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24 October 2024

Joemar Cacnio
Wellington Water Limited
Private Bag 39804
Wellington Mail Centre 5045

Dear Joemar,

**Report: Wellington Water Limited – Seaview WWTP Odour Deodoriser - Air Quality Assessment**

# 1 Introduction

Wellington Water Limited (**WWL**) is seeking resource consent to discharge contaminants from up to four deodoriser sprayers (herein referred to as 'deodorisers') that will be located within the Seaview Wastewater Treatment Plant (**WWTP**) site in Seaview, Lower Hutt.

The deodorisers have been used at the WWTP since the consent was granted in 2006 as a tool to suppress odour generation during maintenance activities. Currently, they are used more regularly to help mitigate the effects of odour that is being generated from the WWTP because of the suboptimal performance of the odour treatment system. Going forward Wellington Water proposes to continue to use the deodorisers until the current plant issues are resolved and to use them intermittently thereafter during maintenance activities that have the potential to generate odour, e.g. primary sedimentation tank and/or dryer maintenance.

The discharges from the deodorisers contain a range of compounds that mask the odours generated by the WWTP. The discharge from the deodorisers is not allowed by a rule in the Natural Resources Plan for the Wellington Region (**NRP**) and it is also not provided for by the WWTP existing air discharge permit. Therefore, a new resource consent is required to authorise the operation of the deodorisers.

WWL has engaged Air Quality Consulting NZ Limited (**AQCNZ**) to undertake an assessment of the potential effects associated with discharges to air from the deodorisers. This assessment will support an application to the Greater Wellington Regional Council (**GWRC**) for an air discharge consent.

# 2 Description of the Deodoriser

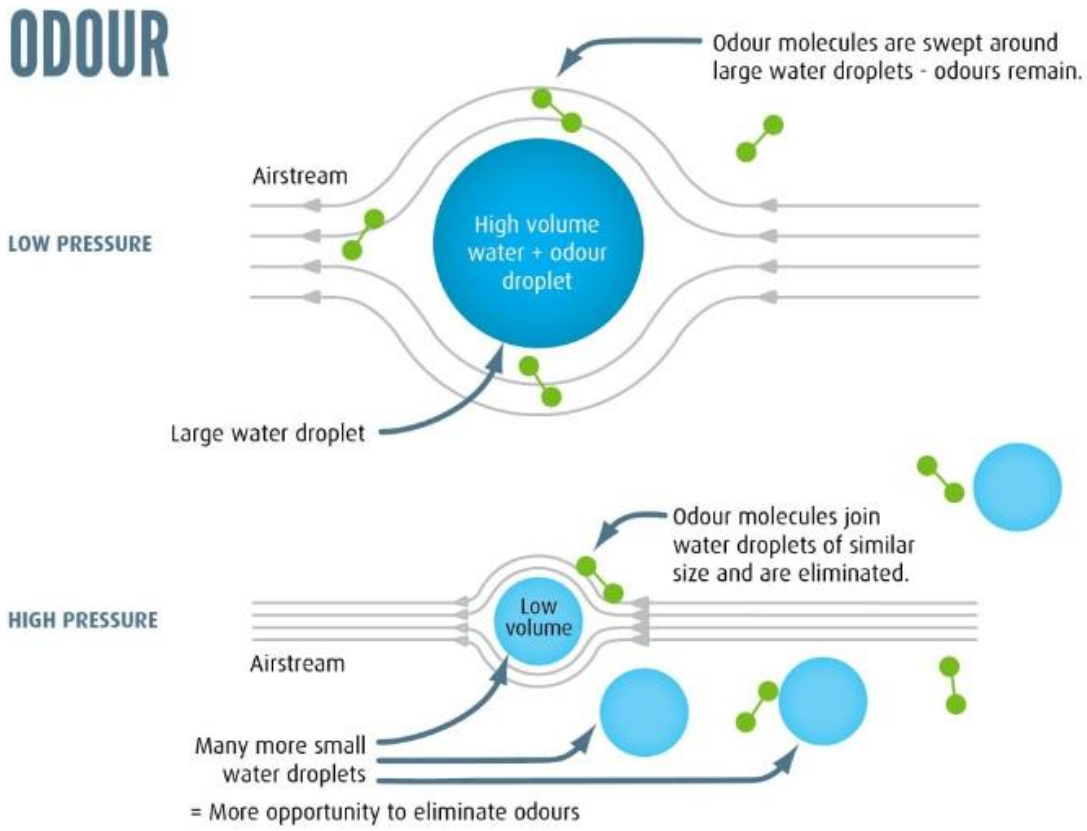
The primary components of a deodoriser include a water misting cannon, a chemical dosing system, a small diesel generator and a large water tank. A photograph of the proposed Spray Stream 2.2 Self Supporting deodoriser is presented in Figure 1.

***Figure 1: Existing mobile deodoriser***


The deodoriser generates a constant stream of very fine water aerosols, between 20 and 50 µm, containing low concentrations of an odour-neutralising agent which is mixed with water at a ratio of 1 part neutraliser to 500 parts of water before being dispersed by the deodoriser.

The principle behind the deodoriser is that odour molecules interact and react with the fine aerosols produced by the deodoriser. Therefore, the size of the aerosols is important, with a greater number of smaller aerosols providing more opportunity to eliminate odours when compared with low-pressure systems that generate larger aerosols. Figure 2 shows the proposed principle of action purported by supplier.

***Figure 2: The Odour Control and Fogging Principle (Source BiOx International)***




WWL is proposing to use three types of odour-neutralising agents, these are summarised in Table 1 along with the composition of these agents according to the Material Safety Data Sheets. The Material Safety Data Sheets for the odour-neutralising agents are also provided in **Appendix A**.

