



# Ozone Monitoring Report

For

**Sanity Systems**

Document Number 2551-02 v2.00

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## Document Lead Sheet

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	If satisfactory, when is next test due?	N/A		

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Report History

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## 1. Introduction

Environmental Efficiency were commissioned to undertake ozone monitoring by Sanity Systems at their premises in Dublin. This report details the results of ozone monitoring conducted on various Ozone sanitisation systems used in various scenarios.

The working principle of the Sanity Systems Ozone sanitisation units is that the unit produces ozone (O<sub>3</sub>) for a defined period of time, once this cycle is complete it then converts the ozone back to oxygen (O<sub>2</sub>), leaving the area safe for use. The duration of each cycle depends on the unit used and the program setting.

The units/ programs tested are detailed below. Photographs of units are shown in Appendix 1.

Climate controls and HVAC systems were in off mode during testing in all cases.

**Table 1-1 Units/ Programs Tested**

Unit/ Program	Area Used	Area Volume (m <sup>3</sup> )	Total Cycle Duration (mins)	O <sub>3</sub> Cycle Duration (mins)	Catalytic Cycle Duration
Sany Car/ P1	Medium sized car	N/A	22	15	7
Sany Car P2	Medium sized car	N/A	29	20	9
Sany Car p3	Medium sized car	N/A	44	30	14
Sany Med/ P1	Medium Sized Office	22	34	15	19

The 2020 Code of Practice for the Safety, Health and Welfare at Work (Chemical Agents) Regulations 2001 (S.I. No. 619 of 2001) specifies mandatory and advisory limits for the concentration of various substances to provide protection of workers. The Occupational Emission Limit Value (OELV) of ozone for a worker conducting light work is 0.1 ppm TWA based on an 8-hour working day, there is no Short term (15 minute) listed in Ireland, however, rule of thumb is that this is 3 times the 8-hour limit, giving a short term limit of 0.3 ppm. A safe limit of 0.3 ppm is used for this report.

## 2. Summary

All units functioned as specified in supporting documentation.

### 3. Method

Ozone levels were monitored using a Gray Wolf AdvancedSense Pro with Ozone Probe, set to data log every 30 seconds. The results were then download to excel. The raw data is available in Appendix 2.



Figure 3-1 Gray Wolf AdvancedSense Pro.

