meter to assess treatment performance and proactively address any foul air break-through. The testing should be started as soon as possible with air samples taken as close to the middle of the biofilter surface as possible. Samples should be taken at least 5 days per week or when the centrifuge is operating to reflect the worse-case operating conditions.

    c. It is suspected that short-circuiting is occurring through gaps in the lock block containment. The leaks should be confirmed through site investigations and local sampling using the Jerome meter and sealed as required.

    d. Options to improve treatment performance of the biofilter should be investigated and a preferred upgrade plan adopted. The upgrade plan and treatment performance objective should be supported by a dispersion model.

e. Upgrades to the biofilter should also include provision for additional capacity to service areas where odour emissions are occurring at the WRWTP (i.e., primary effluent channel near Bioreactors 1 and 2, influent gate chamber, and exhaust air from centrifuge building).

5. The Westbank Trunk siphon is generating odour emissions due to the turbulence at the bottom of the slope near Powers Creek and is likely contributing to the complaints by residents on Flying Horse Drive. As a short-term solution, a new carbon scrubber should be installed prior to the summer, 2022. The carbon scrubber should allow for air venting to be unimpeded at the upstream end of the siphon. Furthermore, an H_2S logger should be installed on the carbon scrubber vent and operated continuously through the summer to assess performance and to determine a media replacement schedule.

6. The manhole where the East Trunk Lift Station manhole transitions to gravity flow is currently a source of odours in the immediate area and should be addressed in conjunction with long term solutions for the Westbank Trunk siphon emissions. As a short-term solution, a carbon scrubber in the manhole through the spring and summer of 2022 would help to reduce odour emissions. Following installation of the carbon scrubber, an H_2S logger should be installed on the vent and operated continuously through the summer to assess performance and to determine a media replacement schedule.

7. All room spaces where foul air is drawn should be at a negative pressure relative to atmosphere to ensure odour to not escape. The next plant-wide balancing should include confirmation of room pressures and room space air-changes.