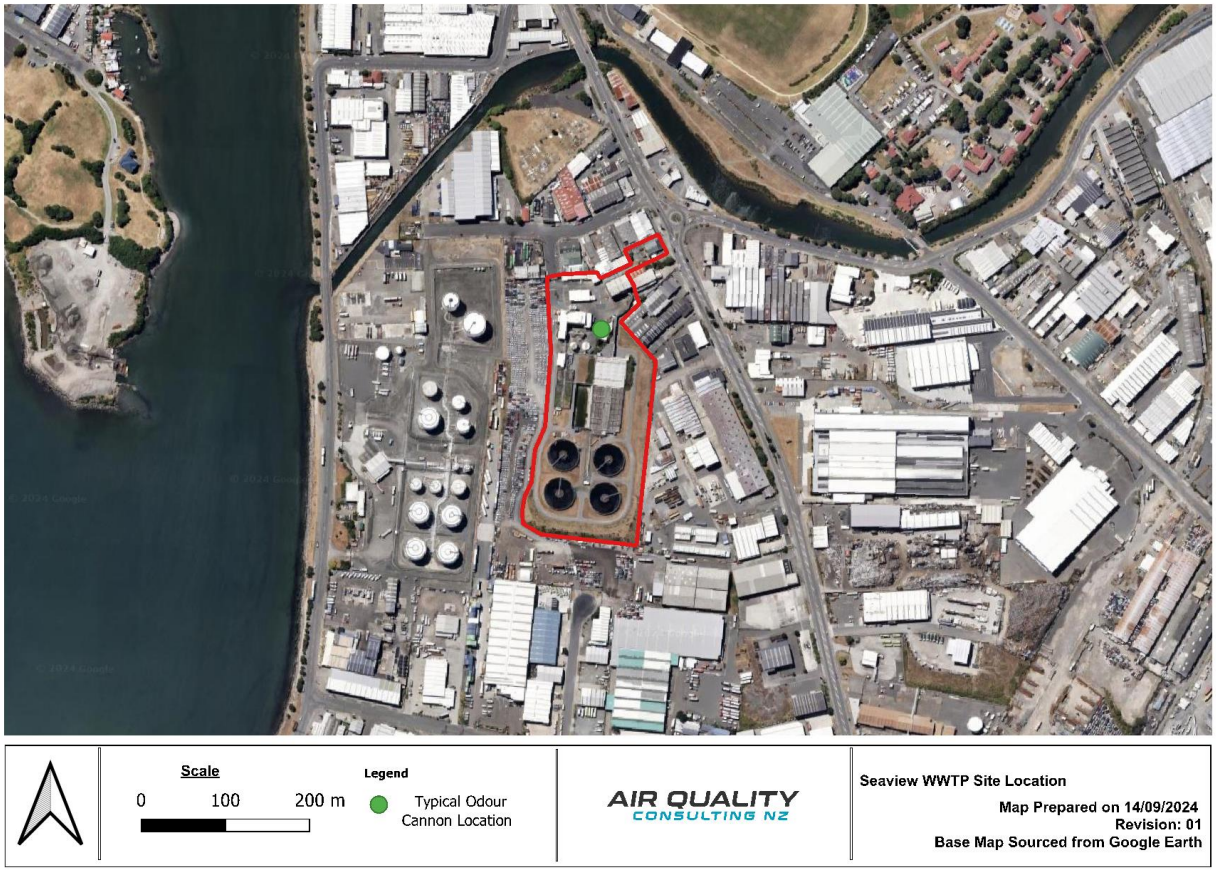
***Table 1: Summary of the composition of odour neutralisers***

| **Hi Chem** | | |
|---|---|---|
| **Compound** | **CAS Number** | **Composition** |
| Quaternary ammonium compounds, alkylbenzyldimethyl, chlorides | 8001-54-5 | 10% |
| Non-hazardous ingredients | - | 90% |
| **Odour Neutraliser Plus** | | |
| **Composition** | **Composition** | **Composition** |
| Sodium Chlorite | 7758-19-2 | 2% |
| Potassium Persulphate | 7727-21-1 | 0.1% |
| Surfactant | 1643-20-5 | 1% |
| Non-hazardous ingredients | - | 96.9% |
| **Oda-Ban** | | |
| Contains no hazardous ingredients | | |

The primary reason for using the deodorisers is to mitigate the additional risk of WWTP odour during periods when maintenance work is being undertaken on key elements of treatment process or in the event of malfunction. Given that such events are unpredictable, Wellington Water is seeking a consent that allows for the use of the deodorisers at any time.

WWL is seeking resource consent for discharges from up to four deodorisers. Currently WWL operates a mix of fixed and mobile deodorisers. However to provide flexibility to operational staff on how to best deploy deodorisers to reduce off-site odour effects, this assessment is based on the assumption that the deodorisers will be mobile units and therefore could be stationed anywhere within the WWTP site shown in Figure 3.

***Figure 3: Location of the WWTP***



# 3 Background Information

## 3.1 Meteorology

Wind can have a significant impact on the potential for transporting the fine aerosols from the deodorisers; however, generally speaking, strong winds have the greatest potential for carrying aerosol at greater distances. It is, therefore, important to understand the local meteorology to assess the potential for air quality effects to arise.

WWL operates its own Automatic Weather Station (**AWS**) recording wind speed and direction at the Seaview WWTP. Data from this station for the period 15 December 2023 to 20 August 2024 has been analysed and the distribution of hourly average wind speeds and directions recorded at the site is presented in Figure 4. The distribution frequency of wind speed is presented in Table 2.

