



Air Quality Annual Monitoring Report 2023

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Approvals

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Executive Summary

This report provides a review of the air quality monitoring programme carried out by OceanaGold New Zealand Limited (OGNZL) in and around Waihi, and related matters. The report is produced annually to provide a continuing record of the air quality performance of OGNZL. This report covers the 2023 calendar year and is produced in accordance with the Favona, Trio, Correnso & Martha Mines Air Quality Management Plan, 2023.

The information presented mainly relates to OGNZL's routine ambient air monitoring programme, which has been underway since 1982. The 2023 routine monitoring included measurements of total suspended particulate (TSP) and deposited particulate (DP) at 13 sites. There are 6 monitors for TSP and 9 monitors for DP.

Also included in this report are quality assurance measures, the results of any additional air quality monitoring and complaints received, as required by the consent conditions.

The conclusions of the 2023 review are:

- No exceedances of the threshold limits or breaches of the trigger levels occurred for TSP or DP during the year.
- OGNZL received one air quality complaints during 2023 (*cf.* two in 2022), however it was not mine related.

1 Introduction

Surface and underground mining operations can generate dust from drilling, blasting, ripping, grading, loading, haulage, tipping, crushing, conveying, and general vehicle movements. Dust can also be generated from exposed areas and stockpiles. Other mining air emissions include combustion gases (carbon monoxide and dioxide, nitrogen oxides and sulphur dioxide), directly from blasting and via exhaust emissions from machinery.

Several Discharge to Air consents (Consent 109741 for the Favona Mine, Consent 121697 for the Trio Mine, and Consent 124859 for the Golden Link Project Area) regulate the site air emissions. The requirement to provide an annual written report is a condition in each of the consents and the condition states:

The consent holder shall provide to the Waikato Regional Council a written annual report each year that addresses at least the following:

- (a) A summary of the results of the monitoring required by this consent.*
- (b) Any environmentally important trends arising from the monitoring programme.*
- (c) Comments on compliance with all conditions.*
- (d) Any reasons for non-compliance or difficulties in achieving compliance with the conditions of this resource consent.*
- (e) Any works that have been undertaken to improve environmental performance or that are proposed to be undertaken in the up-coming year to improve environmental performance in relation to the activities included in this consent.*

This report is prepared to satisfy that requirement. In particular, it gives a review of the air quality monitoring programme carried out by OGNZL at Waihi. The review covers the 2023 calendar year with reference to earlier years as appropriate.

This report also covers other air quality activities including other (non-routine) air quality monitoring, quality assurance measures and any complaints received.

2 Air Resource Consent & Air Quality Management Plan

The site's Discharge to Air resource consents authorise OGNZL to discharge contaminants to the air from the surface project area, mine portal, and vent shafts. The consents require OGNZL to develop an Air Quality Management Plan (discussed below) to address air quality objectives, management, and monitoring. It is to be reviewed and updated at least once every two years. This report is in accordance with the 2023 Air Quality Management Plan which was approved by Waikato Regional Council (WRC) in January 2023; the 2023 Plan is the latest approved version.

The Air Quality Management Plan is the guiding document for air quality management at OGNZL, the contents of which are defined in the consent. If there is a conflict or inconsistency

between the conditions of the consent and the provisions of the Air Quality Management Plan, the Discharge to Air resource consent shall prevail.

The Discharge to Air resource consent prescribes various process-type measures to reduce atmospheric emissions and assessments of environmental impacts. The resource consent also sets down the required content of this report.

A requirement of the Air Quality Management Plan is to specify air quality control measures. To meet this requirement OGNZL have adopted the concept of “trigger levels” as being ambient concentrations of air pollutants of concern, rather than ambient air quality guidelines that were more commonly used previously in air quality management. The trigger levels are set at about two-thirds the level of previous limits, and they are recorded in the Air Quality Management Plan.

When the trigger levels are exceeded, OGNZL is required to investigate and report on the reason for the elevated result and identify corrective action(s) to prevent a repeat occurrence where possible. The ambient air “trigger levels” specified in the Air Quality Management Plan are displayed in Table 1.

Table 1. Air Quality Parameters and Trigger Levels

	Total suspended particulate	Deposited particulate
Sample period	7-day average	30-day average
Unit of measure	µg/m ³	g/m ² /month
OGNZL trigger level	45	4

3 Routine Monitoring Programme

There are two types of dust measurement included in the routine ambient air monitoring programme: total suspended particulate (TSP) and deposited particulate (DP).

Although not part of the routine weekly/monthly monitoring programme, PM₁₀ and silica monitoring has in the past been done biennially. After years of data collection by both OGNZL and WRC (with results within accepted limits), monitoring for PM₁₀ and silica has been suspended, with a provision to reinstate a programme if/when considered necessary.

3.1 Monitoring Sites

Details of all 2023 dust monitoring sites are given in Table 2. During the calendar year, there have been a total of 13 sites in use for the routine monitoring programme (Figure 1).

Table 2. Description of 2023 Permanent Monitoring Sites

Site No	Description	Location	Air Monitor Type(s)
6.59	Alexander's, Golden Valley	N of Devt Site	DP
6.60	Torrens, Golden Valley	N of Mill	DP
6.61	Leaches	NE of Pit	DP
6.61	Grey St	NE of Pit	TSP and Real-time TSP
6.63	Met Station, Barry Rd	SE of Pit	TSP, DP and Real-time TSP
6.64	Courthouse, Haszard Street	S of Pit	TSP
6.65	Moresby Avenue	SW of Pit	TSP
6.66	Waihi College, Rata Street	W of Pit	TSP and DP
6.71	Morrison's Farm, Trig Road	SE of Devt Site	DP
6.72	Ruddock's Farm, Baxter Road	W of Devt Site	DP
6.73	TSF East	E of Devt Site	DP
6.74	Bulltown Road	N of Pit	DP and Real-time TSP
6.78	Cnr Grey & Slevin Streets	E of Pit	TSP