Appendix A – Odour Complaints Log & Weather Station Data

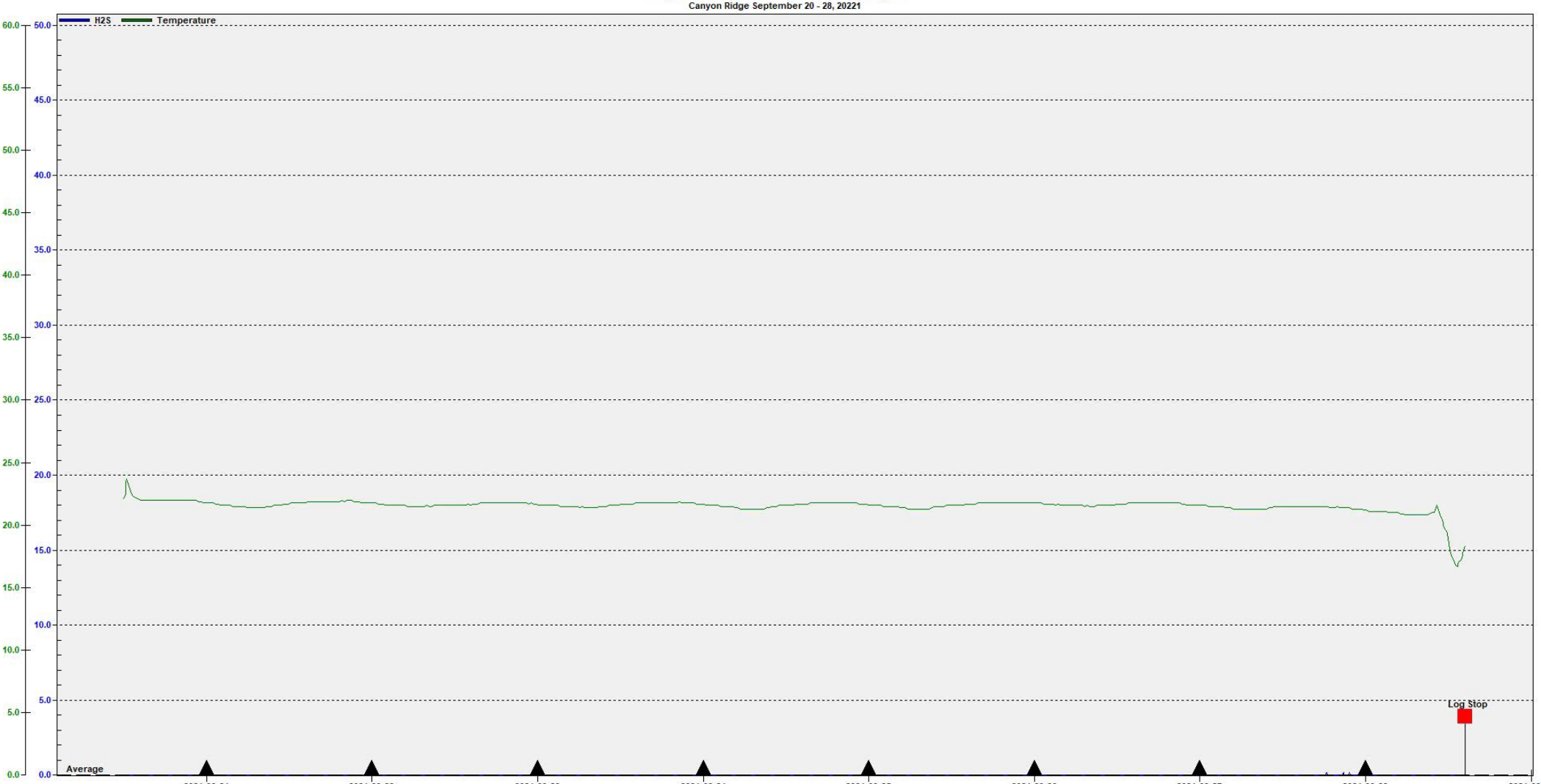
Date	Odour Start	Odour Stop	Area	Address	Intensity (#/5)	Notes	Dominant Wind Direction
6-Aug-21	Morning	Unknown	Whitworth	2505 Whitworth Road	Unknown	The odour on whitworth is extreme.	W
27-Jun-21	8:31 PM	Unknown	Whitworth	2541 Whitworth Road	Unknown	Foul odour while walking	E
29-Jun-21	8:03 PM	Unknown	Whitworth	2541 Whitworth Road	Unknown	Hard to sit on the deck	E
30-Jun-21	8:54 PM	Unknown	Whitworth	2541 Whitworth Road	Unknown	Stink bomb!	SSW
2-Jul-21	7:49 PM	Unknown	Whitworth	2541 Whitworth Road	Unknown	No wind, bad smell	ENE
4-Jul-21	9:24 PM	Unknown	Whitworth	2541 Whitworth Road	Unknown	Outside to enjoy breeze, smells	ENE
5-Jul-21	9:00 PM	Unknown	Whitworth	2541 Whitworth Road	Unknown	Smell started, forced inside	ENE
9-Jul-21	7:00 PM	Unknown	Whitworth	2541 Whitworth Road	2	Front yard at 7pm, then back yard at	ENE
11-Jul-21	7:45 PM	Unknown	Whitworth	2541 Whitworth Road	2	Had to come back in at 8:45pm, just too	ENE
12-Jul-21	8:18 PM	Unknown	Whitworth	2541 Whitworth Road	Unknown	Smell started a little bit at 7:30 but left	ENE
13-Jul-21	7:53 PM	Unknown	Whitworth	2541 Whitworth Road	Unknown	No wind. Drove residents inside just as	E
28-Jul-21	7:07 PM	Unknown	Whitworth	2541 Whitworth Road	Unknown	We are eating outside with our	NW
31-Jul-21	8:33 PM	Unknown	Whitworth	2541 Whitworth Road	Unknown	Very strong	ENE
30-Jul-21	7:55 PM	Unknown	Whitworth	2541 Whitworth Road	Unknown	Just started to smell	NW
29-Jul-21	8:33 PM	Unknown	Whitworth	2541 Whitworth Road	Unknown	I walked down to pebble beach. Their	ENE
2-Sep-21	7:55 PM	Unknown	Whitworth	2541 Whitworth Road	Unknown	Smells comes and goes	ENE
24-Aug-21	9:03 PM	Unknown	Whitworth	2541 Whitworth Road	Unknown	So bad, we can't go outside. Company	ENE
24-Aug-21	6:35 PM	Unknown	Whitworth	2541 Whitworth Road	Unknown	Trying to have dinner outside with	ENE
19-Aug-21	8:20 PM	Unknown	Whitworth	2541 Whitworth Road	Unknown	Blast of smell while sitting on dock.	WNW
19-Aug-21	6:37 AM	Unknown	Whitworth	2541 Whitworth Road	Unknown	Smell really bad. Smell was also coming	WNW
13-Aug-21	7:45 PM	Unknown	Whitworth	2541 Whitworth Road	Unknown	Smell came while going for a walk.	ENE
12-Aug-21	9:45 PM	Unknown	Whitworth	2541 Whitworth Road	Unknown	Went to check the garage door, almost	ENE