***Figure 4: Seaview WWTP - Windrose (15 Dec 2023 to 20 Aug 2024)***

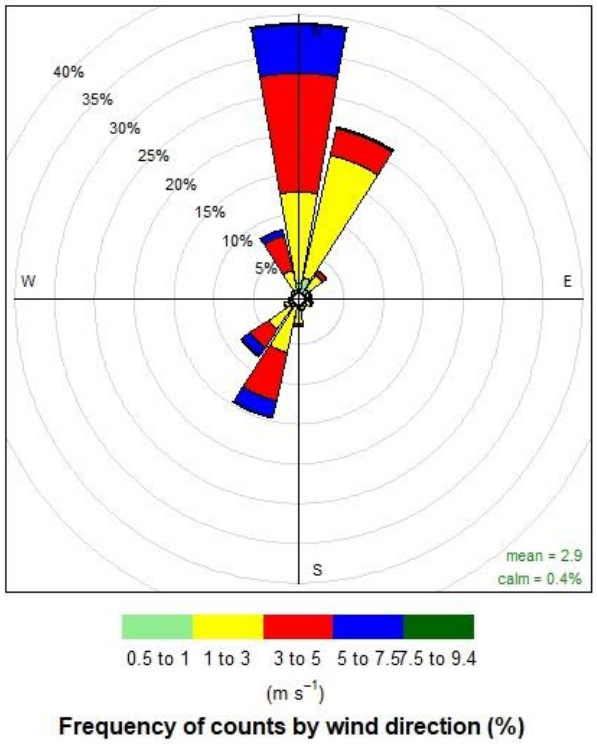


***Table 2: Seaview WWTP - Average Wind Speed Distribution (%)** 15 Dec 2023 to 20 Aug 2024*

| Wind Direction | Wind Classes (m/s) | | | | | |
|---|---|---|---|---|---|---|
| | 0.5 -1.0 | 1.0 – 3.0 | 3.0 – 5.0 | 5.0 – 7.5 | >7.5 | Total (%) |
| N | 1.3 | 11.4 | 14.9 | 6.1 | 0.2 | 34.0 |
| NNE | 2.1 | 15.8 | 3.4 | 0.2 | 0.0 | 21.5 |
| NE | 0.8 | 2.2 | 0.6 | 0.1 | 0.0 | 3.6 |
| ENE | 0.3 | 0.5 | 0.1 | 0.0 | 0.0 | 1.0 |
| E | 0.3 | 0.5 | 0.1 | 0.0 | 0.0 | 0.9 |
| ESE | 0.2 | 0.7 | 0.2 | 0.0 | 0.0 | 1.1 |
| SE | 0.2 | 0.4 | 0.0 | 0.0 | 0.0 | 0.6 |
| SSE | 0.2 | 0.6 | 0.0 | 0.0 | 0.0 | 0.8 |
| S | 0.2 | 2.2 | 0.3 | 0.0 | 0.0 | 2.8 |
| SSW | 0.3 | 5.9 | 6.2 | 2.2 | 0.1 | 14.6 |
| SW | 0.5 | 3.5 | 2.8 | 1.2 | 0.2 | 8.1 |
| WSW | 0.6 | 0.6 | 0.0 | 0.0 | 0.0 | 1.2 |
| W | 0.2 | 0.3 | 0.0 | 0.0 | 0.0 | 0.5 |
| WNW | 0.1 | 0.2 | 0.0 | 0.0 | 0.0 | 0.3 |
| NW | 0.2 | 0.3 | 0.0 | 0.0 | 0.0 | 0.5 |
| NNW | 0.5 | 2.5 | 4.5 | 0.8 | 0.0 | 8.3 |
| Sub-Total | 7.9 | 47.4 | 33.2 | 10.7 | 0.4 | 99.6 |
| Calms | | | | | | 0.4 |
| Total | | | | | | 100 |

## 3.2 Sensitive Receptors

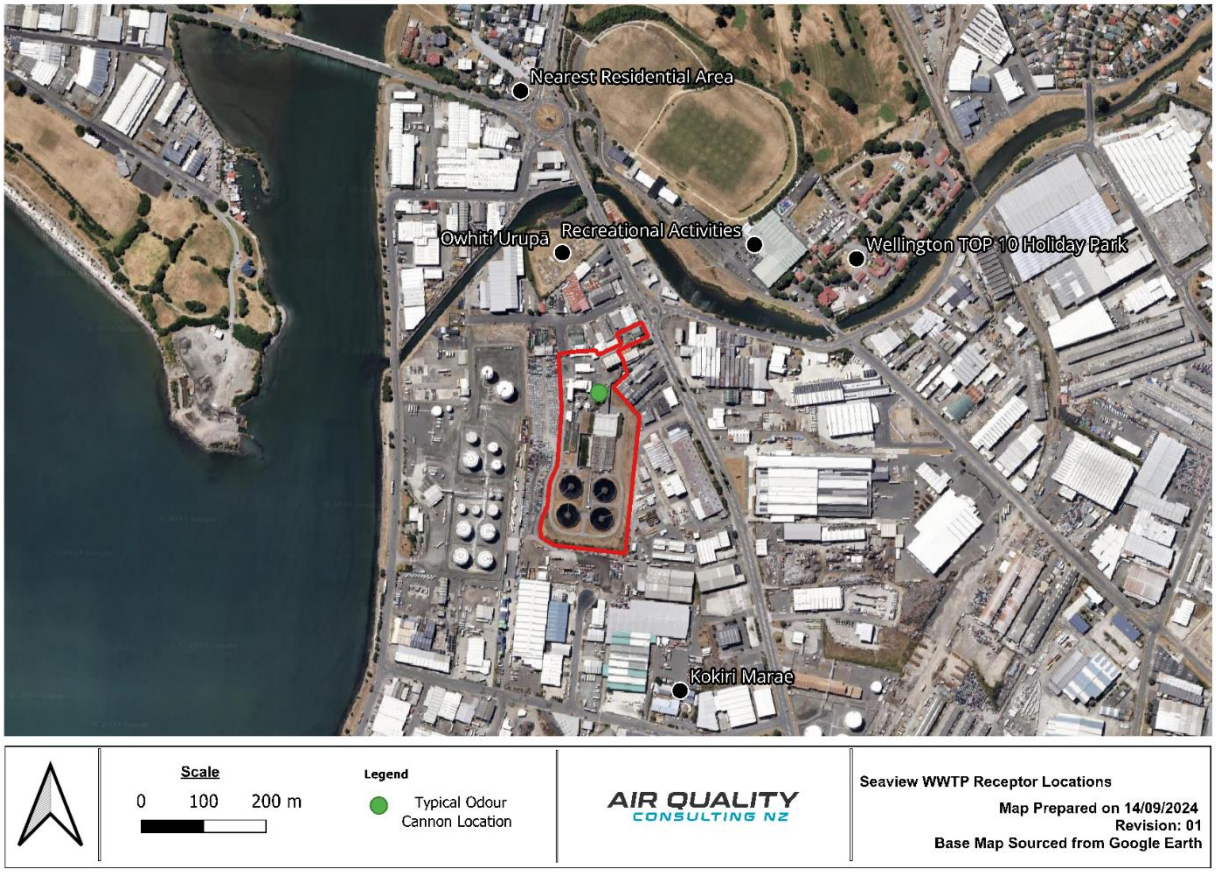
The WWTP is located in the Seaview industrial area on land zoned ‘Special Business’ in the Hutt City District Plan which allows for long established and regionally important area for industrial activities of which is applicable to the WWTP. This zoning allows for a lower level of air quality. The properties immediately adjoining the WWTP are all also zoned ‘Special Business’ which contains a variety of industrial and commercial activities.

A sensitive receptor is defined as a location where people or surroundings may be susceptible to the effects of air pollution. The closest of which is the Owhiti Urupā which is zoned ‘Community Iwi’ in the Hutt City District Plan. At its nearest the boundary of the urupā site is approximately 100 metres from the Waterman Street gate to the WWTP.

To the South of the WWTP is the Kokiri Marae which is also zoned ‘Community Iwi’ in the Hutt City District Plan. The marae provides a variety of social and community services including a kōhanga reo. The boundary of Kokiri Marae is approximately 150 m from the southern boundary of the WWTP site.

The nearest residentially zoned land is north of the WWTP at the intersection of Waione Street, Croft Gove and Randwick Street. This area is approximately 400 m from the boundary of the WWTP. There is also a number of recreational activities approximately 300 m to the north of the site and Wellington Top 10 Holiday Park 450 m to the northeast. The nearest sensitive receptors are presented in Figure 5.

***Figure 5: Receptor Locations***




# 4 Assessment of Effects

The actual distance that aerosols from the deodoriser can travel depends on three factors, firstly how strong the wind is, secondly how large the aerosols are, and finally the maximum height and the 'throwing distance' (forward momentum) in which aerosols are released.