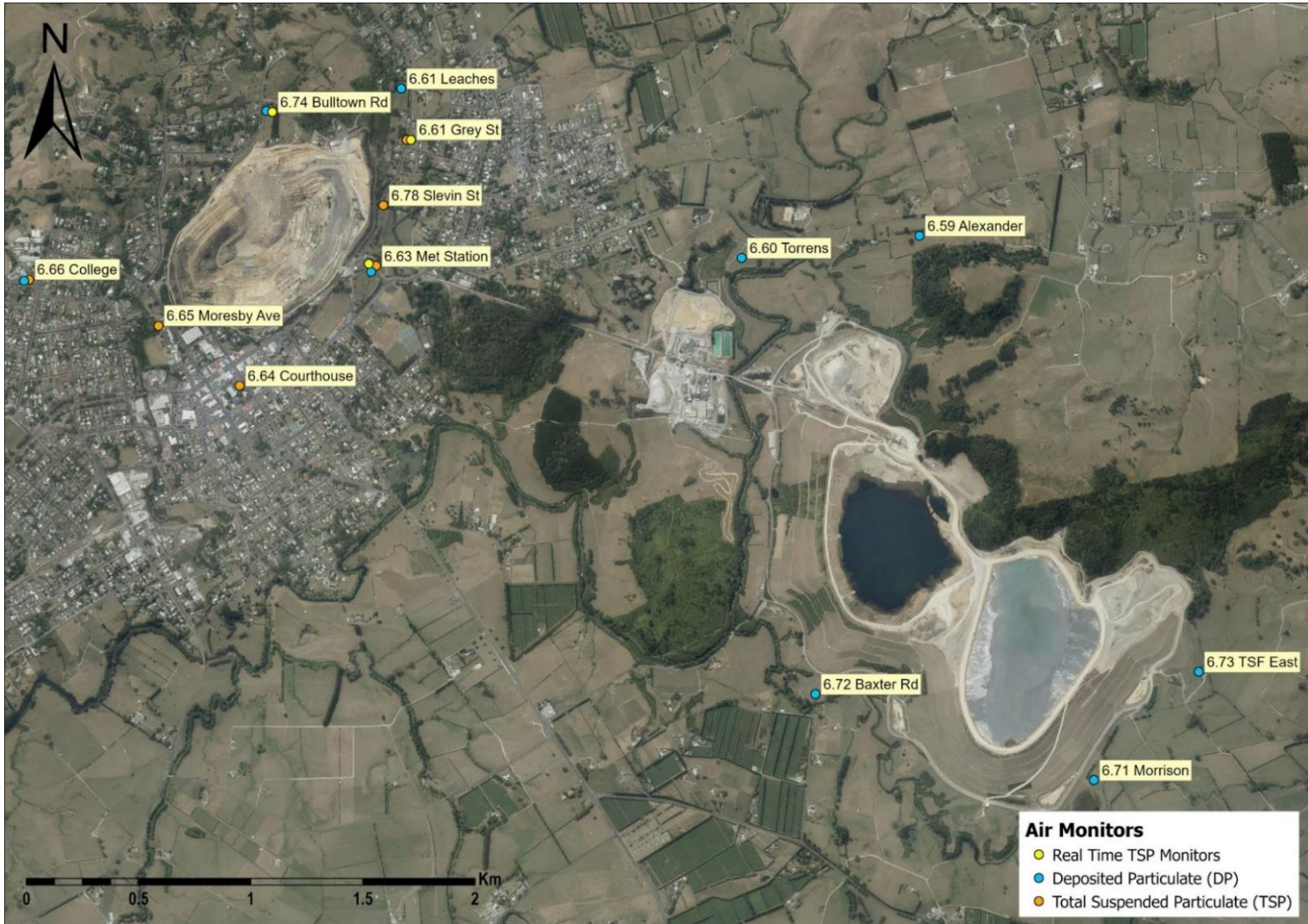


Figure 1. Waihi Dust Monitoring Sites

3.2 Quality Assurance

There are two key aspects of the quality assurance programme – gas meter calibrations and balance calibrations.

- The TSP gas meters at the suspended particulate monitoring sites were replaced with new calibrated units in July 2023.
- OGNZL's Precisa XT220A balance was calibrated on 8 June 2023. The "best accuracy" level was determined for the balance of up to 0.0008g in the 0-40g calibration range. This is considered satisfactory.

3.3 Quality Control

Two TSP samples were affected with damaged filters during 2023. The sample from the 6.65 Moresby Ave monitor was void for the week ending 6 January 2023, as was the 6.66 College/Rata St sample for the week ending 24 February 2023.

One DP sample was contaminated during 2023. The sample was from 6.63 Met Station for the November monitoring period and was unable to be filtered due to contamination of the sample with bird droppings. Also, during the November monitoring period, the sample from 6.74 Bulltown Road was lost due to the bucket tipping over on site.

4 Summary of Results

4.1 Total Suspended Particulate

The results of the weekly TSP monitoring for 2023 are given in

Figure 2 and Appendix A. Total Suspended Particulate Monitoring Results 2023 ($\mu\text{g}/\text{m}^3$).