### 4. Results

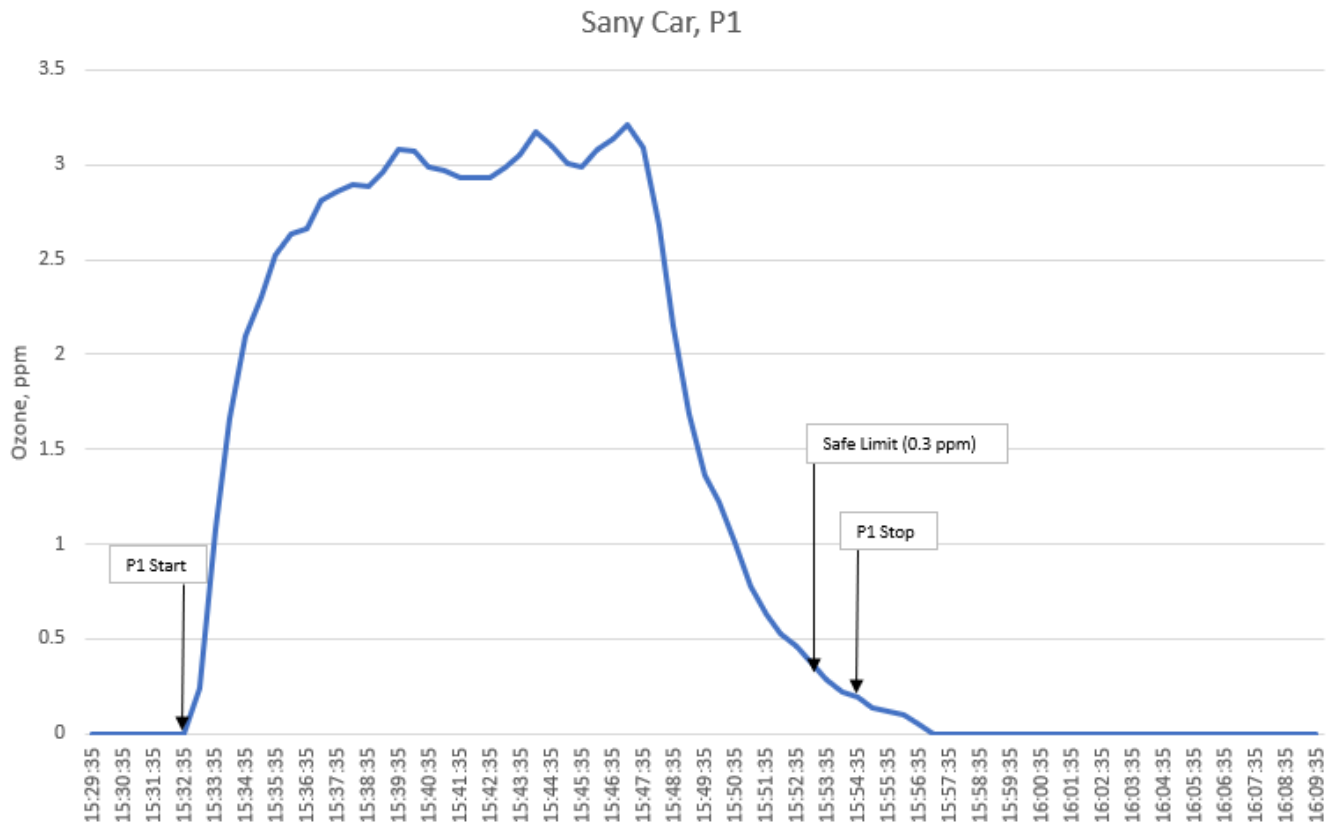


Figure 4-1 Sany Car P1 Ozone Graph 10/07/20

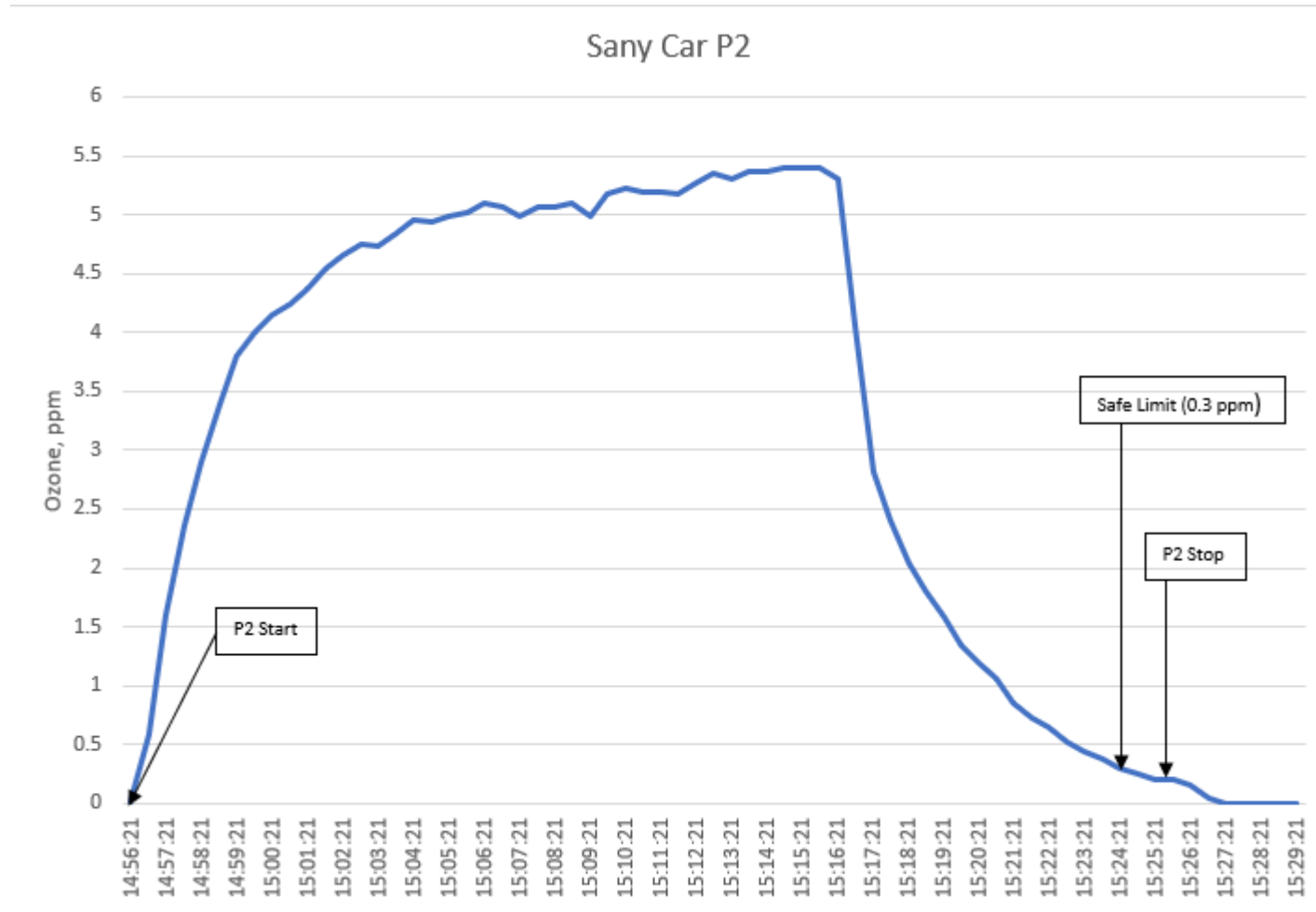


Figure 4-2 Sany Car P2 Ozone Graph 13/07/20

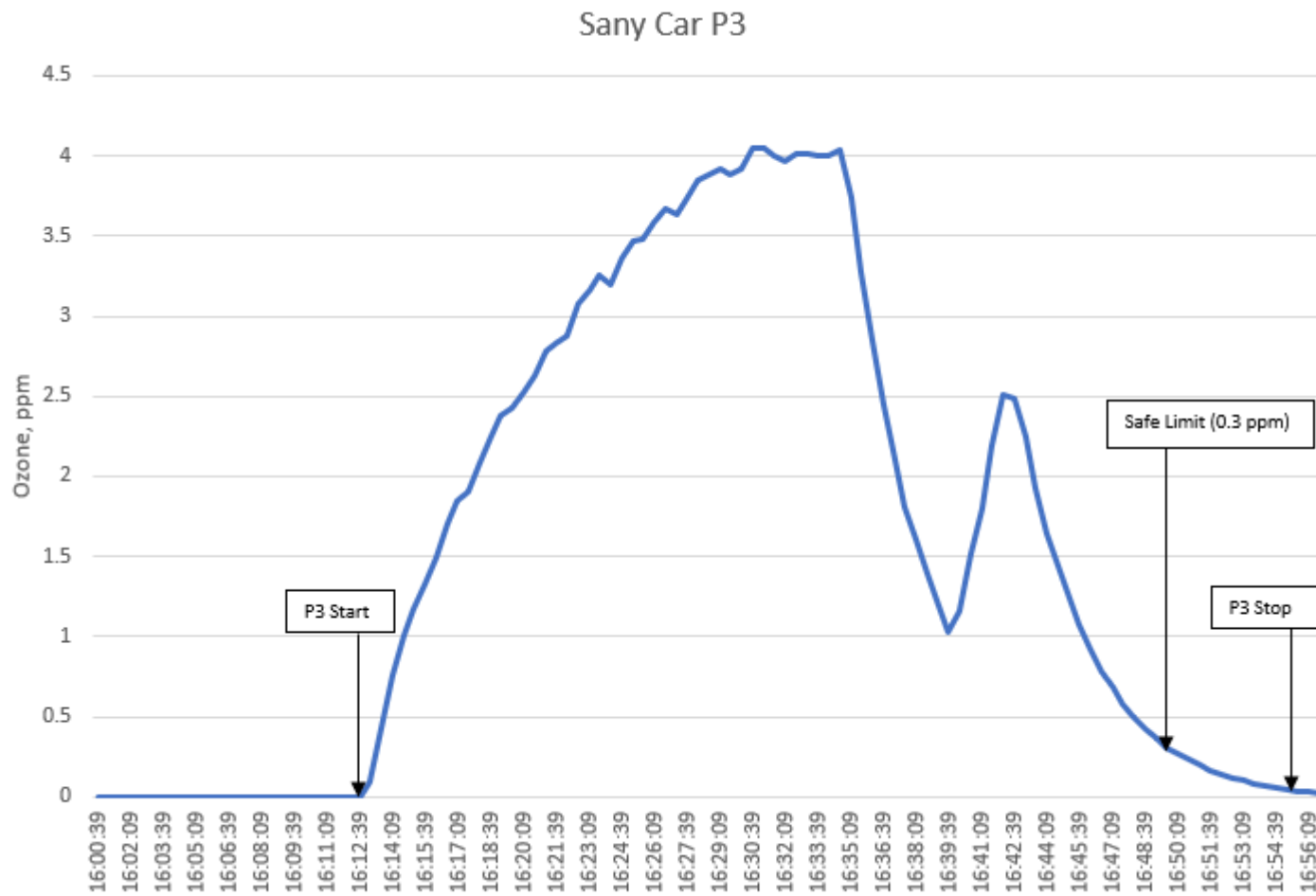


Figure 4-3 Sany Car P3 Ozone Graph 13/07/20



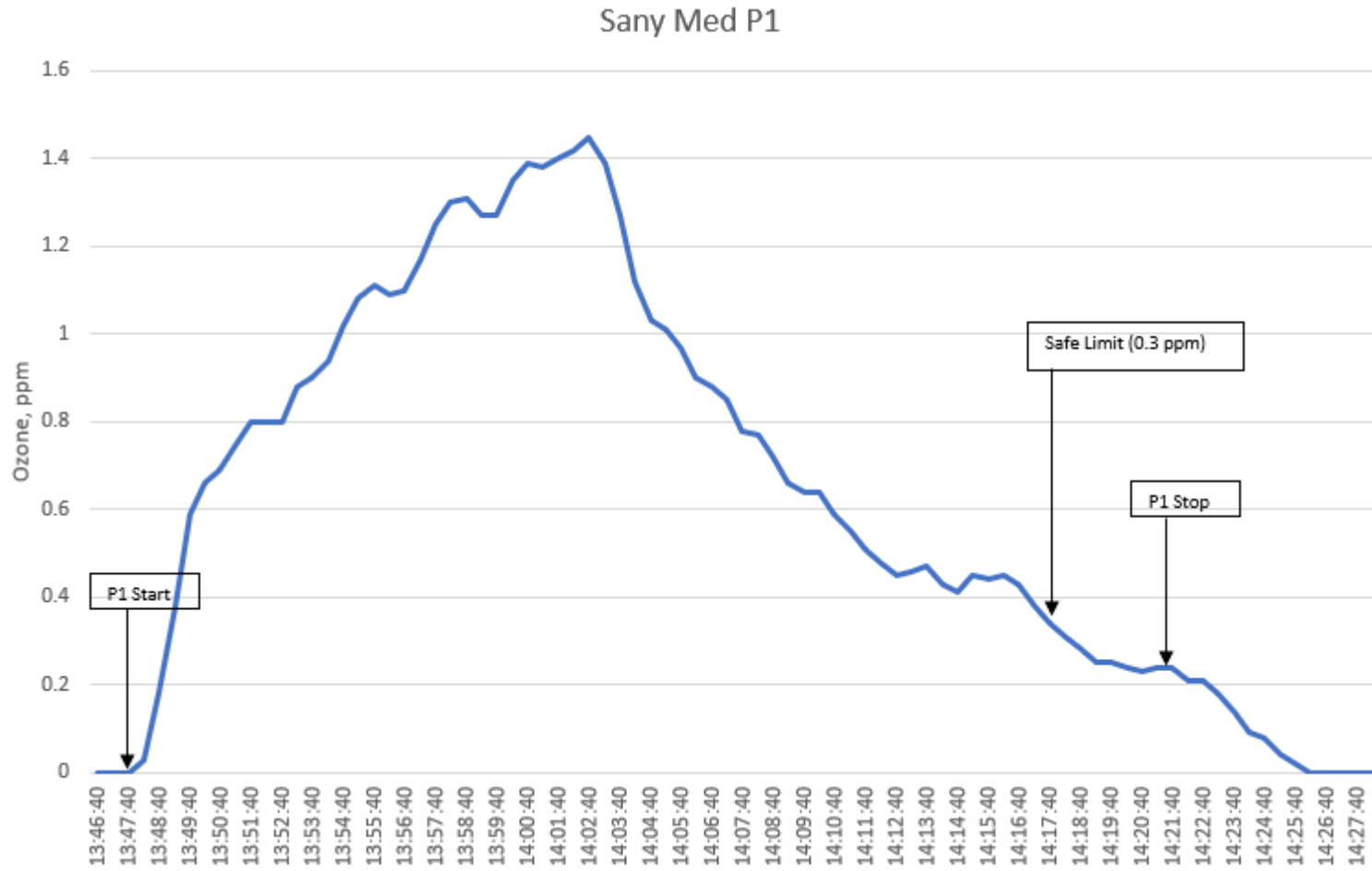


Figure 4-4 Sany Med P1 Ozone Graph 10/07/20

## **5. Discussion**

All Sanity Systems units reported a return to safe Ozone levels before the instrument finished its sanitisation cycle.