To help determine how far aerosol could be transported off-site and at what concentration AQCNZ undertook atmospheric dispersion modelling assessment was undertaken using CALPUFF Version 7, which has been used extensively in New Zealand and Australia and is a recommended model in the Good Practice Guide for Atmospheric Dispersion Modelling[1] (**GPG ADM**). The GWRC Lower Hutt (2018-2019) CALMET dataset was incorporated into CALPUFF to account for localised meteorological conditions.

Given the relatively small size of the aerosols produced by the deodorisers, it has been assumed that the aerosol once airborne will behave similar to particulate and therefore the model has been configured to have particles of 10 µm in size. To account for the horizontal 'throwing distance' the deodorisers were place 30 metres closer to the northern boundary (the nearest direction of the

[1] Ministry for the Environment, Good Practice Guide for Atmospheric Dispersion Modelling, 2004

nearest sensitive receptor) to allow for any increase distance that the droplets might travel. Also noting that the model has been set up with a horizontal discharge, however the aerosols are released at 45 degree angle which should result in better dispersion and therefore making the model more conservative. The discharge parameters used in this assessment are summarised in The different component discharge rates of the deodoriser are based on a total discharge rate of 390 L/hr and a 500:1 mixing ratio, resulting in a deodorant usage rate of 0.8 L/hr. With a specific gravity of 1 g/m³, each component's hourly discharge is calculated by multiplying its MSDS percentage by the deodorizer rate. For instance, for sodium chloride at 2%, the discharge rate is 0.8 L/hr × 2% = 0.016 kg/hr.

Table 3. The different component discharge rates of the deodoriser are based on a total discharge rate of 390 L/hr and a 500:1 mixing ratio, resulting in a deodorant usage rate of 0.8 L/hr. With a specific gravity of 1 g/m³, each component's hourly discharge is calculated by multiplying its MSDS percentage by the deodorizer rate. For instance, for sodium chloride at 2%, the discharge rate is 0.8 L/hr × 2% = 0.016 kg/hr.

***Table 3: Deodoriser model parameters***

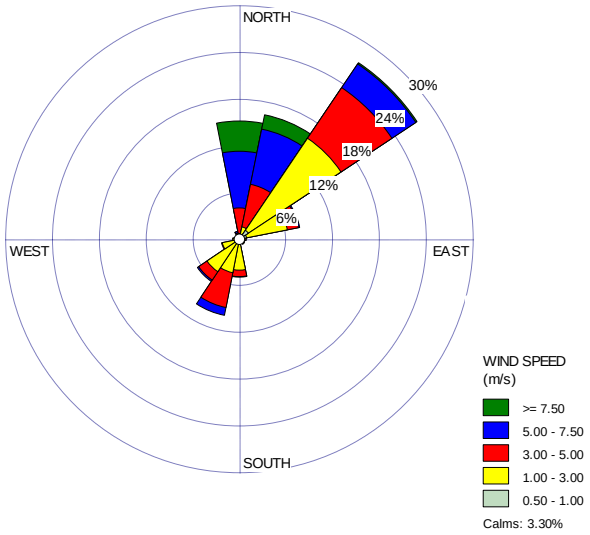
| Parameter | Value |
|---|---|
| Source characterisation | Deodoriser with a horizontal discharge |
| Number of Unit | 4 |
| Stack height (m) | 3.5 |
| Stack diameter (m) | 0.5 |
| Discharge Velocity (m/s) | 10 |
| Temperature (K) | 288 |
| Maximum Water Rate per unit (L/hr) | 390 |
| Specific Gravity (g/cm³) | 1 |
| Quaternary ammonium compounds, alkylbenzyldimethyl, chlorides (kg/hr) | 0.078 |
| Sodium Chlorite (kg/hr) | 0.016 |
| Potassium Persulphate (kg/hr) | 0.001 |
| Surfactant (kg/hr) | 0.008 |

A windrose extracted from the CALMET dataset at the Site's location is presented in Figure 6. The following is observed from the wind rose:

- The prevailing winds are from the north, north northeast and northeast.
- The highest predicted wind speeds are from the northeast.
- While the windrose shows more variety in wind direction (including a more prominent north to northeast windflow) and lower windspeeds when compared to the weather station at the WWTP, the CALMET dataset suitability captures the range of wind directions and wind speeds experienced at the Site.

Overall, AQCNZ considers that while there are differences in the wind roses the different range of wind conditions measured at WWTP is captured in the CALMET dataset.

***Figure 6: CALMET output for the Site***




## 4.1 Modelling Results

Table 4 shows the maximum 1-hour average off-site concentrations for the different compounds found in the deodorisers. A graphical presentation of the maximum 1-hour average sodium chlorite ground-level concentrations from the Site is presented in Figure 7 to show how aerosols are likely to disperse.

The modelling results show that the maximum off-site concentration from the deodorisers occurs just to the west of the site on land zoned industrial where there is a lower level of air quality is expected. The highest predicted concentration at a location deemed sensitive to air quality occurs at the Owhiti Urupa to the north of the site.

It should be also noted that this assessment approach in itself is very conservative and therefore all of the predicted concentrations are likely to be much lower than the values presented in Table 4 for the follow reasons:

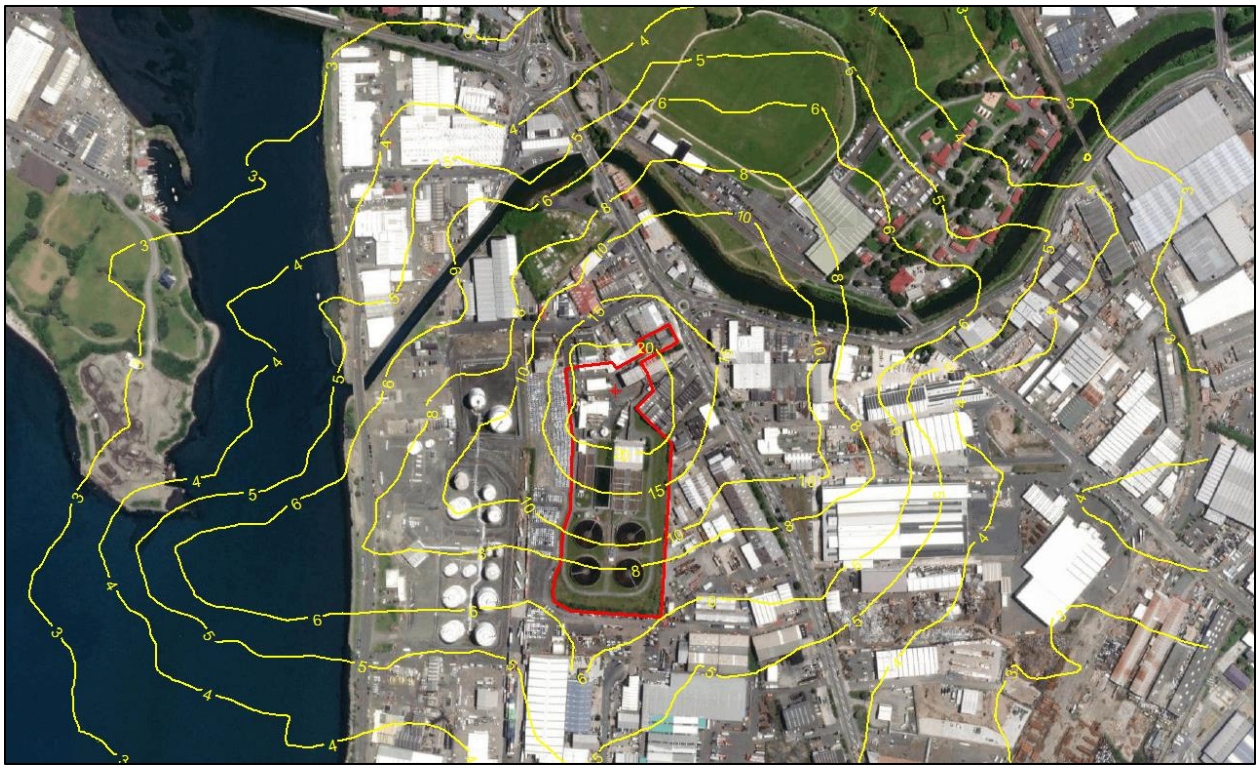
- It is unlikely that all four deodorisers will be operating at the same time.
- The model is based on the assumption that all the deodorisers will be located in the same location to give a concentrated discharge rate. This is unlikely as the deodorisers are likely to be spread around the site a varying distances.
- The model has assumed that all four deodorisers will operate continuously i.e. every hour of the day for the entire modelling period.
- As the Oda-ban deodoriser has no hazardous compounds, if this was to be used, or even partially used, predicted concentrations would be lower.

- The model has assumed that the aerosol behave like particles that are 10 µm, whereas the aerosols have size range of between 20 – 50 µm. This would result in the model overpredicting the distance in which the aerosol may travel.

***Table 4: Maximum 1-hour Average Off-site Concentrations***

| Pollutant | Maximum Off-site Concentration (µg/m³) | Maximum Concentration at a Sensitive Location (µg/m³) |
|---|---|---|
| Quaternary ammonium compounds, alkylbenzyldimethyl, chlorides | 108.8 | 46.8 |
| Sodium Chlorite | 21.6 | 9.2 |
| Potassium Persulphate | 1.2 | 0.4 |
| Surfactant | 10.8 | 4.8 |

***Figure 7 Isopleth of the predicted maximum 1-hour average Sodium Chlorite Concentrations***



## 4.2 Health Risk Assessment

Based on the modelling results presented on Section 4.1 a health risk assessment (**HRA**) was undertaken by Environment Risk Sciences Pty (**EnRisks**). The health risk associated with the discharges from the deodorisers are discussed in more detail in the EnRisks assessment attached in **Appendix B**.

However, in summary, the assessment quantified potential exposure and risks to human health associated with these chemicals using a threshold dose-response approach. This involved comparing the estimated intake or exposure concentration with threshold values that represent a

tolerable intake or concentration, while also accounting for background level. The resulting ratio, known as the Hazard Index (**HI**), represents the sum of all Hazard Quotients (**HQ**) across relevant exposure pathways.

Several conservative assumptions were applied to ensure an over estimation of risks:

- **Constant Aerosol Concentration**: The assessment assumed that predicted aerosol concentrations would remain constant over the entire exposure duration. In reality, aerosol sprays emitted from the on-site deodorisers will only be present during periods when the wastewater treatment plant undergoes maintenance activities. This conservative assumption likely overestimates potential exposure levels.
- **Distance from Source**: Risk estimates for off-site residents, who live approximately 400 m from the site, were based on exposure concentrations predicted for the nearest recreational area, located only 100 m from the site. Since aerosol concentrations decrease with distance, the risks calculated for the off-site residents are likely to be overestimated.
- **Indoor Exposure**: Risk estimates also assumed that off-site residents would be exposed to aerosol concentrations indoors for 20 hours per day, which likely overstates the actual exposure. This is because aerosol spray entering residential dwellings through open windows and doors would be less than the outdoor concentrations used in the calculations.

Given these conservative assumptions, the assessment concluded that the calculated Hazard Index (HI) remains well within acceptable limits. Therefore, the overall risk to human health at all off-site sensitive locations is deemed low and compliant with New Zealand's health guidelines.

# 5 Conclusion

To better understand the potential off-site effects of deodorisers at the Seaview WWTP, AQCNZ conducted an atmospheric dispersion modelling assessment in accordance with the Ministry for the Environment's *Good Practice Guide for Assessing Discharges to Air from Industry* (2016) and the *Good Practice Guide for Atmospheric Dispersion Modelling* (2008).

The model predicted ground-level concentrations for various air pollutants, including benzalkonium chloride, sodium chlorite, potassium persulphate, and dodecyldimethylamine oxide (surfactant). A conservative approach was used in configuring the model inputs, which would likely result in an overestimation of ground-level pollutant concentrations.

EnRisks conducted a HRA based on these conservative predictions, which also followed a conservative methodology. The assessment concluded that the predicted ground-level concentrations of the compounds in the deodorisers at all off-site sensitive locations are low and acceptable according to New Zealand guidelines.

Considering both the air quality assessment and the health risk assessment, AQCNZ concludes that there is a low potential for adverse health effects from air discharges. Overall, AQCNZ considers the effects from the site activities to be less than minor.

# 6 Closure

If you have any questions regarding the above assessment, please don't hesitate to contact the undersigned.

Yours sincerely,

**Jonathan Harland**
BAppSC, CASANZ CAQP
Senior Air Quality Consultant

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AIR QUALITY
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# 7 Limitations

Air Quality Consulting NZ Limited has prepared this report in accordance with the usual care and thoroughness of the consulting profession for the use of Wellington Water Limited, and only those third parties who have been authorised in writing by Air Quality Consulting NZ Limited to rely on this report.