10-Aug-21	9:05 PM	Unknown	Whitworth	2541 Whitworth Road	Unknown	Smell is Lakeside now	W
10-Aug-21	7:59 PM	Unknown	Whitworth	2541 Whitworth Road	Unknown	Smell is on the street side	W
4-Aug-21	8:18 PM	Unknown	Whitworth	2541 Whitworth Road	Unknown	Bad smell for about 20 minutes, no	E
5-Jul-21	9:29pm	Unknown	Whitworth	2547 Whitworth Road	Unknown	A smelly night. Concern regarding	ENE
28-Jul-21	7:53 PM	Unknown	Whitworth	2547 Whitworth Road	Horrid'	Stepped out onto the patio facing the	NW
31-Jul-21	5:13 PM	Unknown	Whitworth	2547 Whitworth Road	Unknown	Smells Gross	ENE
31-Aug-21	9:30 AM	Unknown	Whitworth	2547 Whitworth Road	Unknown	Got a whiff of sewer while outside.	ENE
26-Aug-21	9:00 PM	Unknown	Whitworth	2547 Whitworth Road	Unknown	Smell is getting embarrassing. Upset	SSW
19-Aug-21	9:35 PM	Unknown	Whitworth	2547 Whitworth Road	Unknown	Embarrased to be out on patio with our	WNW
13-Aug-21	8:47 PM	Unknown	Whitworth	2547 Whitworth Road	Unknown	Smell is disgusting. Smells really bad	ENE
11-Jul-21	9:05 PM	Unknown	Whitworth	2547 Whitworth Road	Unknown	Retreated inside as a result of the bad	ENE
30-Jul-21	6:45 PM	Unknown	Whitworth	2547 Whitworth Road	Unknown	Strong smell of sewage on the patio	NW
4-Oct-21	7am and 3pm		Whitworth	2547 Whitworth Road			NW
8-Jul-21	10:00 PM	Unknown	Whitworth	2587 Whitworth Road	Unknown	Odour sometime after engagement on	E
28-May-21	-	-	Whitworth	2589 Whitworth Road	4	Significant odor'	
8-Jun-21	8:30 PM	Unknown	Whitworth	2589 Whitworth Road	Unknown		NW
30-Jun-21	5:55pm	Unknown	Whitworth	2589 Whitworth Road	Unknown	4 evenings in a row	SSW
30-Jun-21	8:35pm	Unknown	Whitworth	2589 Whitworth Road	Unknown	Stinks, eyes watering, headaches	SSW
2-Jul-21	9:00pm	Unknown	Whitworth	2589 Whitworth Road	Unknown	Forced inside, itchy eyes and headaches	ENE
5-Jul-21	9:15 PM	Unknown	Whitworth	2589 Whitworth Road	Unknown	Driven inside to avoid smell, headache,	ENE
13-Jul-21	8:30 PM	Unknown	Whitworth	2589 Whitworth Road	Unknown	Middle of Whitworth, strong smell	E
1-Aug-21	Unknown	Unknown	Whitworth	2589 Whitworth Road	Unknown	The smell of the plant right now, last	NW
30-Jul-21	Unknown	Unknown	Whitworth	2589 Whitworth Road	Unknown	The last 2 nights the odor has been	NW
19-Aug-21	Unknown	Unknown	Whitworth	2589 Whitworth Road	Unknown	Concerned monitoring will be tainted	WNW
10-Aug-21	Unknown	Unknown	Whitworth	2589 Whitworth Road	Unknown	Had to move inside, the whole area.	W