It was noted that the Sany car on program 3 unit noted a significant drop then rise in ozone levels midway through the cycle. The same Sany car unit was used for programs 1, 2 & 3.

**Appendix 1 Sany Units Used**



**Figure 5-1 Sany Med Unit**



Figure 5-2 Sany Car Unit

## Appendix 2 Raw Data

Table 5-1 Sany Car P1 10/07/20

Time	Ozone ppm	Time	Ozone ppm	Time	Ozone ppm
15:29:35	0	15:48:35	2.15	16:09:35	0
15:30:05	0	15:49:05	1.69	16:07:35	0
15:30:35	0	15:49:35	1.36	16:08:05	0
15:31:05	0	15:50:05	1.22	16:08:35	0
15:31:35	0	15:50:35	1.01	16:09:05	0
15:32:05	0	15:51:05	0.78		
15:32:35	0	15:51:35	0.63		
15:33:05	0.24	15:52:05	0.53		
15:33:35	1.08	15:52:35	0.46		
15:34:05	1.66	15:53:05	0.37		
15:34:35	2.1	15:53:35	0.29		
15:35:05	2.3	15:54:05	0.22		
15:35:35	2.52	15:54:35	0.19		
15:36:05	2.64	15:55:05	0.14		
15:36:35	2.66	15:55:35	0.12		
15:37:05	2.81	15:56:05	0.1		
15:37:35	2.86	15:56:35	0.05		
15:38:05	2.9	15:57:05	0		
15:38:35	2.89	15:57:35	0		
15:39:05	2.96	15:58:05	0		
15:39:35	3.08	15:58:35	0		
15:40:05	3.07	15:59:05	0		
15:40:35	2.99	15:59:35	0		
15:41:05	2.97	16:00:05	0		
15:41:35	2.93	16:00:35	0		
15:42:05	2.93	16:01:05	0		
15:42:35	2.93	16:01:35	0		
15:43:05	2.99	16:02:05	0		
15:43:35	3.05	16:02:35	0		
15:44:05	3.17	16:03:05	0		
15:44:35	3.1	16:03:35	0		
15:45:05	3.01	16:04:05	0		
15:45:35	2.99	16:04:35	0		
15:46:05	3.08	16:05:05	0		
15:46:35	3.14	16:05:35	0		
15:47:05	3.21	16:06:05	0		
15:47:35	3.09	16:06:35	0		
15:48:05	2.68	16:07:05	0		

