



**Porirua WWTP Investigation Report**

**Faecal Coliform exceedances: February 2024**



# Document Control

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## 1. Incident Details

## The Event

On the 21<sup>st</sup> February 2024, Wellington Water was notified by Veolia that the Faecal Coliform results at Porirua Wastewater Treatment Plant had been non-compliant with Condition 35(A) of Resource Consent on 14<sup>th</sup> & 15<sup>th</sup> February.

The condition states that the Faecal Coliform levels should not exceed 2,000 cfu per 100 m/l of treated wastewater for 2 or more consecutive days. The results are shown in the table below.

<u>Date</u>	<u>Faecal Coliforms (cfu/100MI)</u>
14/2/2024	5348
15/2/2024	3924

## Contributory Factors

*The following factors are believed to have contributed to the non-compliance:*

- Staff sampling errors due to recent employment/inexperience of operators
- Technical issues with the inlet penstock of the (new) Duron UV system which caused the deviation of the normal duty/standby UV system setup
- Timing of the sample collections

## 2. Timeline/Sequence of events

DATE	EVENT
26/1/24	22:56 – The penstock on the new Duron UV unit faults, no SCADA alarms are relayed to the on-call operators
27/1/24	07:35 – Veolia Northern Team Leader observes the fault to the Duron unit during routine morning checks and immediately turns it back on 15:30 – The Operations team decide, moving forward, to set the Duron to operate during manned hours and to operate the more reliable TAK unit system during afterhours.
29/1/24	09:00 – After some internal investigation the Veolia engages the UV manufacturer Xylem to fix penstock issue, booked in for 12 Feb.
9/2/24	16:00 – Veolia receives email from Xylem postponing the 12 February repair date to the 15 February
15/2/24	14:00 – Xylem repairs penstock on Duron unit
19/2/24	09:20 – Veolia observe exceedances with results from 14 <sup>th</sup> and 15 <sup>TH</sup> February
21/2/24	11:33 – Veolia notifies Wellington Water of exceedance
Ongoing	Continuous monitoring of TAK lamps and UV results by the Operations team.

# 3. Analysis and Findings

## UV System operation

The penstock of the Duron UV system experienced a mechanical fault in the late hours of 26 January. The actuator valve tripped out on high torque preventing the penstock from controlling the effluent level in the Duron channel. The SCADA system failed to send any alarm notifications to the on-call operators therefore the fault was discovered the following morning during the routine daily checks. After the incident the decision was made to use the Duron unit only in the manned hours of the plant's operation (7.30am – 4pm) and run the TAK unit from the remaining after-hours and 24 hours over weekends until the UV manufacturer could send their engineers to diagnose/fix the fault. Both UV systems are programmed to run at 100% power output to maximize the UV disinfection once they are brought online. The setup change has been implemented since 27<sup>th</sup> January but there were no exceedances recorded until 14<sup>th</sup> and 15<sup>th</sup> February. This would mean that this issue is unlikely the root cause of the exceedance.