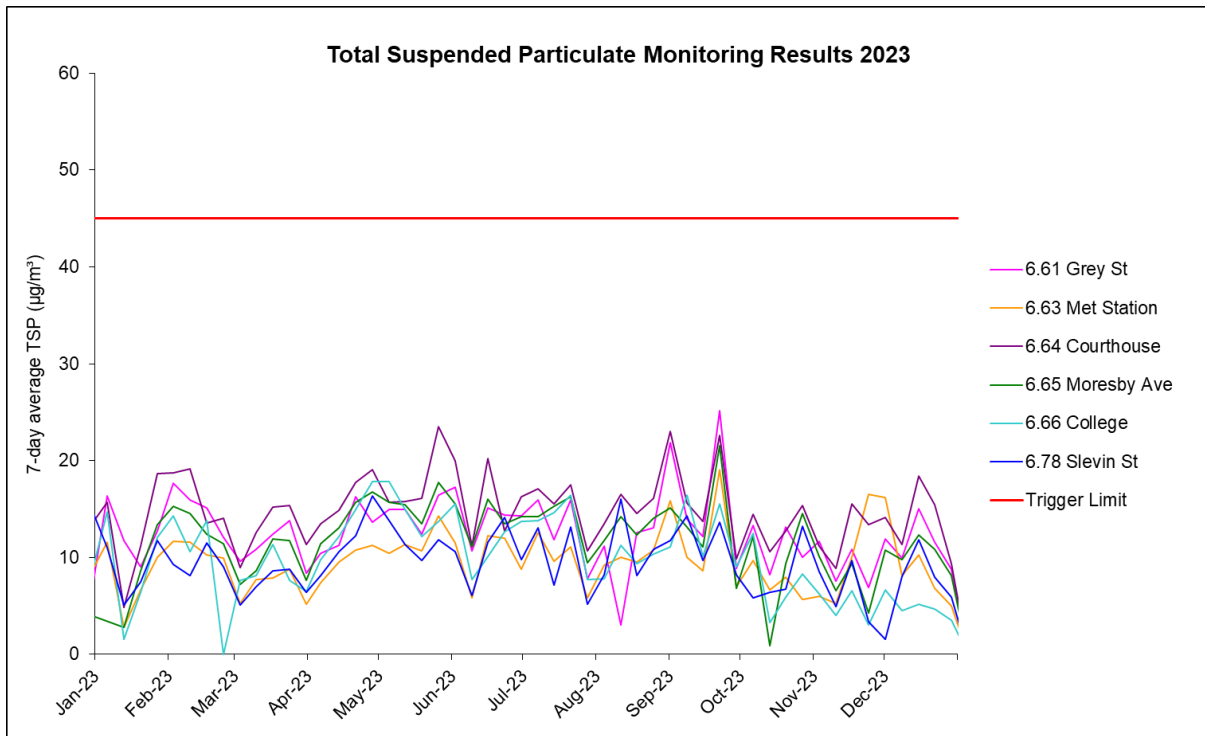


Figure 2. Total Suspended Particulate Results for 2023

No results exceeded the OGNZL TSP trigger limit of 45 µg/m³, seven-day average during 2023. The highest recording during the year was 25.1 µg/m³ at the 6.6 Grey Street monitor for the week ending 24 September (no other monitor exceeded 25 µg/m³ during the week concerned). The higher TSP concentrations during winter months in 2023 is consistent with previous years' results showing a seasonal trend which is likely due to increased household heating (more fires being lit) when temperatures drop. The average weekly result across all sites was 11.4 µg/m³ (c.f. 11.5 µg/m³ in 2022).

4.2 Deposited Particulate

The results of the monthly DP monitoring for 20223 are given in Figure 3 and Appendix B. Deposited Particulate Monitoring Results 2023 (g/m²/month).

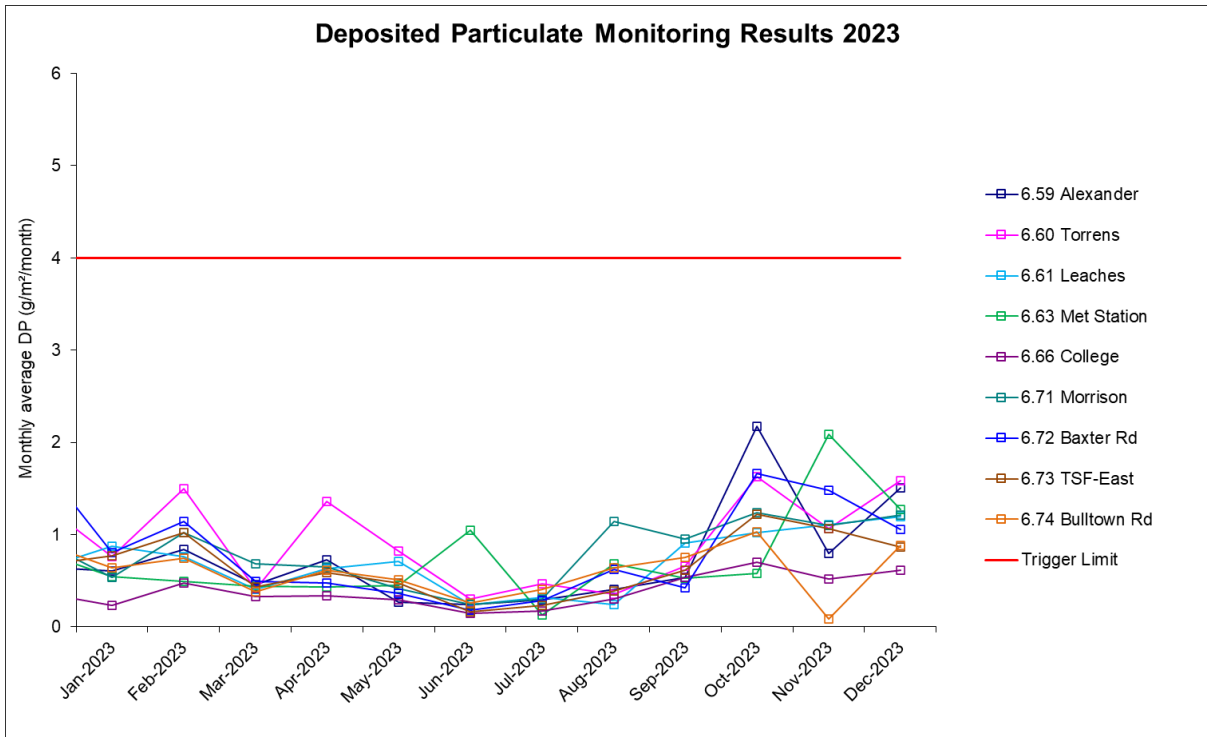


Figure 3. Deposited Particulate Results for 2023

No results exceeded the OGNZL DP trigger limit of 4 g/m²/month during 2023. The highest recording during the year was 2.2 g/m²/month at the 6.59 Alexander monitor for the month of October, however no dust generating activities from this area of the mine site occurred during this time. No other site exceeded 2.2 g/m²/month for the reporting period. The average monthly reading across all sites was 0.7 g/m²/month (c.f. 0.7 g/m²/month in 2022).

4.3 Trends

The criteria of air quality trigger levels have applied for 24 years, and the dust concentrations are below those trigger levels most of the time. It can be concluded that the air quality in and around Waihi is not deteriorating.

Figure 4 shows the long-term results of the TSP monitoring. The phases of active mining activities do not seem to have been reflected in corresponding changes in TSP levels, indicating that control measures during mining have been effective.

