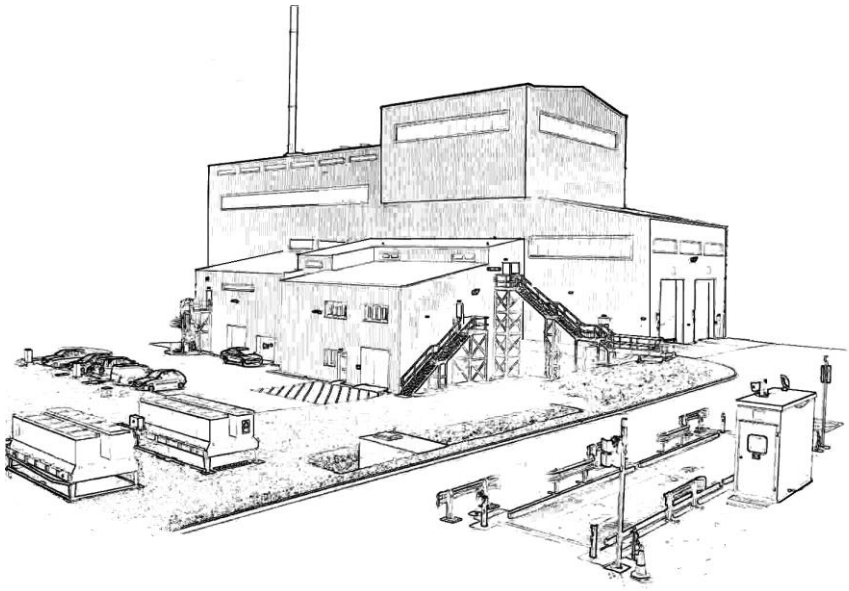
# Shetland Islands Council
# Environmental Services

# Energy Recovery Plant
# Annual Report

# 2022



**Pollution Prevention and Control (Scotland) Regulations 2000**
**Permit Number: PPC/A/1003141**
Prepared for: **Scottish Environment Protection Agency**

Prepared by: [redacted]

**Shetland Islands Council**
**Environmental Services**
**Infrastructure Services Department**
**Grantfield**
**Lerwick**
**Shetland**
**ZE1 0NT**

## Introduction

The Energy Recovery Plant was built for the Shetland Islands Council and is situated at Greenhead, Lerwick. The furnace is equipped with a traditional moving grate system for the incineration of mixed waste. The waste used is mainly municipal, generated from Shetland, Orkney and Off Shore. In the latter three months municipal waste has been delivered for processing from Highland Council.

The energy from the furnace is transformed into hot water, which is fed into a District Heating Scheme.

Flue gases from the primary incineration stage are treated prior to discharge to the atmosphere by controlled secondary combustion, dry electrostatic precipitation and wet scrubbing and then dried before finally passing through bag filtration.

This is the Annual report for the Energy Recovery Plant for the months January – December 2022 inclusive.

Dioxins and Furans from the stack are monitored twice yearly and the discharge from the water treatment is monitored on a monthly basis.

This report contains information requested in table 2.1 of the authorisation and is submitted in accordance with the conditions.

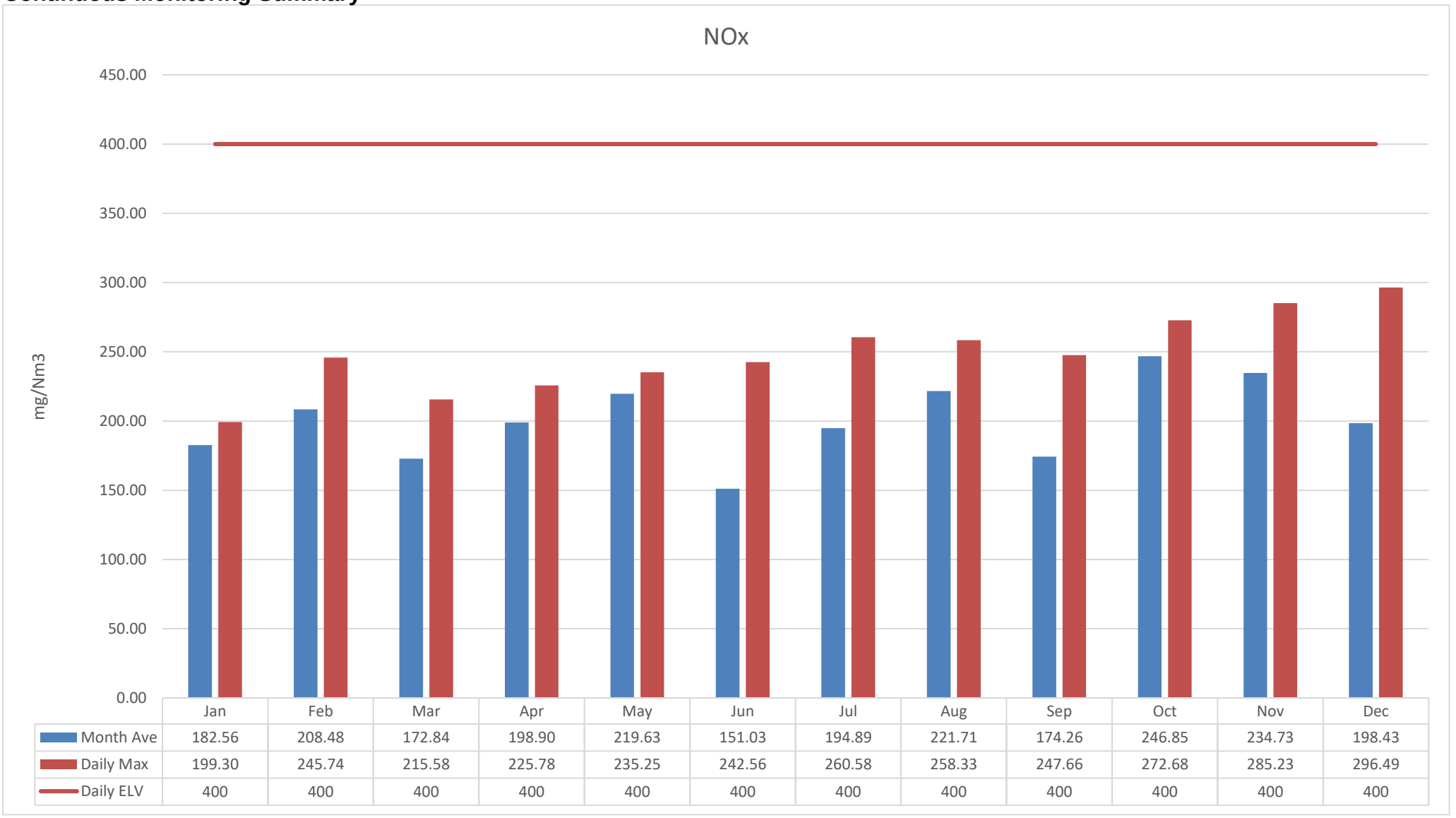
All continuous emission information in the report is obtained automatically from the reporting PC, which is an integrated part of the incinerator plant's Control Regulating and Monitoring system.