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# Appendix A: Material Safety Datasheets

# SAFETY DATA SHEET

## Section 1. Identification of the material and the supplier

| | |
|---|---|
| Product: | **Oda-Ban Concentrate** |
| Product Use: | **Odour Neutraliser** |
| Restriction of Use: | Refer to Section 15 |
| New Zealand Supplier: | **biOx International Limited** |
| Address: | 38/38 Ashley Place<br>Papamoa<br>New Zealand |
| Telephone: | 021815536 |
| **Emergency Telephone:** | 021815536 |
| Date of SDS Preparation: | 7 April 2020 version 2 |

## Section 2. Hazards Identification

**This substance is not hazardous according to the EPA Hazardous Substances (Classification) Notice 2017**

## Section 3. Composition / Information on Ingredients

| Ingredient | % | CAS No. |
|---|---|---|
| Non Hazardous Ingredients | 100 | Proprietary |
| | | |

## Section 4. First Aid Measures

Routes of Exposure:

| | |
|---|---|
| Eye | Flush the affected eye with a gentle stream of water for 15 minutes. If irritation persists seek medical advice. |
| Skin | Flush with water, incidental skin contact is not harmful. |
| Ingestion | Give water or milk to dilute. Seek medical attention. |
| Inhalation | This substance should not pose any adverse health conditions if accidentally inhaled. |

**Most important symptoms and effects, both acute and delayed**

Symptoms: None known.

## Section 5. Fire Fighting Measures

| | |
|---|---|
| Suitable Extinguishing media | All types of extinguishing media in line with surrounding materials |
| Fire and Explosion hazards | None |
| Fire Fighting Instructions | Self-contained breathing apparatus and protective clothing should be worn when fighting fires involving chemicals. |

## Section 6. Accidental Release Measures

Contain spill, collect and return large amounts to container. Use until one inch remains in the container, empty container, triple rinse and recycle.

## Section 7. Handling and Storage

Handling and Storage Advice: Store in a cool, dry area. Keep container tightly closed and upright when not in use. If frozen, thaw and mix to make usable.

## Section 8 Exposure Controls / Personal Protection

**WORKPLACE EXPOSURE STANDARDS (provided for guidance only)**

| | | TWA | | STEL | |
|---|---|---|---|---|---|
| **Substance** | **CAS # (a)** | **ppm(b)** | **mg/m3(c)** | **ppm(b)** | **mg/m3(c)** |

No components of this product are listed in the NZ WES tables.

Workplace Exposure Standard – Time Weighted Average (WES-TWA). The time-weighted average exposure standard designed to protect the worker from the effects of long-term exposure. Workplace Exposure Standard – Short-Term Exposure Limit (WESSTEL). The 15-minute average exposure standard. Applies to any 15- Minute period in the working day and is designed to protect the worker against adverse effects of irritation, chronic or irreversible tissue change, or narcosis that may increase the likelihood of accidents. The WES-STEL is not an alternative to the WES-TWA; both the short-term and time-weighted average exposures apply. Workplace Exposure Standards and Biological Exposure Indices NOV 2019 11$^{TH}$ EDITION.

| | |
|---|---|
| Engineering Controls: | None |
| Personal Protective Equipment: | Advisable to wear protective gloves and goggles for bulk handling or transferring to alternative containers. |

## Section 9 Physical and Chemical Properties

| | |
|---|---|
| Physical State: | Liquid |
| Colour: | Semi-translucent |
| Odour: | Citrus/Floral |
| pH: | N/A |
| Solubility: | 100% |
| Boiling point: | 100$^0$C |
| Melting Point: | N/A |

Specific Gravity: 1.0
Evaporation Rate(Butyl Acetate) <1

## Section 10. Stability and Reactivity

| | |
|---|---|
| **Stability of Substance** | This product is stable when stored under recommended normal temperature and pressures. |
| **Conditions to Avoid** | None known. |
| **Incompatible Materials** | Strong oxidizing substances |
| **Hazardous Decomposition Products** | None known. |

## Section 11 Toxicological Information

**Acute Effects:**

| | |
|---|---|
| **Swallowed** | Not applicable. |
| **Dermal** | Not applicable. |
| **Inhalation** | Not applicable. |
| **Eye** | Not applicable. |
| **Skin** | Not applicable. |

**Chronic Effects:**

| | |
|---|---|
| **Carcinogenicity** | Not applicable. |
| **Reproductive Toxicity** | Not applicable. |
| **Germ Cell Mutagenicity** | Not applicable. |
| **Aspiration** | Not applicable. |
| **STOT/SE** | Not applicable. |
| **STOT/RE** | Not applicable. |

Acute Oral Toxicity $LD_{50}$ Rat (oral) >5000 mg/kg body weight
Acute Dermal Toxicity $LD_{50}$ Rat (dermal) >5000 mg/kg body weight
Long term Effects None anticipated

## Section 12. Ecotoxicological Information

Environmental Precautions

Ecological Toxicity Not expected to be toxic to the environment

Environmental Fate

*Soil* Environmentally biodegradable. Does not persist

*Water* Environmentally biodegradable. Does not persist

Environmental Exposure Limits EEL $_{water}$ Not known

## Section 13. Disposal Considerations

Empty containers should be triple water rinsed before being sent for recycling.

## Section 14 Transport Information

**This product is NOT classified as a Dangerous Good for transport in NZ ; NZS 5433:2012**

## Section 15 Regulatory Information

This product does not trigger any Regulatory controls in New Zealand

## Section 16 Other Information

The information herein is given in good faith, but no warranty, express or implied is made. Please contact the New Zealand proprietor, Biox International Ltd, if further information is required.

Prepared by: biOx International Ltd
Date: 7 April 2020 Review Date: 7 April 2025

# Safety Data Sheet

**Hazardous, NON-Dangerous Goods**

## 1. MATERIAL AND SUPPLY COMPANY IDENTIFICATION

**Product name:** Hi Chem - Disinfectant Reodorant

**Recommended use:** Disinfectant


**Supplier:** A1 Evolution Pty Ltd - Hi Chem
**Company No.:** 9429047401457
**Street Address:** 3/3 Margaret Williams Drive
Papakura, Auckland
2244
New Zealand
**Telephone:** (09) 298 5635
**Email:** info@a1evolution.co.nz


**Emergency Telephone number:** **0800 764 766**

## 2. HAZARDS IDENTIFICATION

**This material is hazardous according to criteria of EPA New Zealand.**

**EPA Group Standard:** HSR002530 - Cleaning Products (Subsidiary Hazard) Group Standard

**Signal Word**
Warning

**Hazard Classifications**
6.3A - Substances that are irritating to the skin
6.4A - Substances that are irritating to the eye

**Hazard Statements**

| | |
|---|---|
| H315 | Causes skin irritation. |
| H319 | Causes serious eye irritation. |

**Prevention Precautionary Statements**

| | |
|---|---|
| P102 | Keep out of reach of children. |
| P103 | Read label before use. |
| P264 | Wash hands, face and all exposed skin thoroughly after handling. |
| P280 | Wear protective clothing, gloves, eye/face protection and suitable respirator. |