Date	Odour Start	Odour Stop	Area	Address	Intensity (#/5)	Notes	Dominant Wind Direction
28-Jun-21	Evening	Unknown	Whitworth	2589 Whitworth Road, #2	Unknown	"unbearable", 3 evenings in a row	E
5-Jul-21	7:39 AM	Unknown	Whitworth	2589 Whitworth Road, #2	Unknown	Noxious gases a daily occurrence.	ENE
11-Jul-21	9:00 PM	Unknown	Whitworth	2589 Whitworth Road, #2	Unknown	Stink from the plant drove everyone	ENE
23-Jul-21	6:30 AM	6:45 AM	Whitworth	2589 Whitworth Road, #2	Very intense	Unable to sit outside due to intense	W
13-Aug-21	6:15 PM	Unknown	Whitworth	2589 Whitworth Road, #3	Unknown	Smell has driven us inside, beyond	ENE
23-Sep-21	7:00pm		Whitworth	2589 Whitworth Road, #3			ENE
9-Oct-21	8:30am		Whitworth	2589 Whitworth Road, #3			NW
3-Oct-21	5:30pm		Whitworth	2589 Whitworth Road, #3			WNW
2-Jul-21	6:45pm	Unknown	Whitworth	2589 Whitworth Road, #4	Unknown	Driven indoors. Unbearable	ENE
6-Jul-21	9:15pm	Unknown	Whitworth	2589 Whitworth Road, #4	Unknown	reported as "unbearable" at Pebble	NW
10-Jul-21	8:00 PM	Unknown	Whitworth	2589 Whitworth Road, #4	Unknown	Foul and intense. Nauseous. Very	SSW
12-Aug-21	Unknown	Unknown	Whitworth	2589 Whitworth Road, #4	Unknown	Smell at Whitworth the last week has	ENE
8-Oct-21	6:30-8:30pm		Whitworth	2589 Whitworth Road, #4			E
18-Jul-21	3:00 PM	Unknown	Canyon Ridge	301 4035 Gellatly Road	Unknown	Also noted smell while driving along	WNW
20-Jul-21	Day and evening'	Unknown	Canyon Ridge	301 4035 Gellatly Road	Unknown	Also noted smell while driving along	WNW
24-Jul-21	9:00 PM	Unknown	Canyon Ridge	301 4035 Gellatly Road	Unknown	Also noted smell while driving along	ESE
17-Jul-21	7:00 AM	10:00 AM	Canyon Ridge	Canyon Ridge	Unknown	Smell lasted longer than usual.	W
17-Jul-21	9:30 AM	9:50 AM	Canyon Ridge	Canyon Ridge	Unknown	Overpowering smell from SVC truck,	W
13-Jul-21	Unknown	Unknown	Canyon Ridge	Canyon Ridge	"Not as bad"	Smell noticed, not as bad as on July	E
14-Jul-21	Unknown	Unknown	Canyon Ridge	Canyon Ridge	"Not as bad"	Smell noticed, not as bad as on July	WNW
17-Jul-21	10:00 AM	Unknown	Canyon Ridge	Canyon Ridge	Unknown	Noticed while talking to neighbours	W
16-Jul-21	10:00 AM	Unknown	Canyon Ridge	Canyon Ridge	Unknown	Out for a walk through complex in	W
18-Jul-21	1:00 PM	Unknown	Powers Creek Fish Ladders	Powers Creek Fish Ladders	Unknown	Also noted smell while driving along	WNW
19-Jul-21	Day and evening'	Unknown	Powers Creek Fish Ladders	Powers Creek Fish Ladders	Unknown	Also noted smell while driving along	ENE
20-Jul-21	6:00 PM	Unknown	Powers Creek Fish Ladders	Powers Creek Fish Ladders	Unknown	Also noted smell while driving along	WNW
22-Jul-21	Day	Unknown	Powers Creek Fish Ladders	Unknown	Unknown	Also noted smell while driving along	W
23-Jul-21	Day	Unknown	Powers Creek Fish Ladders	Unknown	Unknown	Also noted smell while driving along	W