Information referring to water discharges is the result of samples analysed by external laboratories.

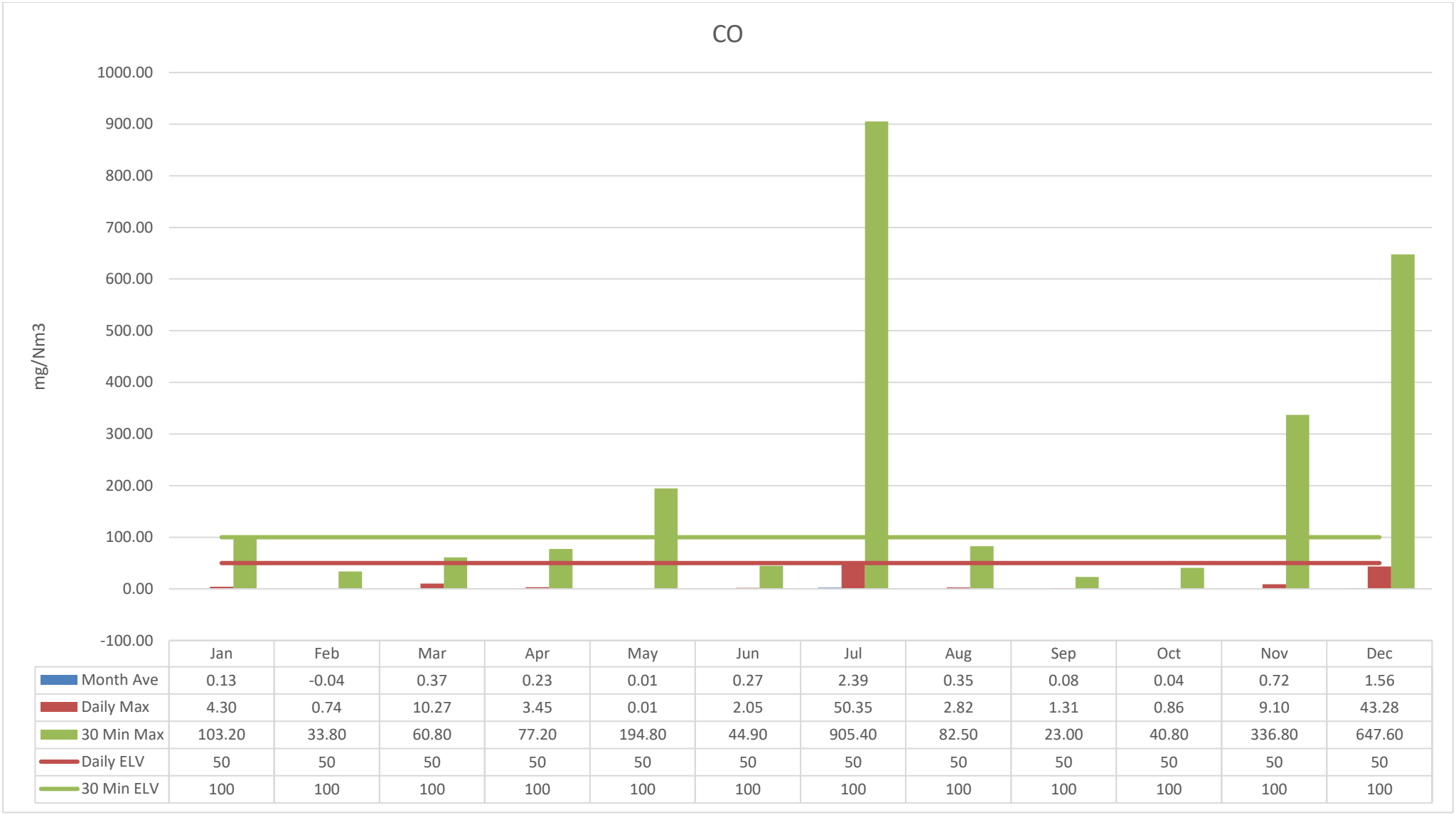
Waste values are obtained from the weighbridge report PC.

During 2022 the plant was shut down for maintenance and repairs on 6 occasions.