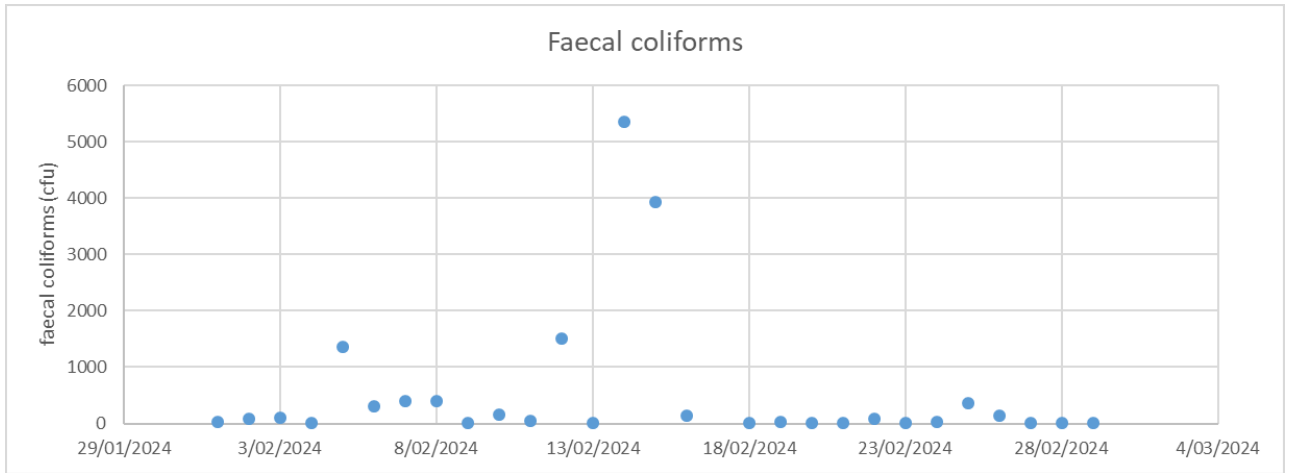
## Individual – Human Factors

During the period of the spikes in faecal coliforms, the sampling was conducted by a newly trained operator. Along with the issues with the UV system the spikes also indicate a potential error in the sample collection process. Operators collect daily samples at approximately 8.30am under the instructions and guidance of a team leader or senior operator until they are deemed fully competent with the sampling technique. This is performed this way to ensure there is a uniformed approach and consistency is achieved in the sampling schedule. The team leader that would normally assist the new operator was on annual leave during this period meaning the samples were taken by the operator alone.

The timing the sample was taken should also be considered. With the Duron penstock having mechanical issues the UV systems were swapped over every morning switching from the TAK (overnight) to the Duron (day operation). The sampling on February 14<sup>th</sup> & 15<sup>th</sup> was carried out when this switchover had just taken place. The switch over on the 14<sup>th</sup> and 15<sup>th</sup> Feb happened around 8:05 am and 8:20 am respectively. This means that the UV system might still be stabilizing and the channel is still filled with stagnant water overnight when the sample was collected which have cause a slight exceedance in the faecal coliform level on the treated wastewater.

## Process/Quality Controls

Figure 2 below shows Faecal coliforms counts during the month of February indicating the spikes on February 14<sup>th</sup> and 15<sup>th</sup>.



**Figure 1: Faecal coliforms count**

**Total Suspended Solids (TSS)**

Since the concentration of Total Suspended Solids (TSS) in the final effluent has a direct effect On the UV system performance, TSS results were also taken into account to make sure there were no spikes in the process during the period.

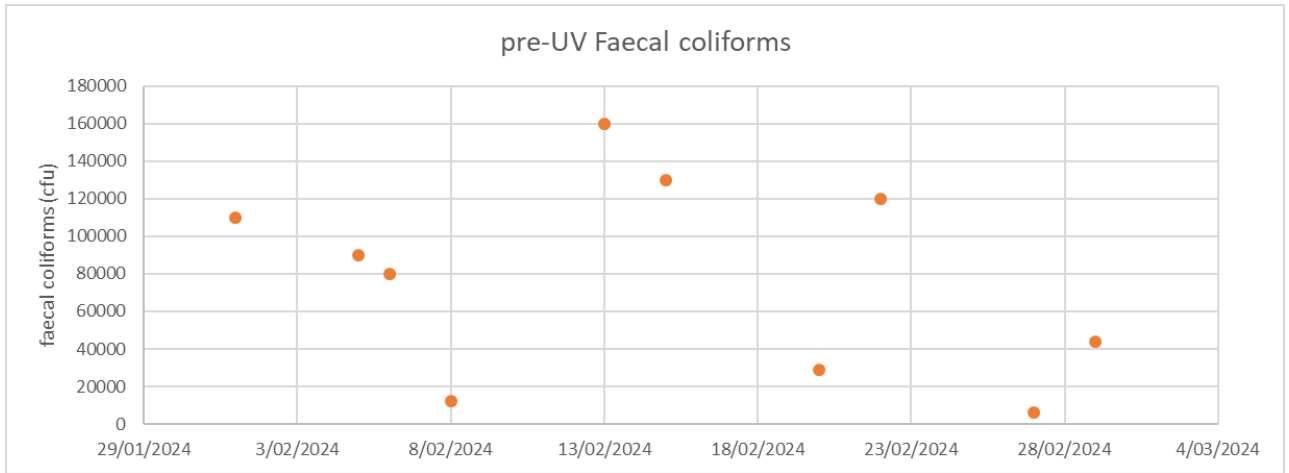
As per the results below in Table 1 the TSS was within limits thus eliminating this as a process issue.