Appendix B – Odalog Data Charts

Regional District of Central Okanagan

Canyon Ridge September 20 - 28, 20221

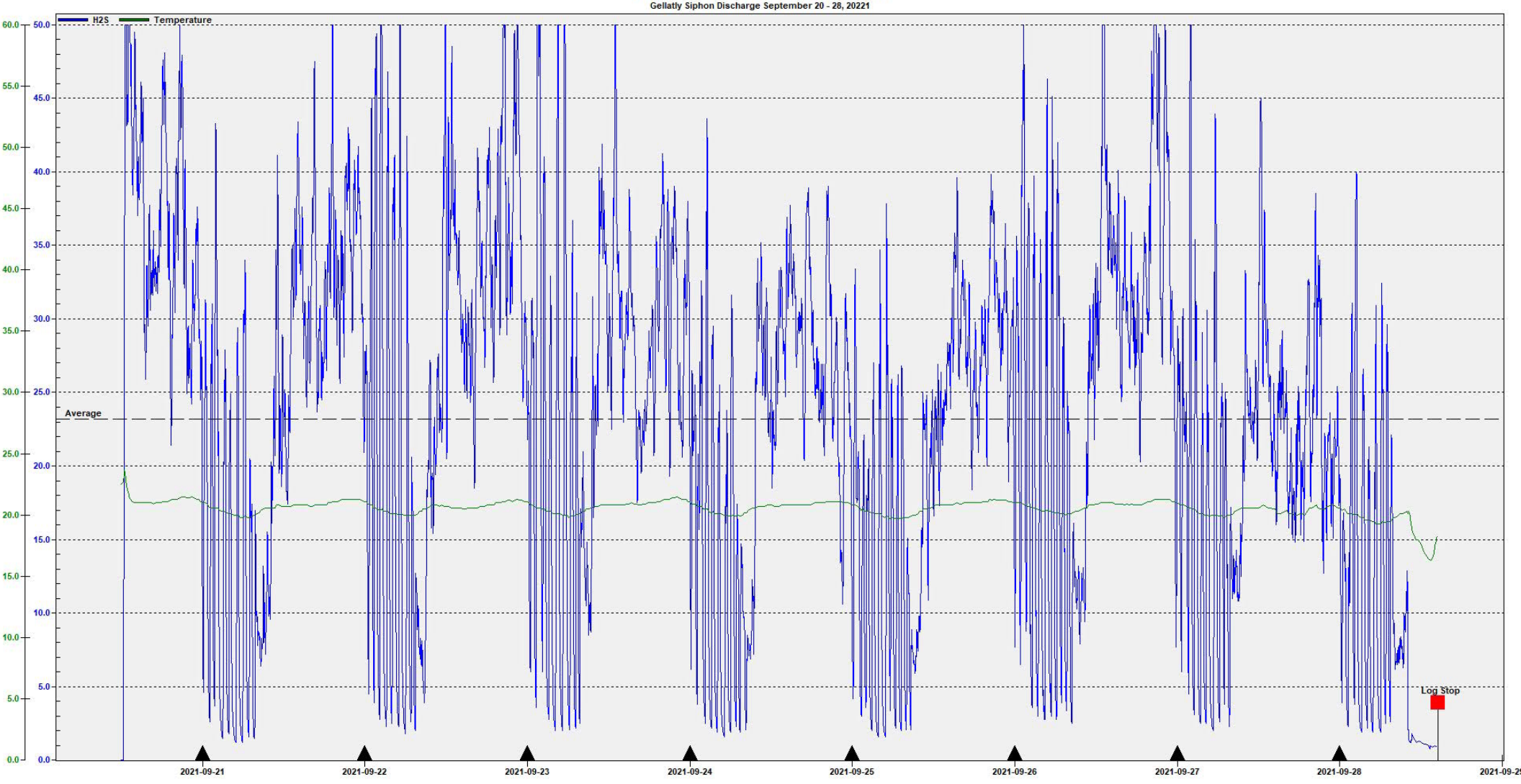


Period Displayed: 2021-09-20 - 2021-09-29 (Oda File: 20210929_05710087_01.oda -- Serial Number: Odalog Type L2-RTx 05710087 Instrument Range 0-0PPM)

Average 0.0 | Month Transition Min 0.0 Max 0.3 (Use Screen Data Only)