## Continuous Monitoring Summary

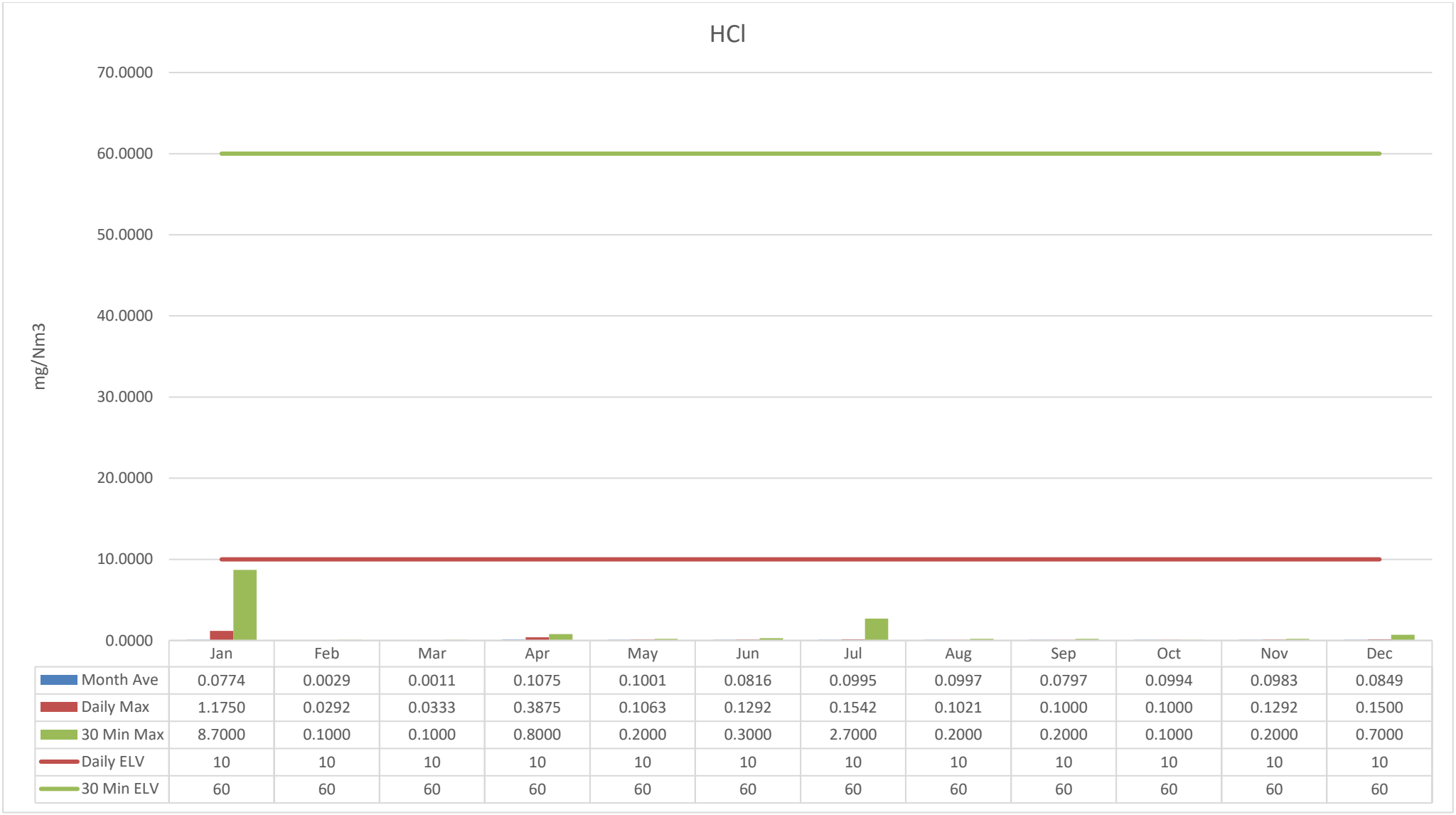



| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Month Ave | 182.56 | 208.48 | 172.84 | 198.90 | 219.63 | 151.03 | 194.89 | 221.71 | 174.26 | 246.85 | 234.73 | 198.43 |
| Daily Max | 199.30 | 245.74 | 215.58 | 225.78 | 235.25 | 242.56 | 260.58 | 258.33 | 247.66 | 272.68 | 285.23 | 296.49 |
| Daily ELV | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 |