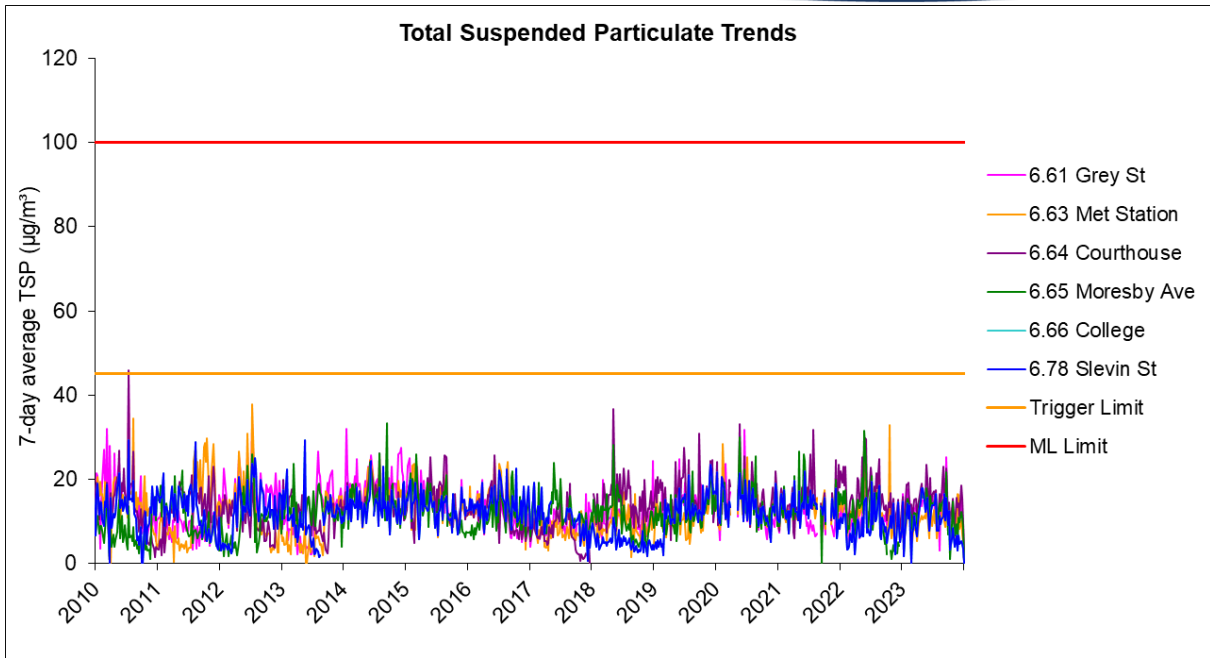


Figure 4. Total Suspended Particulate Trends from 2010 to 2023

Figure 5 shows the long-term DP results from the Waihi monitors. The 2023 results show a stable trend and compare well with results from the previous years.

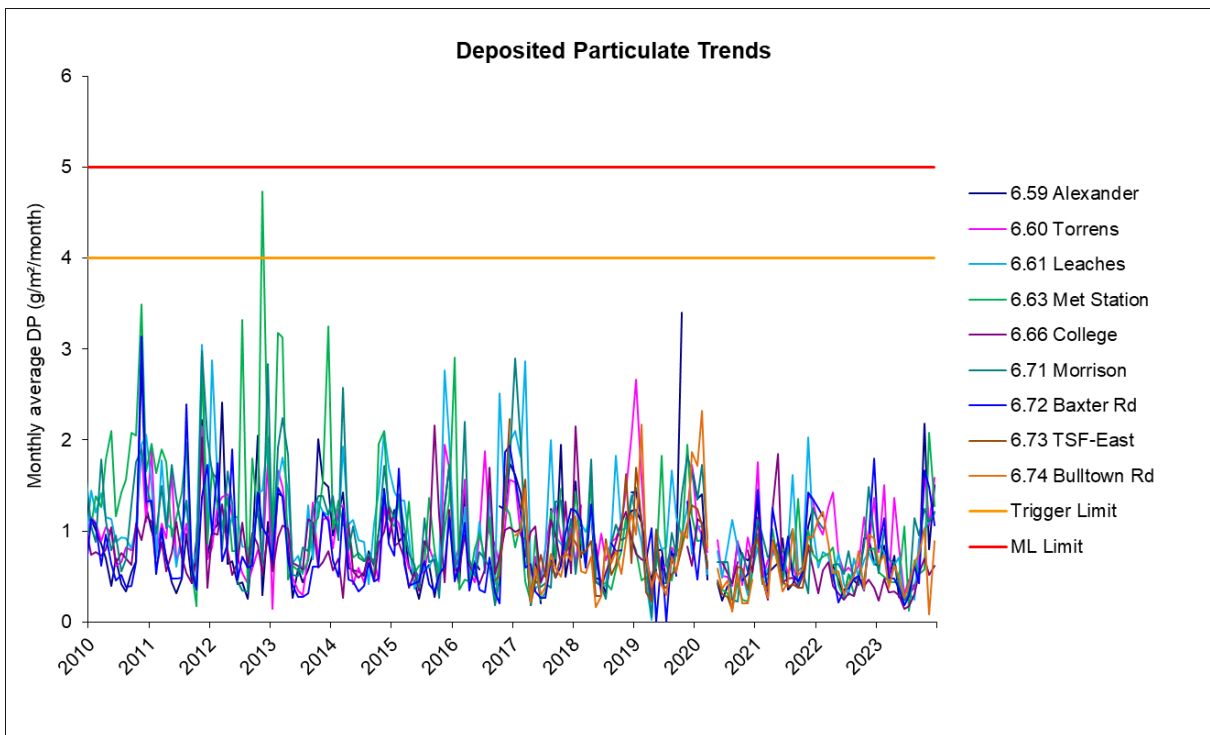


Figure 5. Deposited Particulate Trends from 2010 to 2023

4.4 Discretionary Deposited Particulate Monitoring

No discretionary deposited particulate monitoring was undertaken in 2023.

5 Compliance with Consent Conditions

5.1 General Operations 2023

Mining activities in 2023 remained as normal for most of the site's operations. Ore stockpiling continued as normal, with more ore processed in 2023 compared to 2022. Overall, the site's operations experienced lower levels of activity compared with previous years. The Favona waste stockpile continues to be utilised to store waste rock from the Martha Underground (since early 2020, after being empty for 8 years). At the Development Site, earthworks were commenced for a key-cut between TSF1A and TSF2. Mining in the Martha Pit remains in abeyance, however in-pit waste dumping from the Martha Underground commenced in August 2023.

5.2 Complaints

Complaints about dust, smoke and blasting odour coming from the site's operations are matters of concern to OGNZL. One complaint was received in relation to the above issues in 2023; a smoke complaint.