Date	Suspended Solids (g/m3)	90 Day Geometric Mean (30 g/m3)	Percent compliance
14/2/2024	6	6	100
15/2/2024	6	6	100

**Table 1 : TSS Results during spikes**

**Pre-UV Faecal Coliforms results**

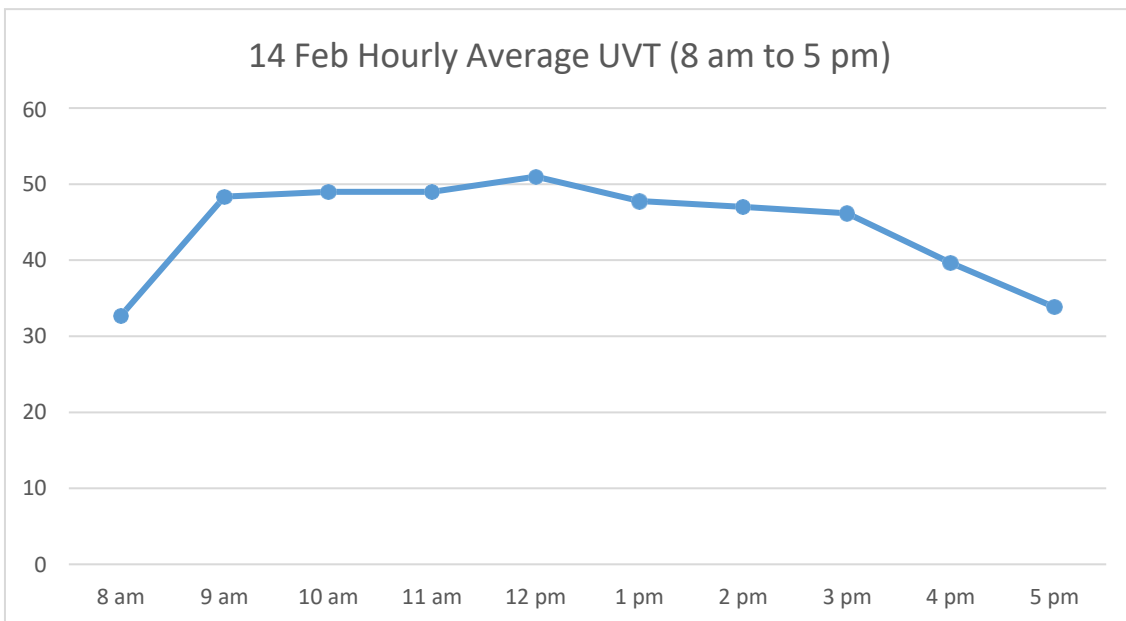
The sampling for the pre-UV is conducted twice a week on Tuesdays and Thursdays therefore only the result for the 15th of February is available however the long-term trend in pre-UV confirms counts shows that there were no concerning spikes.