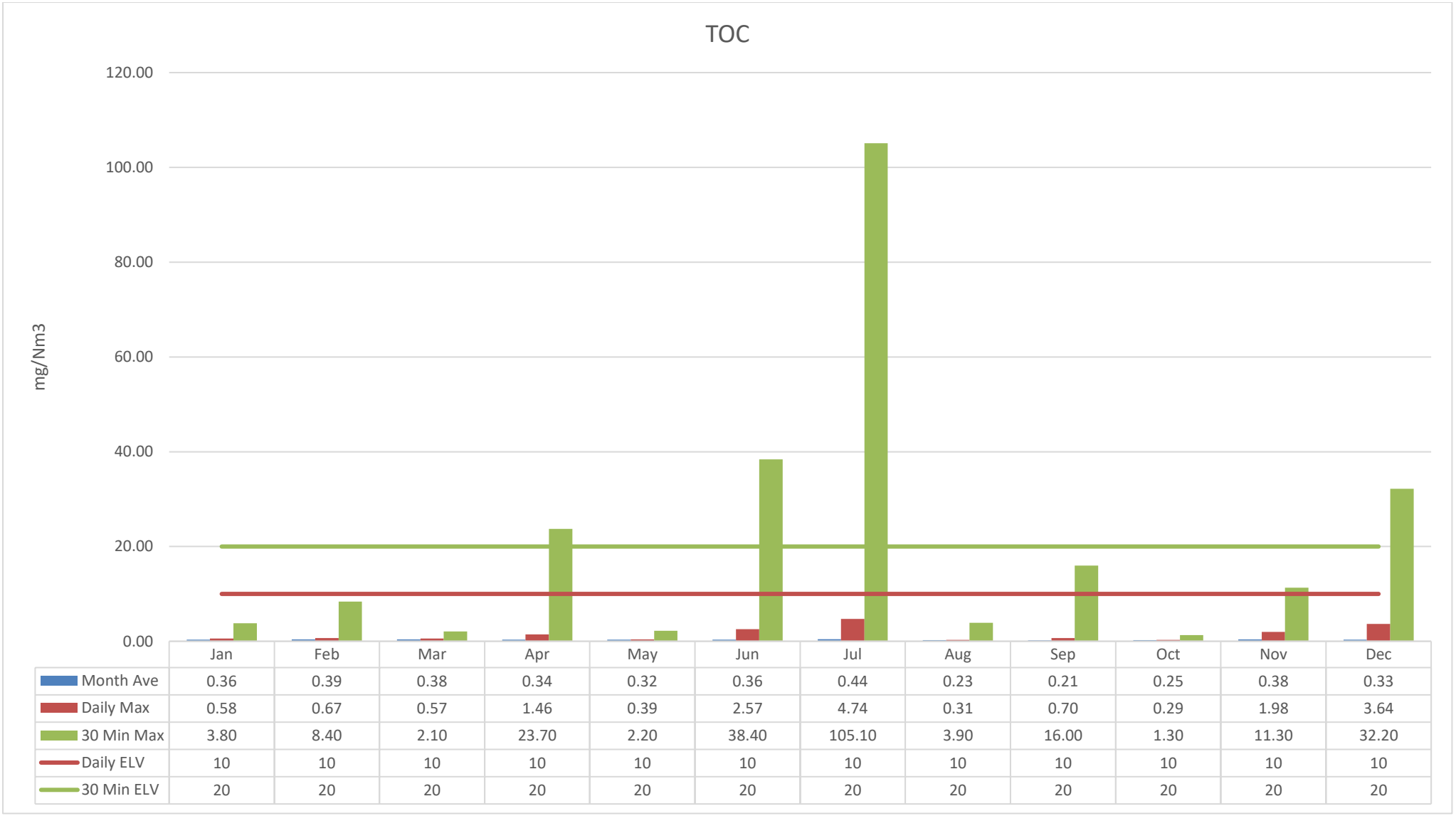



| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Month Ave | 0.13 | -0.04 | 0.37 | 0.23 | 0.01 | 0.27 | 2.39 | 0.35 | 0.08 | 0.04 | 0.72 | 1.56 |
| Daily Max | 4.30 | 0.74 | 10.27 | 3.45 | 0.01 | 2.05 | 50.35 | 2.82 | 1.31 | 0.86 | 9.10 | 43.28 |
| 30 Min Max | 103.20 | 33.80 | 60.80 | 77.20 | 194.80 | 44.90 | 905.40 | 82.50 | 23.00 | 40.80 | 336.80 | 647.60 |
| Daily ELV | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| 30 Min ELV | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