The complaint was related to smoke nuisance behind the resident's property one morning; they wanted to check burning--off on-site wasn't happening. After checking with the respective people at OGNZL, the issue was found to be not mine related and the resident was informed. No further follow-up was needed.

Details of any complaints or concerns received by OGNZL are recorded in a complaints/concerns register, along with information about any follow-up action. The register covers complaints on all operational matters, not just air quality, and has been in use since 1987. The number of complaints received about air quality each year are recorded in the register and listed in Table 3.

Table 3. Air Quality Complaints Recorded in the Company's Register

Year	Number	Year	Number
1987	15	2006	3
1988	6	2007	8
1989	0	2008	7
1990	0	2009	5
1991	2	2010	6
1992	4	2011	26
1993	5	2012	11
1994	6	2013	10
1995	1	2014	5
1996	0	2015	7
1997	0	2016	4
1998	1	2017	5
1999	5	2018	2
2000	10	2019	0
2001	2	2020	1
2002	10	2021	3
2003	5	2022	2
2004	18	2023	1
2005	2		

5.3 Mitigation

The dry periods require OGNZL to be proactive with mitigating any dust emissions occurring from operating areas. Actions taken to mitigate dust emissions, particularly during drier periods, include the use of the sprinklers and watering roads in high activity areas. Speed restrictions on unsealed roads also reduce dust generation.

The average monthly rainfalls can be seen in Figure 6, these showed a higher than usual rainfall at the beginning of the year due to cyclonic weather activities. the resultant 2023 annual rainfall (2898 mm) was more than the previous year (2403 mm in 2022) and more than the historical average of 2107 mm. Therefore, actions required to mitigate dust emissions throughout much of the year were significantly less than normal.

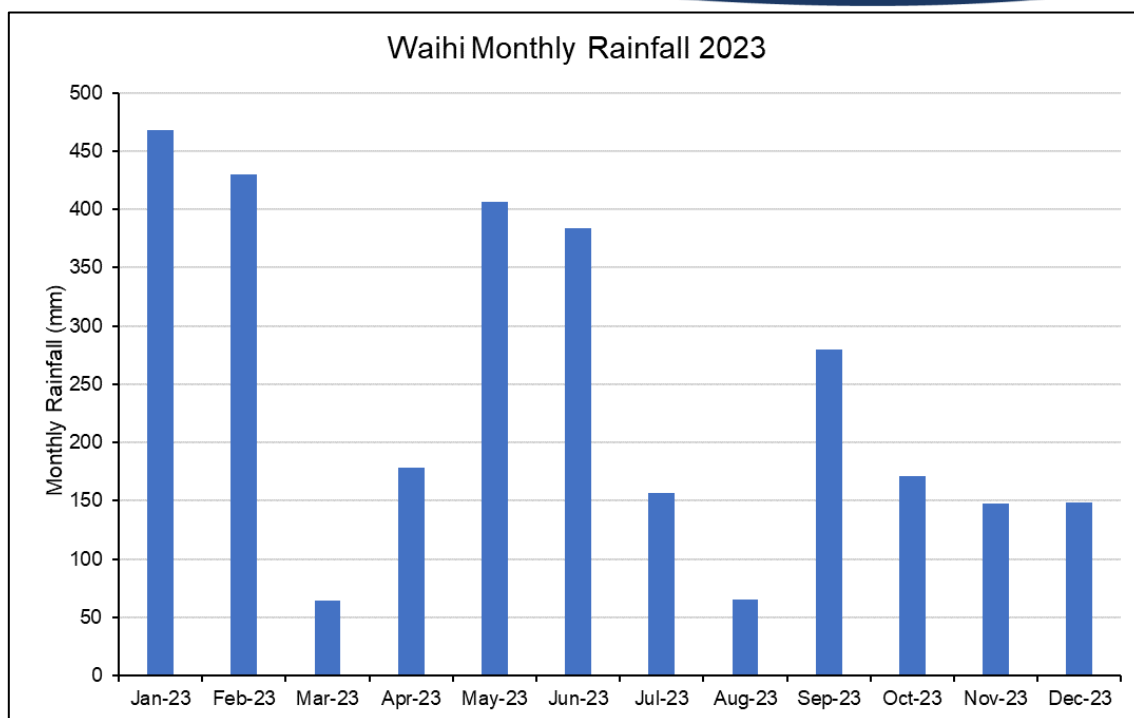


Figure 6. Waihi Monthly Rainfall 2023

Wind speed and direction followed typical seasonal patterns in 2023, with predominantly northeast and southwest winds. There were mostly light winds in late summer to early autumn, while the strongest winds occurred in July (westerlies). The 2023 monthly wind roses for Waihi are displayed in Appendix C. 2022 Monthly Wind Roses, Waihi and compare well with data from the previous year.

5.4 Hydro-seeding, Tarsealing and Rehabilitation

Hydro-seeding and pasture establishment is normally carried out in response to new earthworks (e.g. pit cutbacks, TSF crest raising). No new hydro-seeding or pasture planting was undertaken during the year.

In 2023, the Development Site Perimeter Road was partially re-sheeted, and minor tarseal repairs occurred on the access road; no significant new areas were sealed.

6 Other Monitoring

6.1 PM₁₀ and Silica Monitoring

PM₁₀ and silica community monitoring was not conducted in 2023. Along with the suspension of production mining in the open pit, it has been agreed with WRC that PM₁₀ and silica monitoring can be suspended until such time that it is considered necessary.

6.2 Real-time TSP Monitoring

Three 'real-time' TSP monitors around the open pit were installed in 2021 to provide prompt feedback on TSP levels, ensuring that future earthworks in the open pit will have an established real-time system ready in advance. The monitors are located at 6.61 Grey St, 6.63 Met Station, and 6.74 Bulltown Rd (Figure 1) and can also be adapted to analyse for specific dust fractions (PM_{10} , $PM_{2.5}$, using special cyclones), should the need arise in the future.

The real-time TSP monitoring results for 2023 are given in Figure 7; currently there are no set trigger limits. The peaks identified in the results are not considered mine-related and are more likely a function of atmospheric conditions (e.g. fog) or localised activities (domestic fires etc.)