**Table 5-2 Sany Car P2 13/07/20**

Time	Ozone ppm	Time	Ozone ppm
14:56:21	0.01	15:16:21	5.3
14:56:51	0.58	15:16:51	4.06
14:57:21	1.59	15:17:21	2.82
14:57:51	2.36	15:17:51	2.4
14:58:21	2.9	15:18:21	2.04
14:58:51	3.39	15:18:51	1.8
14:59:21	3.8	15:19:21	1.58
14:59:51	4	15:19:51	1.34
15:00:21	4.14	15:20:21	1.2
15:00:51	4.24	15:20:51	1.06
15:01:21	4.37	15:21:21	0.85
15:01:51	4.55	15:21:51	0.73
15:02:21	4.65	15:22:21	0.64
15:02:51	4.75	15:22:51	0.52
15:03:21	4.74	15:23:21	0.44
15:03:51	4.85	15:23:51	0.37
15:04:21	4.95	15:24:21	0.3
15:04:51	4.94	15:24:51	0.25
15:05:21	4.99	15:25:21	0.21
15:05:51	5.01	15:25:51	0.2
15:06:21	5.1	15:26:21	0.15
15:06:51	5.06	15:26:51	0.04
15:07:21	4.98	15:27:21	0
15:07:51	5.06	15:27:51	0
15:08:21	5.06	15:28:21	0
15:08:51	5.09	15:28:51	0
15:09:21	4.99	15:29:21	0
15:09:51	5.17		
15:10:21	5.23		
15:10:51	5.19		
15:11:21	5.19		
15:11:51	5.18		
15:12:21	5.27		
15:12:51	5.35		
15:13:21	5.31		
15:13:51	5.36		
15:14:21	5.37		
15:14:51	5.39		
15:15:21	5.4		
15:15:51	5.4		

**Table 5-3 Sany Car P3 13/07/20**

Time	Ozone ppm	Time	Ozone ppm	Time	Ozone ppm
16:00:39	0	16:21:09	2.78	16:41:39	2.19
16:01:09	0	16:21:39	2.83	16:42:09	2.51
16:01:39	0	16:22:09	2.88	16:42:39	2.49
16:02:09	0	16:22:39	3.08	16:43:09	2.25
16:02:39	0	16:23:09	3.16	16:43:39	1.93
16:03:09	0	16:23:39	3.25	16:44:09	1.64
16:03:39	0	16:24:09	3.2	16:44:39	1.44
16:04:09	0	16:24:39	3.36	16:45:09	1.24
16:04:39	0	16:25:09	3.47	16:45:39	1.07
16:05:09	0	16:25:39	3.48	16:46:09	0.92
16:05:39	0	16:26:09	3.59	16:46:39	0.78
16:06:09	0	16:26:39	3.67	16:47:09	0.68
16:06:39	0	16:27:09	3.63	16:47:39	0.58
16:07:09	0	16:27:39	3.73	16:48:09	0.5
16:07:39	0	16:28:09	3.85	16:48:39	0.43
16:08:09	0	16:28:39	3.88	16:49:09	0.36
16:08:39	0	16:29:09	3.92	16:49:39	0.31
16:09:09	0	16:29:39	3.88	16:50:09	0.27
16:09:39	0	16:30:09	3.92	16:50:39	0.23
16:10:09	0	16:30:39	4.05	16:51:09	0.2
16:10:39	0	16:31:09	4.05	16:51:39	0.16
16:11:09	0	16:31:39	4	16:52:09	0.14
16:11:39	0	16:32:09	3.97	16:52:39	0.12
16:12:09	0	16:32:39	4.01	16:53:09	0.1
16:12:39	0	16:33:09	4.01	16:53:39	0.08
16:13:09	0.09	16:33:39	4	16:54:09	0.07
16:13:39	0.42	16:34:09	4	16:54:39	0.06
16:14:09	0.76	16:34:39	4.04	16:55:09	0.04
16:14:39	1	16:35:09	3.74	16:55:39	0.03
16:15:09	1.17	16:35:39	3.28	16:56:09	0.03
16:15:39	1.33	16:36:09	2.85	16:56:39	0.02
16:16:09	1.49	16:36:39	2.45		
16:16:39	1.7	16:37:09	2.11		
16:17:09	1.84	16:37:39	1.81		
16:17:39	1.9	16:38:09	1.61		
16:18:09	2.08	16:38:39	1.4		
16:18:39	2.25	16:39:09	1.2		
16:19:09	2.38	16:39:39	1.03		
16:19:39	2.43	16:40:09	1.16		
16:20:09	2.52	16:40:39	1.52		
16:20:39	2.63	16:41:09	1.8		