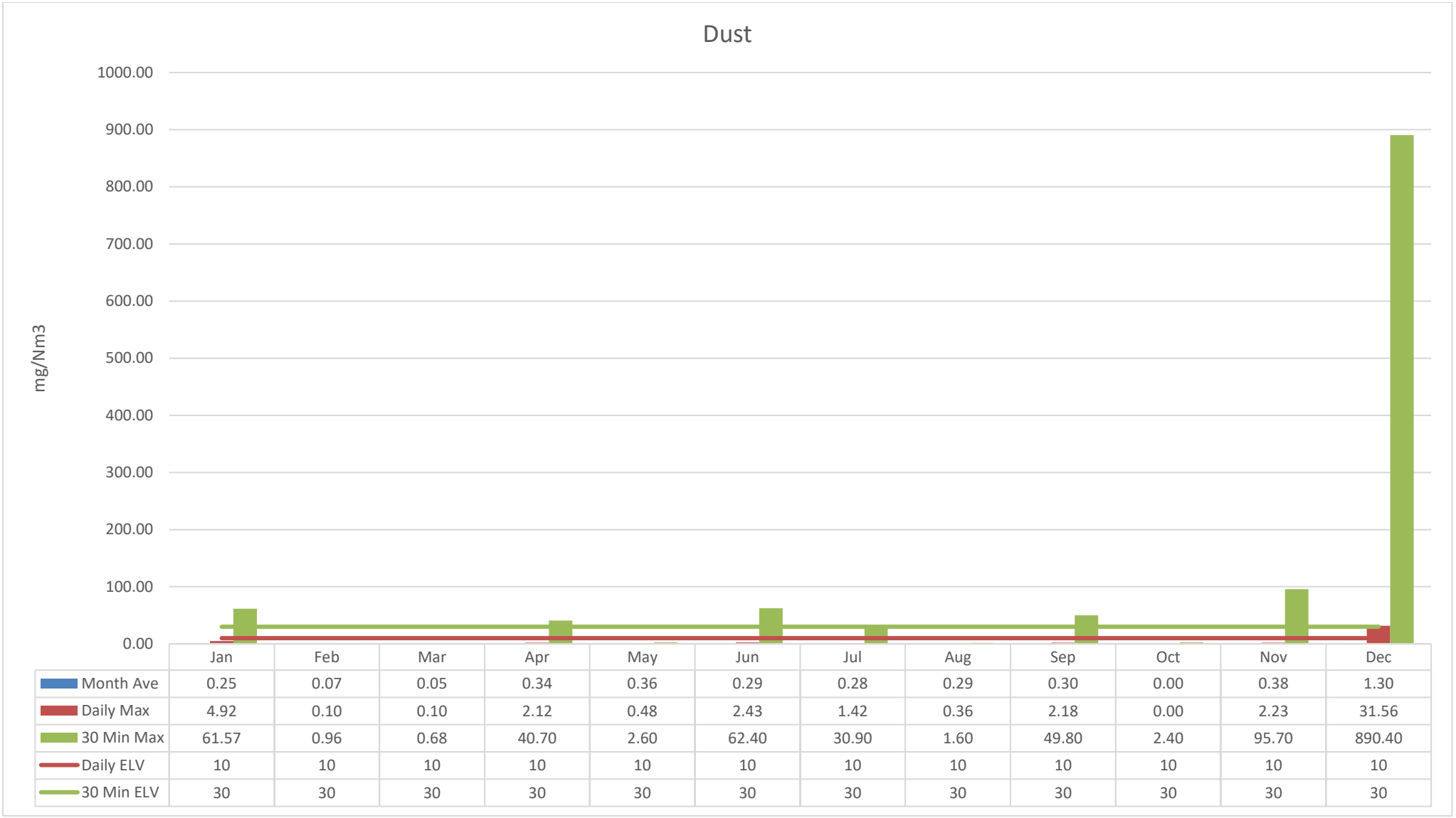

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Month Ave | 3.56 | 3.94 | 4.90 | 7.06 | 8.08 | 3.13 | 3.57 | 3.72 | 3.13 | 11.59 | 18.35 | 9.18 |
| Daily Max | 8.43 | 10.20 | 24.98 | 10.04 | 15.04 | 14.14 | 8.96 | 5.71 | 7.05 | 20.63 | 27.35 | 34.12 |
| 30 Min Max | 107.40 | 189.50 | 122.60 | 73.30 | 130.00 | 44.70 | 69.70 | 50.50 | 41.80 | 84.50 | 235.30 | 127.90 |
| Daily ELV | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| 30 Min ELV | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 |



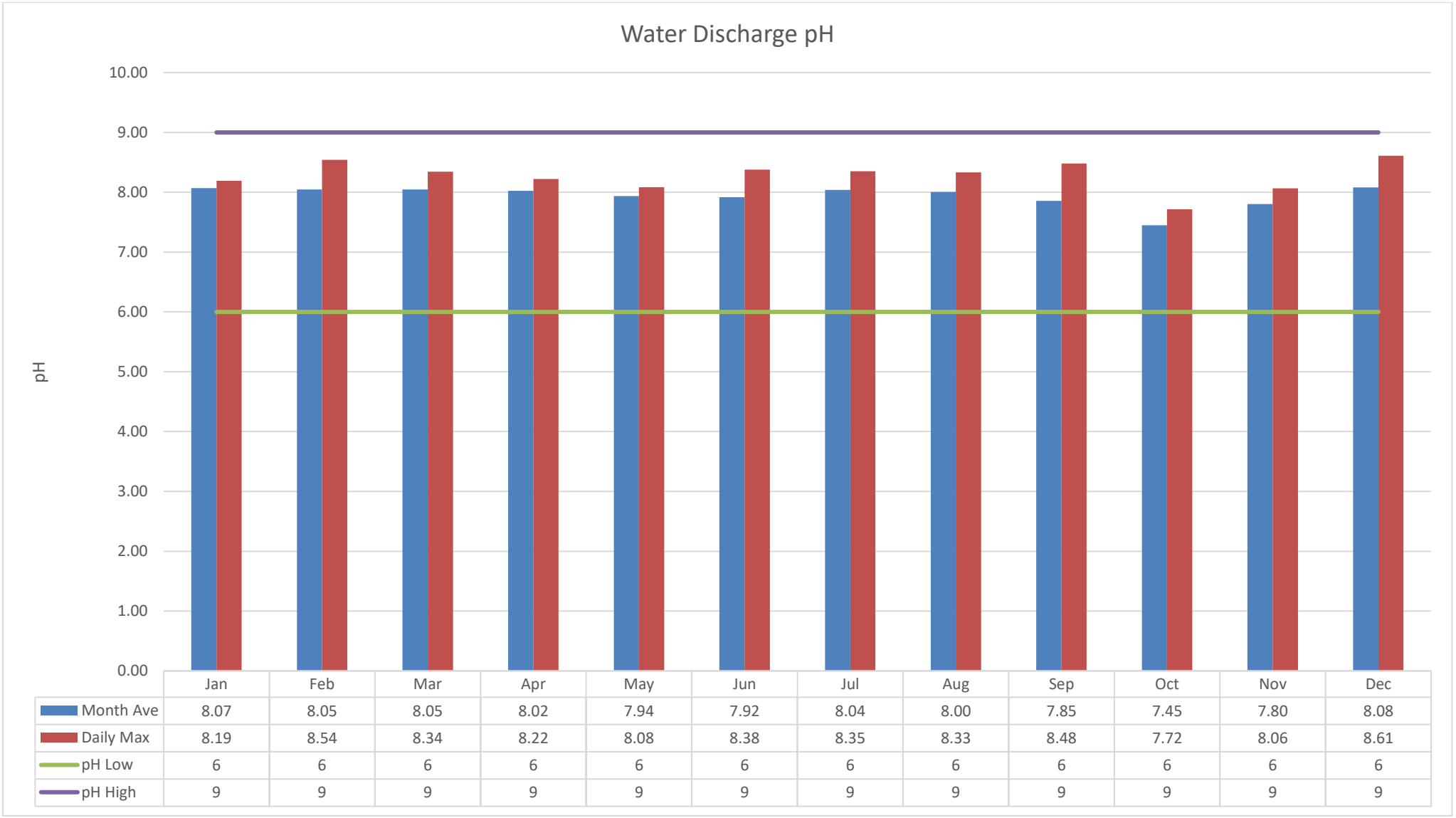

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Month Ave | 0.0774 | 0.0029 | 0.0011 | 0.1075 | 0.1001 | 0.0816 | 0.0995 | 0.0997 | 0.0797 | 0.0994 | 0.0983 | 0.0849 |
| Daily Max | 1.1750 | 0.0292 | 0.0333 | 0.3875 | 0.1063 | 0.1292 | 0.1542 | 0.1021 | 0.1000 | 0.1000 | 0.1292 | 0.1500 |
| 30 Min Max | 8.7000 | 0.1000 | 0.1000 | 0.8000 | 0.2000 | 0.3000 | 2.7000 | 0.2000 | 0.2000 | 0.1000 | 0.2000 | 0.7000 |
| Daily ELV | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| 30 Min ELV | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 |