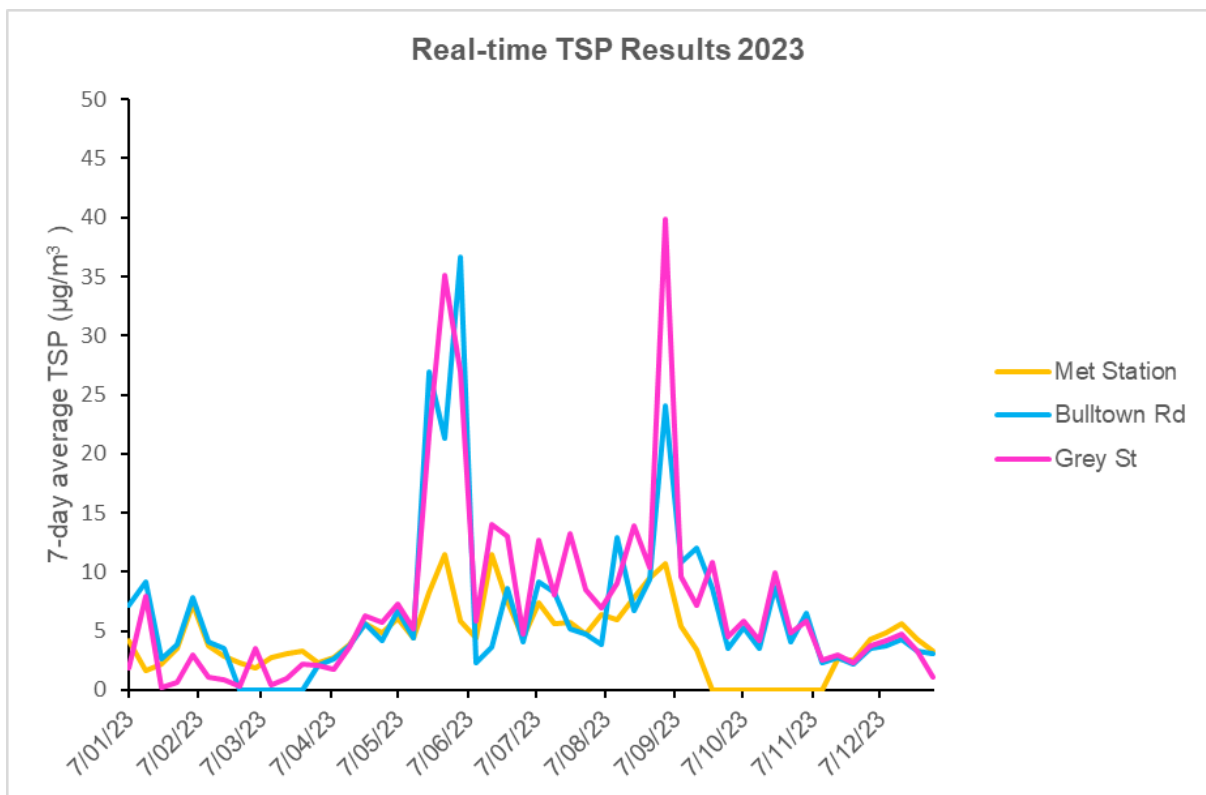


Figure 7. Real-time TSP Results for 2023

7 Future Monitoring

7.1 Deposited and Total Suspended Particulates

Ongoing operational activities followed by rehabilitation activities at Waihi will require dust control activities to be maintained and monitored for some time. At present, there is no consideration for fundamentally altering the current DP and TSP programmes.

7.2 PM₁₀ and Silica

OGNZL had been undertaking biennial monitoring for PM₁₀ and silica and WRC also conducted a continuous monitoring programme for PM₁₀ from 2008 – 2011. Data has indicated that the mine is complying with standards and that Waihi is regarded as a 'complying airshed.' In consultation with WRC, it was agreed that PM₁₀ and silica monitoring can be suspended until such time that it is considered necessary. Future decisions will be based on any trends from the ongoing air quality monitoring programmes, as well as the implications of future mining activity.

Appendix A. Total Suspended Particulate Monitoring Results 2023 (µg/m³)

AIR QUALITY

TOTAL SUSPENDED PARTICULATE (TSP) RESULTS

Co-ordinates refer to NZMS 260 T13 Paeroa

All Measurements in µg/m³

	Above trigger limit (45)
	Near trigger limit (40-45)

Period Ending Date	Year	6.61	6.63	6.64	6.65	6.66	6.78
		Grey St	Met Station	Courthouse	Moresby Ave	College	Slevin St
6-Jan-23		16.4	11.6	15.7	F	14.7	11.0
13-Jan-23		11.7	2.8	4.8	2.8	1.6	5.1
20-Jan-23		9.0	6.6	11.2	8.7	6.4	7.5
27-Jan-23		12.7	10.0	18.6	13.4	12.1	11.7
3-Feb-23		17.6	11.7	18.8	15.3	14.3	9.3
10-Feb-23		15.9	11.5	19.1	14.5	10.6	8.1
17-Feb-23		15.1	10.3	13.6	12.4	13.8	11.5
24-Feb-23		12.1	9.9	14.1	11.4	F	9.0
3-Mar-23		9.6	5.3	8.9	7.2	7.6	5.1
10-Mar-23		10.8	7.7	12.6	8.6	8.1	6.9
17-Mar-23		12.4	7.9	15.2	11.9	11.3	8.7
24-Mar-23		13.8	8.8	15.4	11.8	7.7	8.8
31-Mar-23		8.4	5.2	11.4	7.7	6.5	6.4
7-Apr-23		10.5	7.4	13.5	11.5	9.8	8.2
14-Apr-23		11.2	9.5	14.9	13.0	12.1	10.6
21-Apr-23		16.3	10.7	17.8	15.7	14.9	12.2
28-Apr-23		13.7	11.2	19.0	16.8	17.8	16.4
5-May-23		15.0	10.5	15.7	15.7	17.9	13.8
12-May-23		15.0	11.3	15.8	15.5	15.0	11.4
19-May-23		12.4	10.7	16.1	13.5	12.1	9.7
26-May-23		16.5	14.3	23.5	17.7	13.8	11.9
2-Jun-23		17.3	11.5	20.0	15.6	15.6	10.6
9-Jun-23		10.7	5.8	11.1	11.1	7.8	6.1
16-Jun-23		15.2	12.2	20.3	16.1	10.1	11.6
23-Jun-23		14.4	12.0	12.8	13.5	12.7	14.1
30-Jun-23		14.3	8.8	16.2	14.2	13.7	9.7
7-Jul-23		15.9	12.6	17.1	14.2	13.8	13.1
14-Jul-23		11.8	9.6	15.5	15.3	14.7	7.1
21-Jul-23		15.9	11.1	17.5	16.3	16.5	13.2
28-Jul-23		7.8	5.8	10.7	9.4	7.7	5.2
4-Aug-23		11.2	9.2	13.4	11.8	7.8	8.2
11-Aug-23		3.0	10.0	16.5	14.2	11.3	16.0
18-Aug-23		12.6	9.5	14.6	12.4	9.4	8.1
25-Aug-23		13.1	10.8	16.1	14.0	10.4	10.9
1-Sep-23		21.8	15.8	23.0	15.1	11.1	11.7
8-Sep-23		13.9	10.1	15.6	13.2	16.4	14.3
15-Sep-23		12.2	8.6	13.7	11.1	10.1	9.7
22-Sep-23		25.1	19.0	22.6	21.5	15.5	13.6
2-Oct-23		8.9	6.9	9.8	6.8	9.1	8.2
6-Oct-23		13.3	9.7	14.5	12.2	12.5	5.8
13-Oct-23		8.2	6.6	10.6	0.9	3.2	6.4
20-Oct-23		13.1	8.0	12.7	9.4	5.9	6.7
27-Oct-23		10.1	5.6	15.4	14.6	8.3	13.2
3-Nov-23		11.7	6.0	11.2	10.1	6.3	8.6
10-Nov-23		7.6	5.2	8.9	6.6	4.0	4.9
17-Nov-23		10.9	10.1	15.5	9.3	6.6	9.7
24-Nov-23		6.9	16.5	13.4	4.3	3.0	3.4
1-Dec-23		11.9	16.2	14.2	10.8	6.7	1.5
8-Dec-23		10.0	8.1	11.3	9.8	4.5	8.1
15-Dec-23		15.1	10.2	18.4	12.3	5.2	11.8
22-Dec-23		11.6	6.8	15.4	10.9	4.6	8.0
29-Dec-23		8.8	5.0	9.4	8.2	3.5	5.9