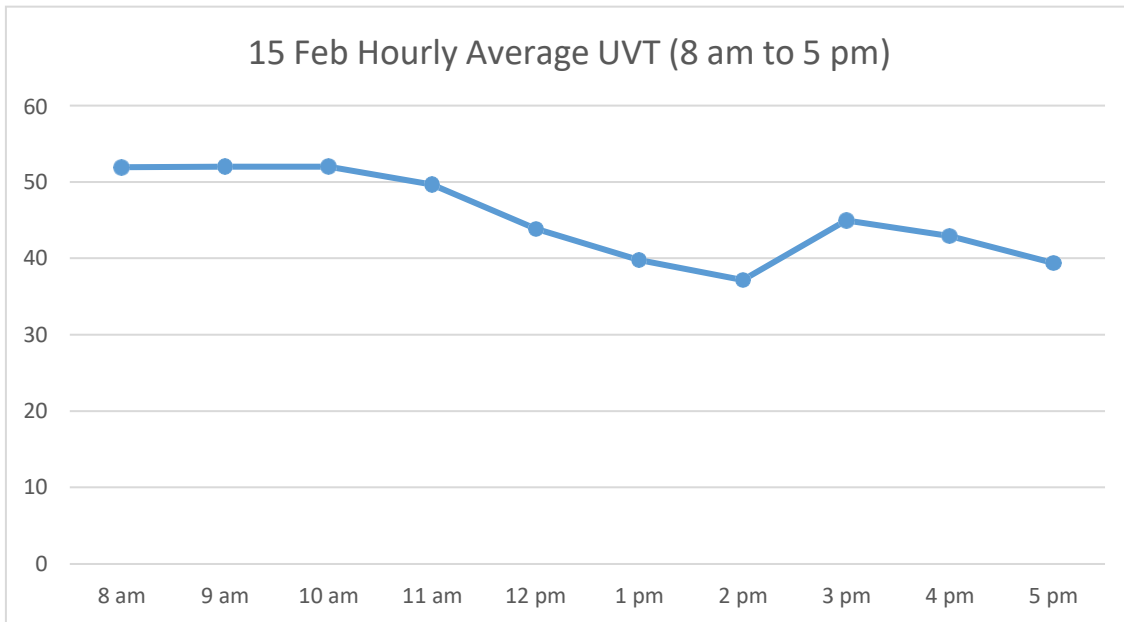
**Figure 2 :Pre-UV Faecal Coliforms Results for February 2024.**

**UV transmissivity**

Trends for the online UV transmissivity readings from the are given below. The samples were taken around 8:30 am with UVT records showing good UVT Results in the morning when the sample was collected.







## Organisational Factors

There are two new operators employed at the Porirua Wastewater Treatment Plant undergoing on-site training. To upskill the operators an extended training campaign for the operations and maintenance team is being planned. This will create an ongoing learning process for the team irrespective of experience, creating uniformity, which should help reduce human error while performing the tasks assigned.

Standard Operating Procedures (SOPs) are being reviewed. The SOP for the cleaning of the UV has been added to the SOP register and includes all the necessary steps as well as the cleaning routines of both the Duron and TAK systems.

## 4. Conclusion

The exceedance of the faecal coliform results on the 14<sup>th</sup> and 15<sup>th</sup> February can be likely attributed to error in sampling and timing of the sample collection.

While there were mechanical issues highlighted in the UV, the exceedance occurring for only two days suggests mechanical issues are not the main cause of the exceedance.

## 5. Corrective Actions

	Observation	Action	By when
1	Duron system technical issues with penstock and Xylem delay in attending site	Engage Xylem to come ASAP, run full diagnostic to ensure Duron operates as intended.	February – Done. Duron now reinstated to duty channel, TAK is assist unit and operates once flow exceeds 750 l/s.
2	Human error in sampling	Training for the full Operational staff, SOP's developed/revisited where needed.	Ongoing
3	Additional monitoring of UV intensity	Proposed idea to install a UV intensity meter	EO June 2024