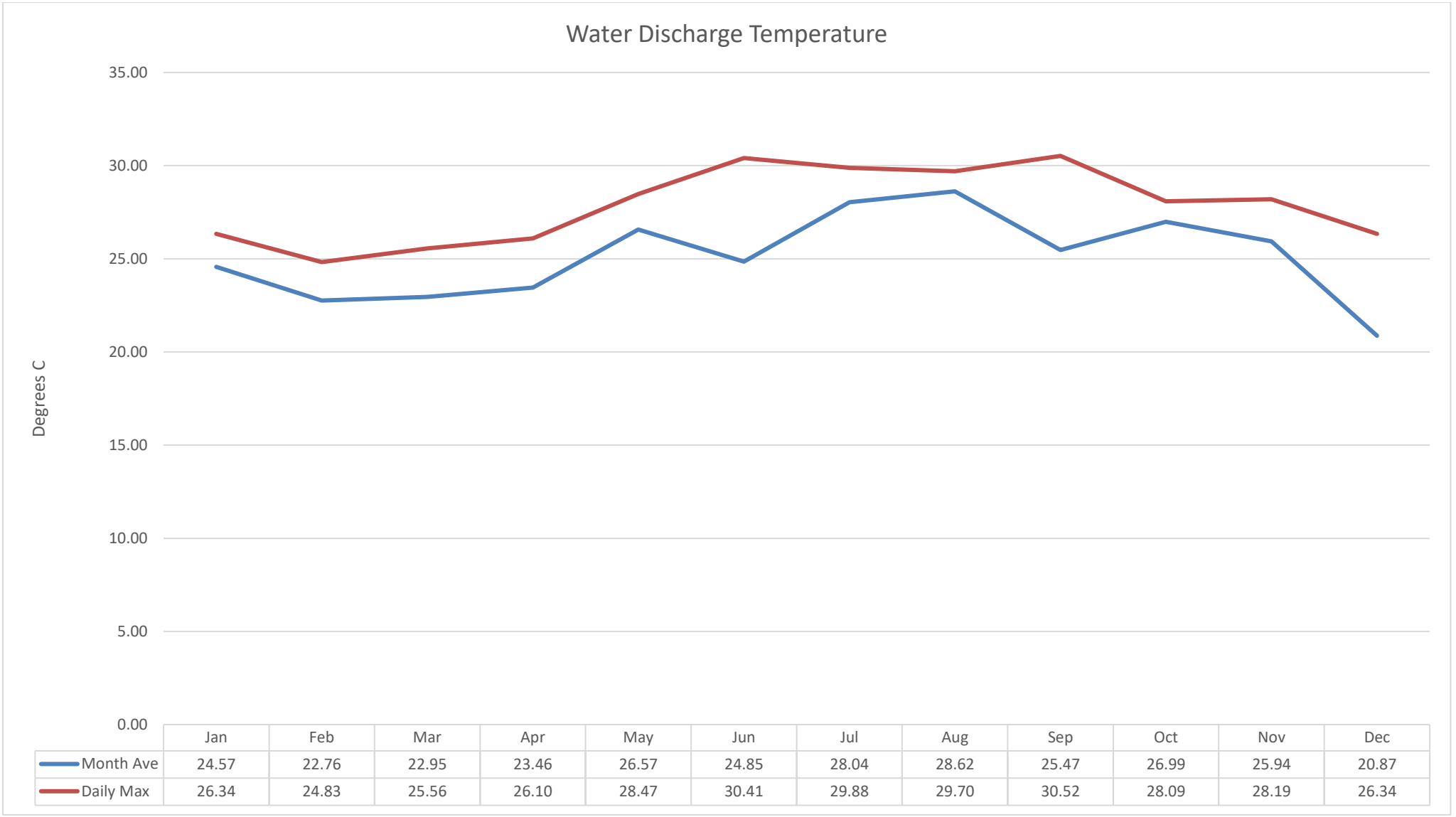

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Month Ave | 0.36 | 0.39 | 0.38 | 0.34 | 0.32 | 0.36 | 0.44 | 0.23 | 0.21 | 0.25 | 0.38 | 0.33 |
| Daily Max | 0.58 | 0.67 | 0.57 | 1.46 | 0.39 | 2.57 | 4.74 | 0.31 | 0.70 | 0.29 | 1.98 | 3.64 |
| 30 Min Max | 3.80 | 8.40 | 2.10 | 23.70 | 2.20 | 38.40 | 105.10 | 3.90 | 16.00 | 1.30 | 11.30 | 32.20 |
| Daily ELV | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| 30 Min ELV | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |



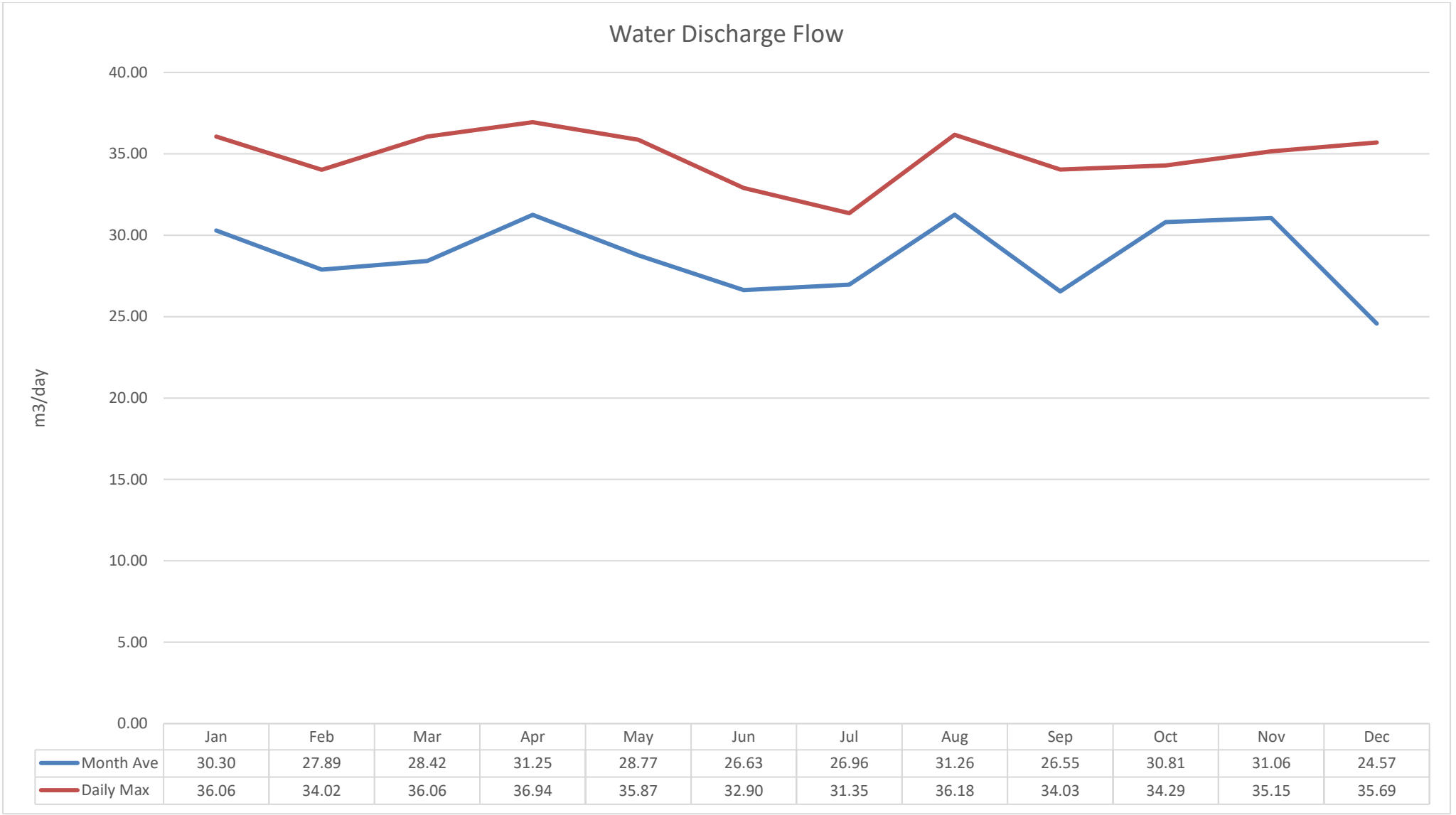

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Month Ave | 0.25 | 0.07 | 0.05 | 0.34 | 0.36 | 0.29 | 0.28 | 0.29 | 0.30 | 0.00 | 0.38 | 1.30 |
| Daily Max | 4.92 | 0.10 | 0.10 | 2.12 | 0.48 | 2.43 | 1.42 | 0.36 | 2.18 | 0.00 | 2.23 | 31.56 |
| 30 Min Max | 61.57 | 0.96 | 0.68 | 40.70 | 2.60 | 62.40 | 30.90 | 1.60 | 49.80 | 2.40 | 95.70 | 890.40 |
| Daily ELV | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| 30 Min ELV | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |




| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Month Ave | 8.07 | 8.05 | 8.05 | 8.02 | 7.94 | 7.92 | 8.04 | 8.00 | 7.85 | 7.45 | 7.80 | 8.08 |
| Daily Max | 8.19 | 8.54 | 8.34 | 8.22 | 8.08 | 8.38 | 8.35 | 8.33 | 8.48 | 7.72 | 8.06 | 8.61 |
| pH Low | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| pH High | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 |




| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Month Ave | 24.57 | 22.76 | 22.95 | 23.46 | 26.57 | 24.85 | 28.04 | 28.62 | 25.47 | 26.99 | 25.94 | 20.87 |
| Daily Max | 26.34 | 24.83 | 25.56 | 26.10 | 28.47 | 30.41 | 29.88 | 29.70 | 30.52 | 28.09 | 28.19 | 26.34 |




| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Month Ave | 30.30 | 27.89 | 28.42 | 31.25 | 28.77 | 26.63 | 26.96 | 31.26 | 26.55 | 30.81 | 31.06 | 24.57 |
| Daily Max | 36.06 | 34.02 | 36.06 | 36.94 | 35.87 | 32.90 | 31.35 | 36.18 | 34.03 | 34.29 | 35.15 | 35.69 |

## Periodic Monitoring

Periodic emissions to atmosphere sampling was carried out by Envirocare in June (EK-0106), and December (EK0207).

*See Appendix 1*

Analysis of ashes and water was carried out by SOCOTEC in March (22031819), June (22060707), September (22090854) and in December (22120516).

*See Appendix 2*

## Incidents

There was a high Max 30 Min CO reading and high dust reading on 21st January. This was due to a power supply unit failure on the flue gas processor. There was no waste being fed at the time.

There was high Dust and TOC readings on 1st of April and the 14th of June. This was due to the plant starting up after being shut down for cleaning.

There was a high CO reading on 24th of May. This was due to breakdowns with the grab. There was no waste being fed at the time.

There was a high dust reading on 20th July. The plant was shut down at the time due to a power supply unit failure. No waste was being fed at the time.

There was a high dust reading on 16th September. The plant was shut down for maintenance at the time. No waste was being fed at the time.