CODE	DEFINITION
F	Filter damaged

Appendix B. Deposited Particulate Monitoring Results 2023 (g/m²/month)

AIR QUALITY

DEPOSITED PARTICULATE (DP) RESULTS

All measurements in g/m²/month

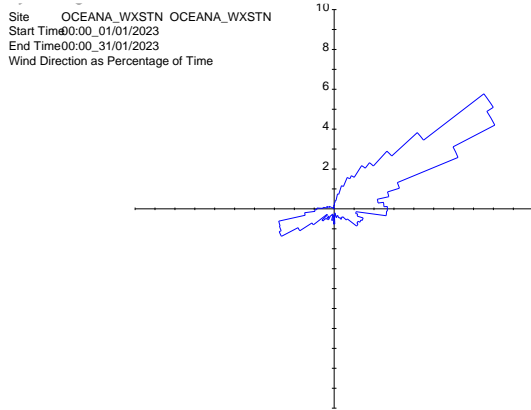
4 g/m ² /month	Above trigger limit
>3 g/m ² /month	Near trigger limit

YEAR		6.59	6.60	6.61	6.63	6.66	6.71	6.72	6.73	6.74
		Alexander	Torrens	Leaches	Met Station	College	Morrison	Baxter Rd	TSF East	Bulltown Rd
2023	Jan-23	0.6	0.8	0.9	0.5	0.2	0.5	0.8	0.8	0.6
	Feb-23	0.8	1.5	0.8	0.5	0.5	1.0	1.1	1.0	0.7
	Mar-23	0.5	0.4	0.4	0.4	0.3	0.7	0.5	0.4	0.4
	Apr-23	0.7	1.4	0.6	0.4	0.3	0.7	0.5	0.6	0.6
	May-23	0.3	0.8	0.7	0.5	0.3	0.4	0.4	0.5	0.5
	Jun-23	0.2	0.3	0.2	1.0	0.1	0.2	0.2	0.2	0.3
	Jul-23	0.3	0.5	0.3	0.1	0.2	0.3	0.3	0.2	0.4
	Aug-23	0.4	0.4	0.2	0.7	0.3	1.1	0.6	0.4	0.6
	Sep-23	0.5	0.7	0.9	0.5	0.5	0.9	0.4	0.6	0.8
	Oct-23	2.2	1.6	1.0	0.6	0.7	1.2	1.7	1.2	1.0
	Nov-23	0.8	1.1	1.1	O	0.5	1.1	1.5	1.1	L
	Dec-23	1.5	1.6	1.2	1.3	0.6	1.2	1.1	0.9	0.9

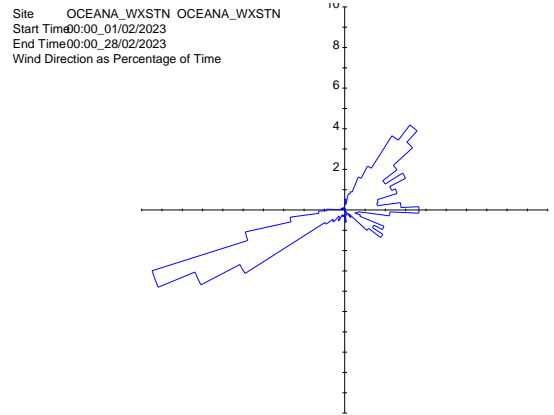
CODE	DEFINITION
L	Lost sample - bucket tipped over or broken
O	Organics, unable to filter