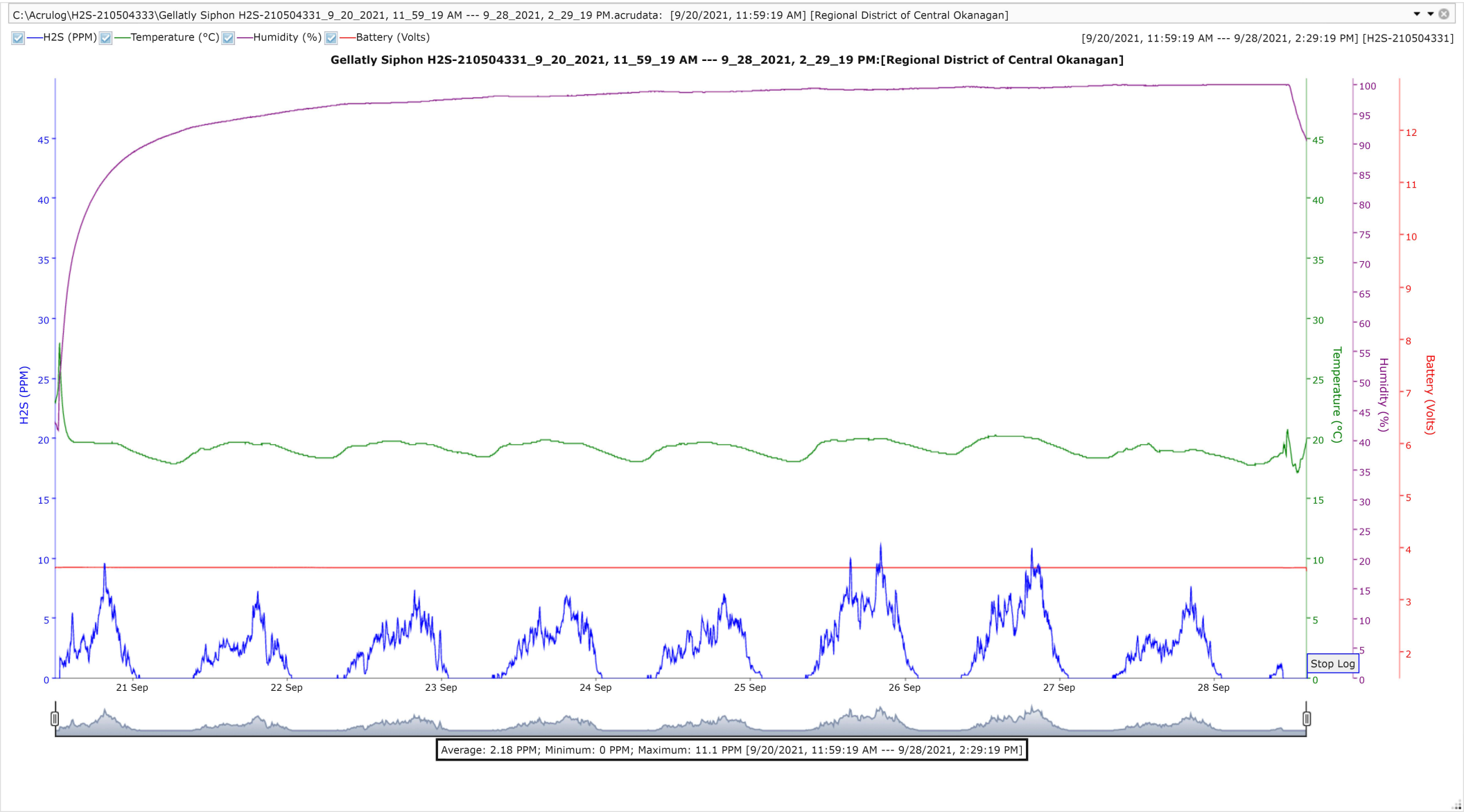
Regional District of Central Okanagan

Gellatly Siphon Discharge September 20 - 28, 20221



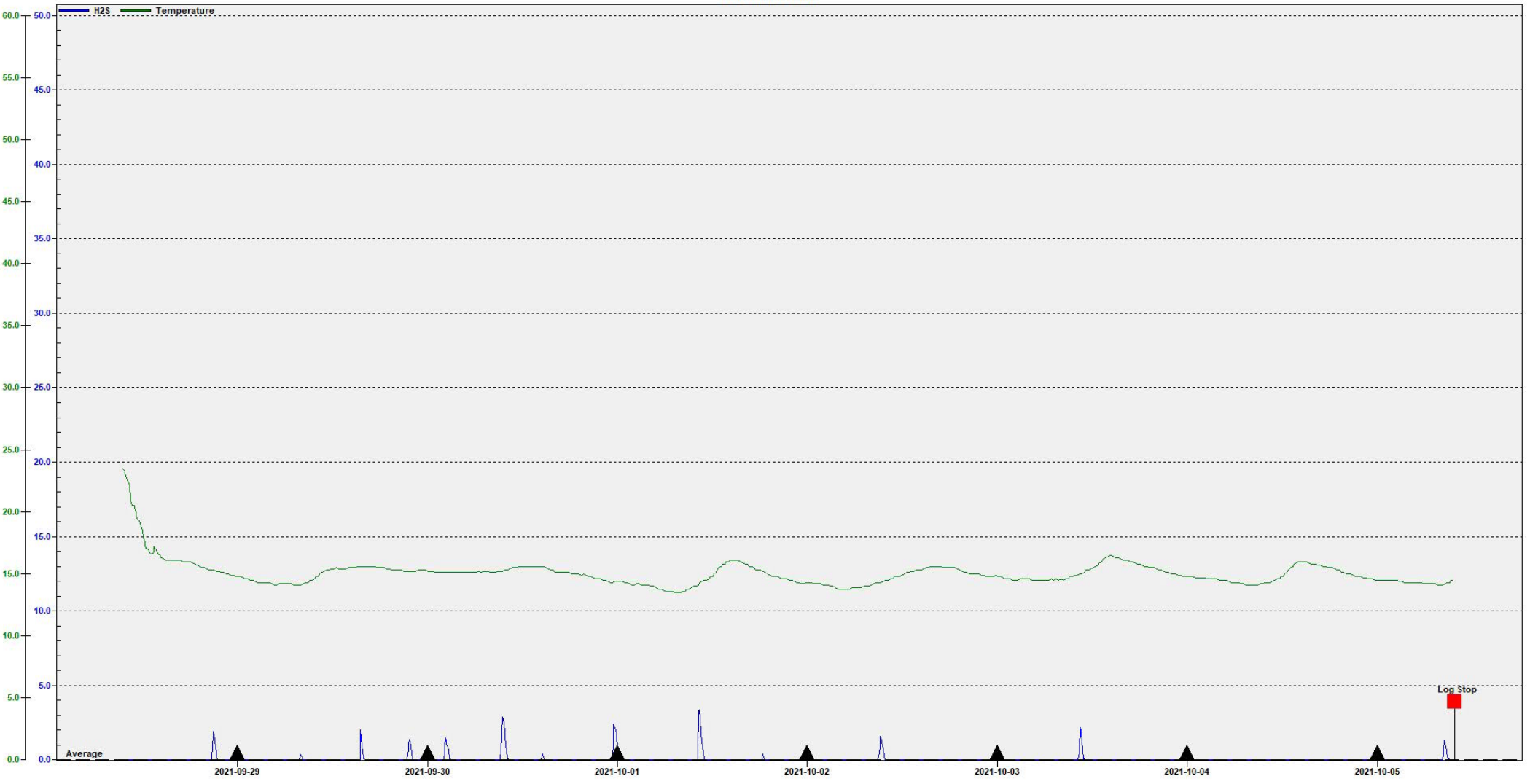
Period Displayed: 2021-09-20 - 2021-09-29 (Oda File: 20210929_09507851_01.oda -- Serial Number: Odalog Type L2-RTx 09507851 Instrument Range 0-0PPM)

Average 23.2 | Month Transition Min 0.0 Max 62.2 (Use Screen Data Only)


C:\Acrulog\H2S-210504333\Gellatly Siphon H2S-210504331_9_20_2021, 11_59_19 AM --- 9_28_2021, 2_29_19 PM.acrudata: [9/20/2021, 11:59:19 AM] [Regional District of Central Okanagan]
H2S (PPM)
Temperature (°C)
Humidity (%)
Battery (Volts)
[9/20/2021, 11:59:19 AM --- 9/28/2021, 2:29:19 PM] [H2S-210504331]
Gellatly Siphon H2S-210504331_9_20_2021, 11_59_19 AM --- 9_28_2021, 2_29_19 PM:[Regional District of Central Okanagan]
H2S (PPM)
Temperature (°C)
Humidity (%)
Battery (Volts)
21 Sep
22 Sep
23 Sep
24 Sep
25 Sep
26 Sep
27 Sep
28 Sep
Stop Log
Average: 2.18 PPM; Minimum: 0 PPM; Maximum: 11.1 PPM [9/20/2021, 11:59:19 AM --- 9/28/2021, 2:29:19 PM]