There was also high CO and TOC reading that day, and also high TOC for the 22nd of July. This was due to a blockage in ash quench, we had to burn of grates and clear.

There was a high dust and CO reading on the 16th November. This was due to the grates being burned off at the time to inspect alkaline nozzles.

There was a high SO2 reading on 18th November which resulted in an emission breach. Stuart Paton sent a report to SEPA to notify them of this at the time.

There was a high TOC reading on 9th December. This was due to starting up after a shutdown. No waste was being fed at this time.

There was a high Dust and TOC reading on 21st December. This was due to the failure of I/O card bases. Stuart Paton sent a report to SEPA to notify them of this at the time.

**Quantities of waste accepted to the premises in 2022 (kg)**

| Waste Type | Kg |
|---|---|
| **Clinical** | 108220 |
| **Municipal** | 22792580 |
| **Offshore** | 0 |
| **Fish** | 165060 |
| **Total** | 23065860 |

**Abnormal Operating Event**

| Date | Device Name | Duration of Failure (Minutes) | Emission Fail (Yes/No) |
|---|---|---|---|
| 06/01/2022 | Dry Injection | 1:00 | No |
| 30/01/2022 | Dry Injection | 0:04 | No |
| 06/02/2022 | Dry Injection | 0:05 | No |
| 17/04/2022 | Dry Injection | 0:05 | No |
| 03/05/2022 | Dry Injection | 0:05 | No |
| 08/05/2022 | Dry Injection | 0:07 | No |
| 15/05/2022 | Dry Injection | 0:12 | No |
| 22/05/2022 | Dry Injection | 0:09 | No |
| 29/05/2022 | Dry Injection | 0:04 | No |
| 19/06/2022 | Dry Injection | 0:09 | No |
| 26/06/2022 | Dry Injection | 0:06 | No |
| 03/07/2022 | Dry Injection | 0:06 | No |
| 10/07/2022 | Dry Injection | 0:06 | No |
| 17/07/2022 | Dry Injection | 0:12 | No |
| 24/07/2022 | Dry Injection | 0:08 | No |
| 31/07/2022 | Dry Injection | 0:14 | No |
| 07/08/2022 | Dry Injection | 0:08 | No |
| 14/08/2022 | Dry Injection | 0:14 | No |
| 21/08/2022 | Dry Injection | 0:06 | No |
| 28/08/2022 | Dry Injection | 0:08 | No |
| 04/09/2022 | Dry Injection | 0:09 | No |
| 18/09/2022 | Dry Injection | 0:05 | No |
| 25/09/2022 | Dry Injection | 0:07 | No |
| 02/10/2022 | Dry Injection | 0:08 | No |
| 09/10/2022 | Dry Injection | 0:05 | No |
| 16/10/2022 | Dry Injection | 0:06 | No |
| 23/10/2022 | Dry Injection | 0:04 | No |
| 30/10/2022 | Dry Injection | 0:10 | No |
| 06/11/2022 | Dry Injection | 0:08 | No |
| 13/11/2022 | Dry Injection | 0:04 | No |
| 20/11/2022 | Dry Injection | 0:09 | No |
| 27/11/2022 | Dry Injection | 0:04 | No |
| 11/12/2022 | Dry Injection | 0:09 | No |
| 18/12/2022 | Dry Injection | 0:04 | No |
| 19/12/2022 | Dry Injection | 1:00 | No |
| 25/12/2022 | Dry Injection | 0:03 | No |
| 29/12/2022 | Dry Injection | 0:44 | No |
| 31/12/2022 | Dry Injection | 0:16 | No |

**Raw material Utilisation**

| Item | Component | Unit | Quantity |
|---|---|---|---|
| **Electricity from Grid** | | MW | 2,087 |
| **Gas Oil** | | ltr | 69112 |
| **Gas Treatment** | Sorbalite | tonne | 36000 |
| | Caustic Solution | ltr | 179000 |
| | Urea | ltr | 0 |
| **Water** | Mains | m3 | 13779 |
| | Spring | m3 | 1238 |
| **Effluent Treatment** | HCl | ltr | 1845 |
| | FeCl | ltr | 2870 |
| | TMT | ltr | 4100 |
| | Lime | tonne | 90000 |
| | Polymer | Kg | 55 |

**Hours of Operation**

Total hours of operation – **8144**

**Water Discharge – Mass emissions**

Mass emissions is calculated using the values from the monthly water samples and the total flow discharge of 10508 $m^3$.

| Metal | Kg/Year |
|---|---|
| Arsenic | 0.0000252 |
| Cadmium | 0.0000240 |
| Chromium | 0.0001870 |
| Copper | 0.0001891 |
| Lead | 0.0000578 |
| Mercury | 0.0000002 |
| Nickel | 0.0008398 |
| Thallium | 0.0000788 |
| Zinc | 0.0024519 |
| | |

## Emissions to Air – Mass emissions

Mass release rates calculated as an average over x2 tests June (EK-0106) December (EK0207). Total operational hours of 0.

| Component | Kg/Year |
|---|---|
| **Particulate matter** | 123.3816 |
| **PCDD/PCDF, (WHO TEQ)** | 1.12387E-07 |
| **PAHs** | 86.7336 |
| **Total 'metals'** | 3.09472 |
| **Cadmium + Thallium** | 0.16288 |
| **Mercury** | 0.044792 |
| **Ammonia** | 52.5288 |
| **Hydrogen chloride** | 6.3116 |
| **Hydrogen fluoride** | 3.6648 |
| **VOCs, as C** | 53.7504 |
| **Carbon monoxide** | 754.9488 |
| **Oxides of nitrogen, as NO2** | 31875.616 |
| **Sulphur Dioxide** | 1144.232 |
| | |

## Remarks

The reported data is defined in section 6.4.3 and submitted as section 2.4.2 of the permit.

# Appendix 1

# Appendix 2