**Table 5-4 Sany Med P1 10/07/20**

Time	Ozone ppm	Time	Ozone ppm	Time	Ozone ppm
13:46:40	0	14:06:40	0.88	14:26:40	0
13:47:10	0	14:07:10	0.85	14:27:10	0
13:47:40	0	14:07:40	0.78	14:27:40	0
13:48:10	0.03	14:08:10	0.77	14:28:10	0
13:48:40	0.18	14:08:40	0.72		
13:49:10	0.38	14:09:10	0.66		
13:49:40	0.59	14:09:40	0.64		
13:50:10	0.66	14:10:10	0.64		
13:50:40	0.69	14:10:40	0.59		
13:51:10	0.75	14:11:10	0.55		
13:51:40	0.8	14:11:40	0.51		
13:52:10	0.8	14:12:10	0.48		
13:52:40	0.8	14:12:40	0.45		
13:53:10	0.88	14:13:10	0.46		
13:53:40	0.9	14:13:40	0.47		
13:54:10	0.94	14:14:10	0.43		
13:54:40	1.02	14:14:40	0.41		
13:55:10	1.08	14:15:10	0.45		
13:55:40	1.11	14:15:40	0.44		
13:56:10	1.09	14:16:10	0.45		
13:56:40	1.1	14:16:40	0.43		
13:57:10	1.17	14:17:10	0.38		
13:57:40	1.25	14:17:40	0.34		
13:58:10	1.3	14:18:10	0.31		
13:58:40	1.31	14:18:40	0.28		
13:59:10	1.27	14:19:10	0.25		
13:59:40	1.27	14:19:40	0.25		
14:00:10	1.35	14:20:10	0.24		
14:00:40	1.39	14:20:40	0.23		
14:01:10	1.38	14:21:10	0.24		
14:01:40	1.4	14:21:40	0.24		
14:02:10	1.42	14:22:10	0.21		
14:02:40	1.45	14:22:40	0.21		
14:03:10	1.39	14:23:10	0.18		
14:03:40	1.27	14:23:40	0.14		
14:04:10	1.12	14:24:10	0.09		
14:04:40	1.03	14:24:40	0.08		
14:05:10	1.01	14:25:10	0.04		
14:05:40	0.97	14:25:40	0.02		
14:06:10	0.9	14:26:10	0		



**Appendix 3 Certificate of Competence**



**About Environmental Efficiency**

Environmental Efficiency was founded in 1996 by two experienced consulting engineers, both with extensive backgrounds in manufacturing, quarrying, IT and construction in the UK, Ireland and overseas.

Our mission is to help improve our clients' environmental and H&S performance in cost effective and practical ways and as a result build long term relationships.

Engineers are natural problem solvers and this, coupled with the expertise of our staff of environmental consultants, enables us to offer solutions to environmental problems that are cost effective and practical.

Environmental Efficiency is engaged in energy, environmental and H&S consultancy across the entire range of manufacturing and commercial activity. Our clients range from US and European based multinationals to indigenous start-ups. What these clients have in common is a requirements for cost effective consultancy and pragmatic solutions to their issues.

Our core services include

- Air, Noise and Water monitoring
- Bund integrity assessments
- Due diligence
- Energy audits
- Workplace/Occupational monitoring
- Environmental Management System implementation
- Environmental Impact Statements

Environmental Efficiency has offices in Ireland (Bray and Cork), Northern Ireland (Lisburn) and Britain (Birmingham).

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