**Response Precautionary Statements**

| | |
|---|---|
| P101 | If medical advice is needed, have product container or label at hand. |
| P302+P352 | IF ON SKIN: Wash with plenty of soap and water. |
| P305+P351+P338 | IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. |
| P332+P313 | If skin irritation occurs: Get medical advice/attention. |
| P337+P313 | If eye irritation persists: Get medical advice/attention. |
| P362 | Take off contaminated clothing and wash before reuse. |

**Storage Precautionary Statement**
Not allocated

**Disposal Precautionary Statement**

| | |
|---|---|
| P501 | Dispose of contents/container in accordance with local, regional, national and international regulations. |

**DANGEROUS GOOD CLASSIFICATION**

Not classified as Dangerous Goods by the criteria of the "Australian Code for the Transport of Dangerous Goods by Road & Rail" and the "New Zealand NZS5433: Transport of Dangerous Goods on Land".

## 3. COMPOSITION INFORMATION

| CHEMICAL ENTITY | CAS NO | PROPORTION |
|---|---|---|
| Quaternary ammonium compounds, alkylbenzyldimethyl, chlorides | 8001-54-5 | <10 % |
| Ingredients determined to be Non-Hazardous | | Balance |
| | | 100% |

## 4. FIRST AID MEASURES

If poisoning occurs, contact a doctor or Poisons Information Centre (Phone Australia 131 126, New Zealand 0800 764 766).

**Inhalation:** Remove victim from exposure - avoid becoming a casualty. Remove contaminated clothing and loosen remaining clothing. Allow patient to assume most comfortable position and keep warm. Keep at rest until fully recovered. Seek medical advice if effects persist.

**Skin Contact:** If skin or hair contact occurs, immediately remove contaminated clothing and flush skin and hair with running water. Continue flushing with water until advised to stop by the Poisons Information Centre or a Doctor; or for 15 minutes and transport to Doctor or Hospital.

**Eye contact:** If in eyes, hold eyelids apart and flush the eyes continuously with running water. Continue flushing until advised to stop by the Poisons Information Centre or a Doctor; or for at least 15 minutes and transport to Doctor or Hospital.

**Ingestion:** Rinse mouth with water. If swallowed, do NOT induce vomiting. Give a glass of water to drink. Never give anything by the mouth to an unconscious patient. If vomiting occurs give further water. Seek medical advice.

**PPE for First Aiders:** Wear overalls, gloves, safety glasses. Available information suggests that gloves made from nitrile rubber should be suitable for intermittent contact. However, due to variations in glove construction and local conditions, the user should make a final assessment. Always wash hands before smoking, eating, drinking or using the toilet. Wash contaminated clothing and other protective equipment before storing or re-using.

**Notes to physician:** Treat symptomatically.

## 5. FIRE FIGHTING MEASURES

**Hazchem Code:** Not applicable.

**Suitable extinguishing media:** If material is involved in a fire use water fog (or if unavailable fine water spray), alcohol resistant foam, standard foam, dry agent (carbon dioxide, dry chemical powder).

**Specific hazards:** Non-combustible material.

**Fire fighting further advice:** Not applicable.

## 6. ACCIDENTAL RELEASE MEASURES

**SMALL SPILLS**
Wear protective equipment to prevent skin and eye contamination. Avoid inhalation of vapours or dust. Wipe up with absorbent (clean rag or paper towels). Collect and seal in properly labelled containers or drums for disposal.

**LARGE SPILLS**
Clear area of all unprotected personnel. Slippery when spilt. Avoid accidents, clean up immediately. Wear protective equipment to prevent skin and eye contamination and the inhalation of vapours. Work up wind or increase ventilation. Contain - prevent run off into drains and waterways. Use absorbent (soil, sand or other inert material). Collect and seal in properly labelled containers or drums for disposal. If contamination of crops, sewers or waterways has occurred advise local emergency services.

**Dangerous Goods - Initial Emergency Response Guide No:** Not applicable

## 7. HANDLING AND STORAGE

**Handling:** Avoid eye contact and skin contact. Avoid inhalation of vapour, mist or aerosols.

**Storage:** Store in a cool, dry, well-ventilated place and out of direct sunlight. Store away from foodstuffs. Store away from incompatible materials described in Section 10. Store away from sources of heat and/or ignition. Keep container standing upright. Keep containers closed when not in use - check regularly for leaks.

## 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

**National occupational exposure limits:** No value assigned for this specific material by WorkSafe New Zealand.

**Biological Limit Values:** As per the WorkSafe New Zealand the ingredients in this material do not have a Biological Limit Allocated.

**Engineering Measures:** Natural ventilation should be adequate under normal use conditions..

**Personal Protection Equipment:** OVERALLS, GLOVES, SAFETY GLASSES.

Personal protective equipment (PPE) must be suitable for the nature of the work and any hazard associated with the work as identified by the risk assessment conducted.

Wear overalls, gloves, safety glasses. Available information suggests that gloves made from nitrile rubber should be suitable for intermittent contact. However, due to variations in glove construction and local conditions, the user should make a final assessment. Always wash hands before smoking, eating, drinking or using the toilet. Wash contaminated clothing and other protective equipment before storing or re-using.

**Hygiene measures:** Keep away from food, drink and animal feeding stuffs. When using do not eat, drink or smoke. Wash hands prior to eating, drinking or smoking. Avoid contact with clothing. Avoid eye contact and skin contact. Avoid inhalation of vapour, mist or aerosols. Ensure that eyewash stations and safety showers are close to the workstation location.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

| | |
|---|---|
| **Base Units:** | Litres |
| **Form:** | Liquid |
| **Colour:** | Clear or slightly coloured, low viscosity liquid |
| **Odour:** | Fragrances will vary |

| | |
|---|---|
| **Solubility:** | Completely soluble in water |
| **Specific Gravity:** | Approx 1.0 |
| **Density:** | N Av |
| **Relative Vapour Density (air=1):** | N Av |
| **Vapour Pressure (20 °C):** | 2.37 kPa at 20°C |
| **Flash Point (°C):** | Non-flammable |
| **Flammability Limits (%):** | N Av |
| **Autoignition Temperature (°C):** | N Av |
| **Melting Point/Range (°C):** | Approximately 0°C |
| **Boiling Point/Range (°C):** | Approximately 100°C at 100kPa |
| **pH:** | N Av |
| **Viscosity:** | N Av |
| **Total VOC (g/Litre):** | N Av |

(Typical values only - consult specification sheet)
N Av = Not available, N App = Not applicable