Appendix C. 2022 Monthly Wind Roses, Waihi

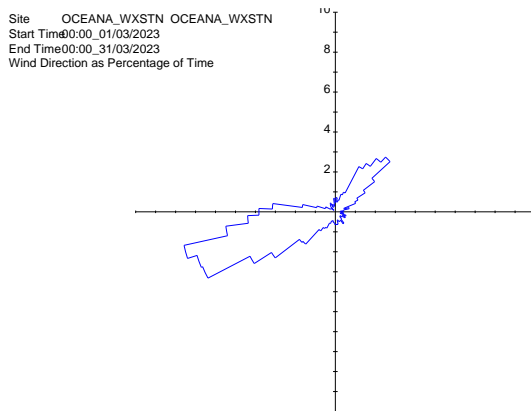
Jan 23



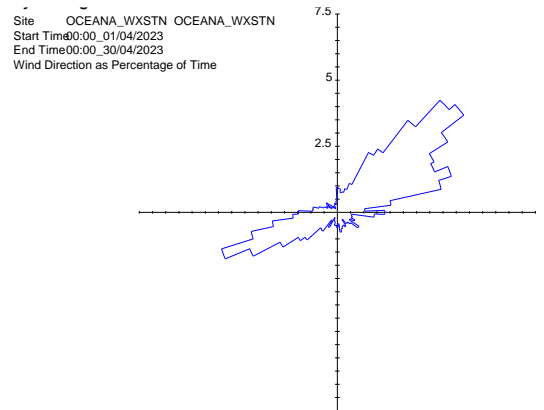
Feb 2023



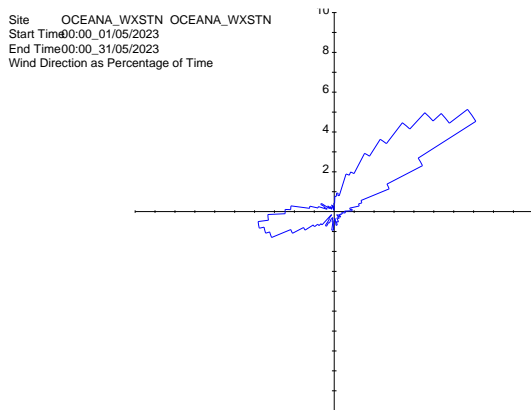
March 2023



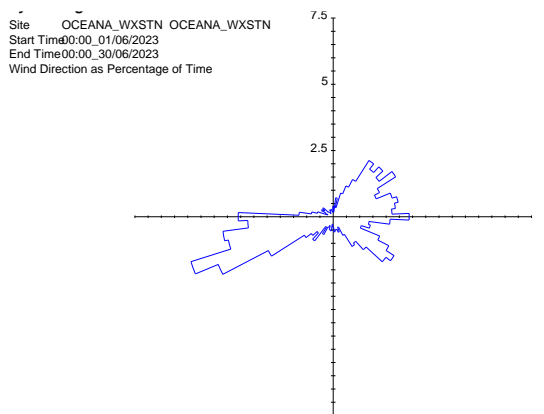
April 2023



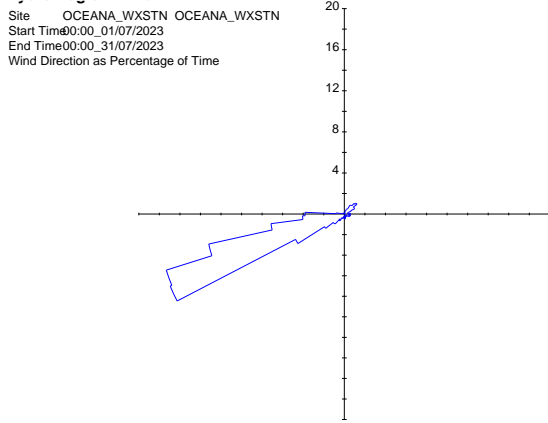
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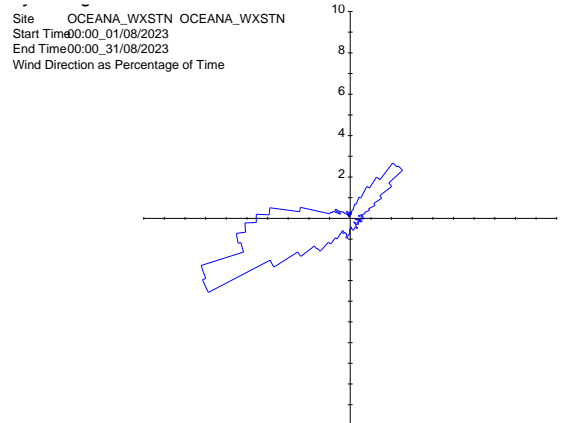
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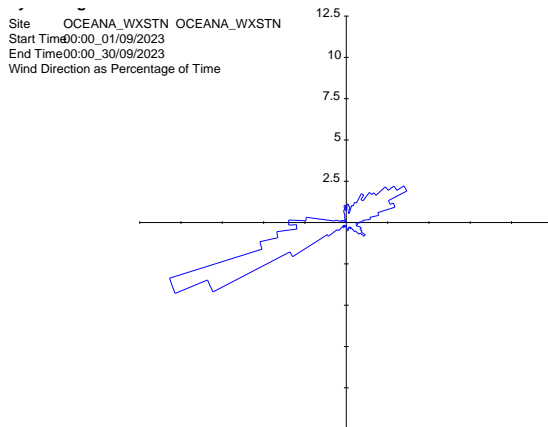
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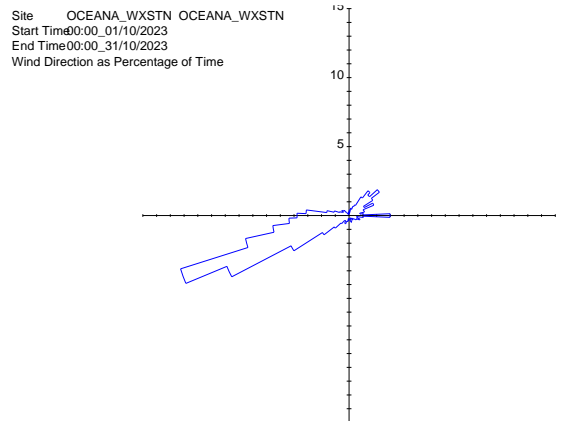
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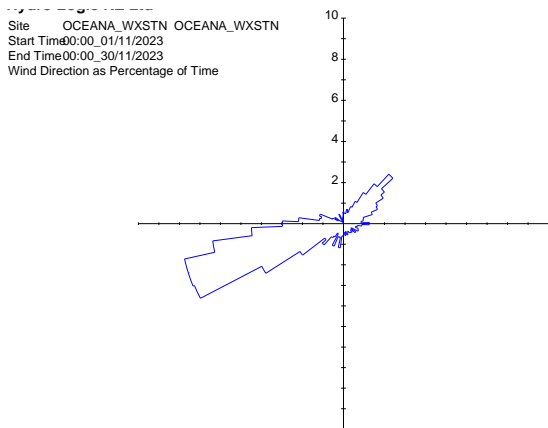
Sept 2023



Oct 2023



Nov 2023



Dec 2023