Regional District of Central Okanagan

Whitworth Lift Station

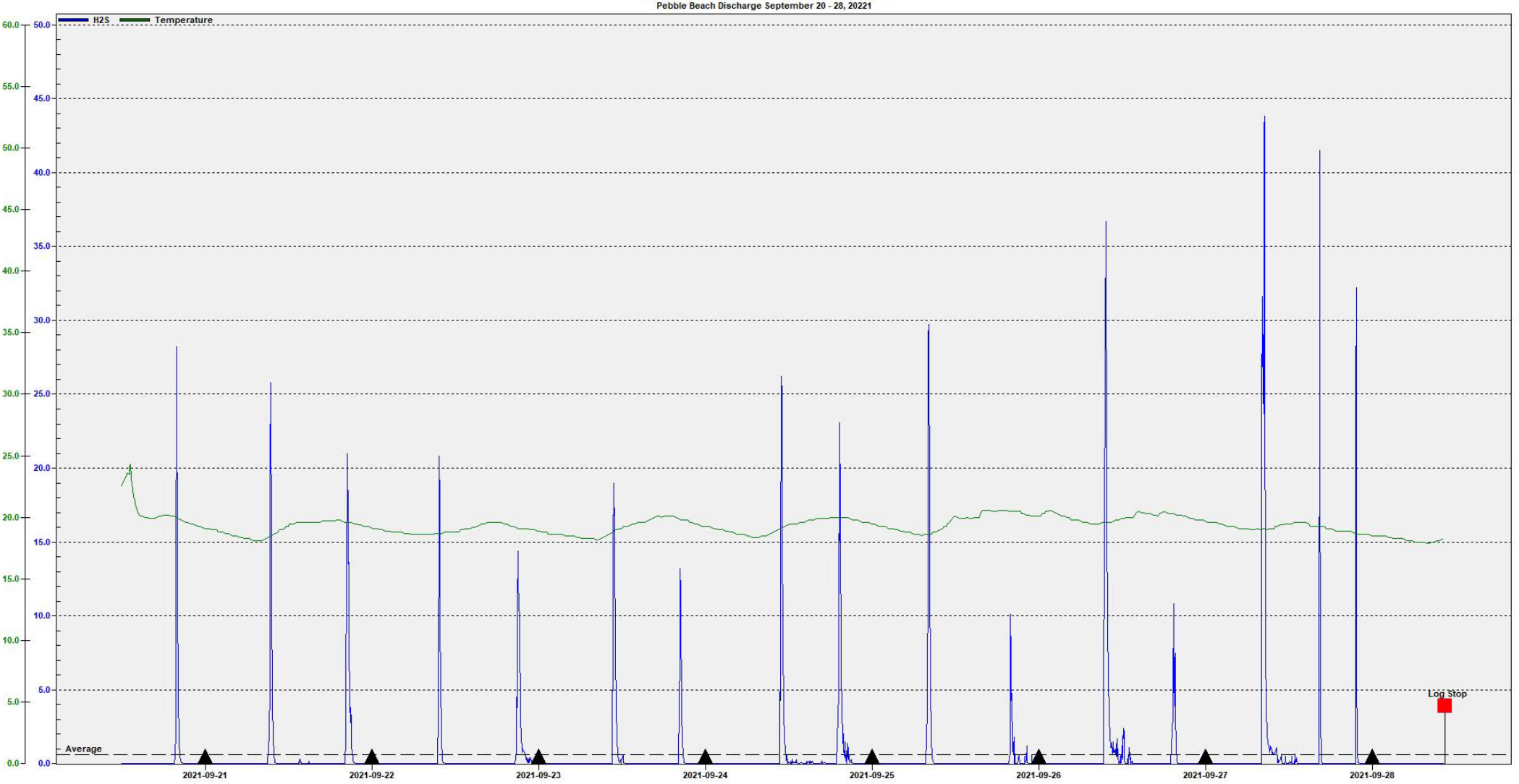


Period Displayed: 2021-09-28 - 2021-10-05 (Oda File: 20211006_05203915_01.oda -- Serial Number: Odalog Type L2-RTx 05203915 Instrument Range 0-0PPM)

Average 0.0 | Day Transition Min 0.0 Max 3.4 (Use Screen Data Only)

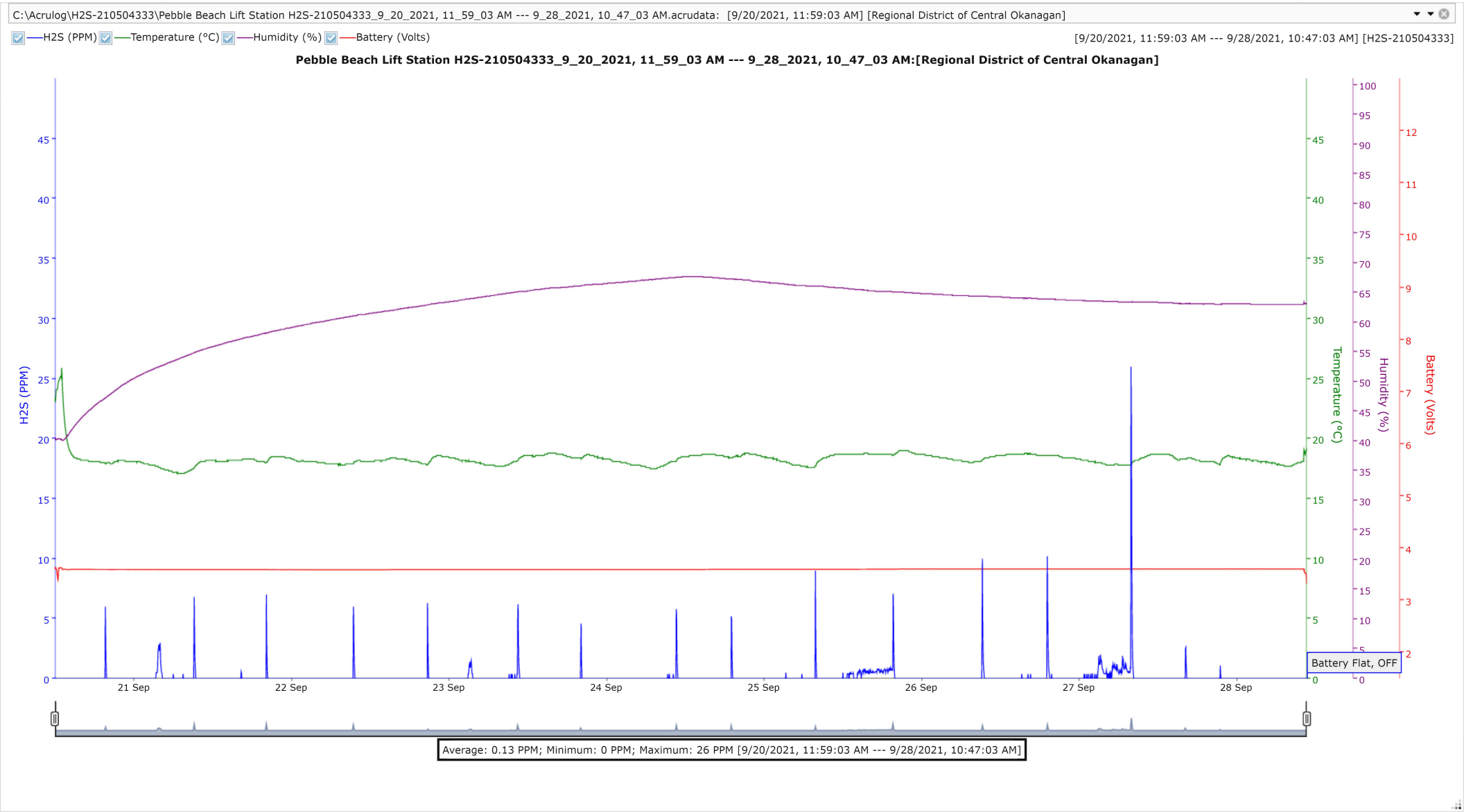
Regional District of Central Okanagan

Pebble Beach Discharge September 20 - 28, 20221



Period Displayed: 2021-09-20 - 2021-09-28 (Oda File: 20210929_05203916_01.oda -- Serial Number: Odalog Type L2-RTx 05203916 Instrument Range 0-0PPM)

Average 0.6 | Month Transition Min 0.0 Max 43.8 (Use Screen Data Only)


C:\Acrulog\H2S-210504333\Pebble Beach Lift Station H2S-210504333_9_20_2021, 11_59_03 AM --- 9_28_2021, 10_47_03 AM.acrudata: [9/20/2021, 11:59:03 AM] [Regional District of Central Okanagan]
H2S (PPM)
Temperature (°C)
Humidity (%)
Battery (Volts)
[9/20/2021, 11:59:03 AM --- 9/28/2021, 10:47:03 AM] [H2S-210504333]
Pebble Beach Lift Station H2S-210504333_9_20_2021, 11_59_03 AM --- 9_28_2021, 10_47_03 AM:[Regional District of Central Okanagan]
H2S (PPM)
Temperature (°C)
Humidity (%)
Battery (Volts)
21 Sep
22 Sep
23 Sep
24 Sep
25 Sep
26 Sep
27 Sep
28 Sep
Battery Flat, OFF
Average: 0.13 PPM; Minimum: 0 PPM; Maximum: 26 PPM [9/20/2021, 11:59:03 AM --- 9/28/2021, 10:47:03 AM]

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