## 10. STABILITY AND REACTIVITY

**Chemical stability:** This product is unlikely to react or decompose under normal storage conditions

**Conditions to avoid:** Avoid excessive heat during storage

**Incompatible materials:** Oxidizing chemicals, cationic surfactants

**Hazardous decomposition products:** Nil

**Hazardous reactions:** Nil

## 11. TOXICOLOGICAL INFORMATION

No adverse health effects expected if the product is handled in accordance with this Safety Data Sheet and the product label. Symptoms or effects that may arise if the product is mishandled and overexposure occurs are:

**Acute Effects**

**Inhalation:** Material may be an irritant to mucous membranes and respiratory tract.

**Skin contact:** Contact with skin will result in irritation.

**Ingestion:** Swallowing can result in nausea, vomiting and irritation of the gastrointestinal tract.

**Eye contact:** An eye irritant.

**Acute toxicity**

**Inhalation:** This material has been classified as non-hazardous. Acute toxicity estimate (based on ingredients): LC50 > 20.0 mg/L for vapours or LC50 > 5.0 mg/L for dust and mist or LC50 > 5,000 ppm gas

**Skin contact:** This material has been classified as non-hazardous. Acute toxicity estimate (based on ingredients): >5,000 mg/Kg bw

**Ingestion:** This material has been classified as non-hazardous. Acute toxicity estimate (based on ingredients): >5,000 mg/Kg bw

**Corrosion/Irritancy:** Eye: this material has been classified as a 6.4A - Substances that are irritating to the eye. Skin: this material has been classified as a 6.3A - Substances that are irritating to the skin.

**Sensitisation:** Inhalation: this material has been classified as not a respiratory sensitiser. Skin: this material has been classified as not a skin sensitiser.

**Aspiration hazard:** This material has been classified as non-hazardous.

**Specific target organ toxicity (single exposure):** This material has been classified as non-hazardous.

**Chronic Toxicity**

**Mutagenicity:** This material has been classified as non-hazardous.

**Carcinogenicity:** This material has been classified as non-hazardous.

**Reproductive toxicity (including via lactation):**

This material has been classified as non-hazardous.

**Specific target organ toxicity (repeat exposure):** This material has been classified as non-hazardous.

## 12. ECOLOGICAL INFORMATION

Avoid contaminating waterways.

**Acute aquatic hazard:** Harmful to aquatic life when diluted and in concentrate form

**Long-term aquatic hazard:** This material has been classified as non-hazardous. Non-rapidly or rapidly degradable substance for which there are adequate chronic toxicity data available OR in the absence of chronic toxicity data, Acute toxicity estimate (based on ingredients): >100 mg/L, where the substance is not rapidly degradable and/or BCF < 500 and/or log $K_{ow}$ < 4.

**Ecotoxicity in the soil environment:** This material has been classified as non-hazardous.

**Ecotoxicity to terrestrial vertebrates:** This material has been classified as non-hazardous.

**Ecotoxicity to terrestrial invertebrates:** This material has been classified as non-hazardous.

**Ecotoxicity:** No information available.

**Persistence and degradability:** The product is readily biodegradable.

**Bioaccumulative potential:** No information available.

**Mobility:** No information available.

## 13. DISPOSAL CONSIDERATIONS

Persons conducting disposal, recycling or reclamation activities should ensure that appropriate personal protection equipment is used, see "Section 8. Exposure Controls and Personal Protection" of this SDS.

If possible material and its container should be recycled. If material or container cannot be recycled, dispose in accordance with local, regional, national and international Regulations.

## 14. TRANSPORT INFORMATION

**ROAD AND RAIL TRANSPORT**
Not classified as Dangerous Goods by the criteria of the "Australian Code for the Transport of Dangerous Goods by Road & Rail" and the "New Zealand NZS5433: Transport of Dangerous Goods on Land".

**MARINE TRANSPORT**
Not classified as Dangerous Goods by the criteria of the International Maritime Dangerous Goods Code (IMDG Code) for transport by sea.

**AIR TRANSPORT**
Not classified as Dangerous Goods by the criteria of the International Air Transport Association (IATA) Dangerous Goods Regulations for transport by air.

## 15. REGULATORY INFORMATION

**This material is not subject to the following international agreements:**
Montreal Protocol (Ozone depleting substances)
The Stockholm Convention (Persistent Organic Pollutants)
The Rotterdam Convention (Prior Informed Consent)
Basel Convention (Hazardous Waste)
International Convention for the Prevention of Pollution from Ships (MARPOL)

**This material/constituent(s) is covered by the following requirements:**

- All components of this product are listed on or exempt from the New Zealand Inventory of Chemical (NZIoC).
- All components of this product are listed on or exempt from the Australian Inventory of Chemical Substances (AICS).

**EPA Group Standard:** HSR002530 - Cleaning Products (Subsidiary Hazard) Group Standard

| | |
|---|---|
| Approved handler | No |
| Location test certificate | No |
| Fire extinguishers | No |
| Signage | Yes |
| Emergency response | Yes |
| Hazardous atmosphere zone | No |

## 16. OTHER INFORMATION

Reason for issue: Revised

This information was prepared in good faith from the best information available at the time of issue. It is based on the present level of research and to this extent we believe it is accurate. However, no guarantee of accuracy is made or implied and since conditions of use are beyond our control, all information relevant to usage is offered without warranty. The manufacturer will not be held responsible for any unauthorised use of this information or for any modified or altered versions.

If you are an employer it is your duty to tell your employees, and any others that may be affected, of any hazards described in this sheet and of any precautions that should be taken.

# Safety Data Sheet

Safety Data Sheets are updated frequently. Please ensure you have a current copy.

# SAFETY DATA SHEET

## Section 1. Identification of the material and the supplier

| | |
|---|---|
| Product: | **Odour Neutraliser PLUS** |
| Product Code: | **SCD1100** |
| Product Use: | **Deodourising Agent** |
| Restriction of Use: | Refer to Section 15 |
| New Zealand Supplier: | **biOx International Limited** |
| Address: | 38/38 Ashley Place<br>Papamoa<br>New Zealand |
| Telephone: | 021815536 |
| **Emergency Telephone:** | 021815536 |
| Date of SDS Preparation: | 7 April 2020 version 5 |

## Section 2. Hazards Identification

**This substance is hazardous according to the EPA Hazardous Substances (Classification) Notice 2017**

**EPA Approval Code:** HSR002530 Cleaning Products (Subsidiary Hazard) Group Standard

**Pictograms:**

**Irritant**

**Chronic**

**Signal Word: DANGER**

| HSNO Classification | Hazard Code | Hazard Statement | GHS Category |
|---|---|---|---|
| 6.3A | H315 | Causes skin irritation. | Skin Irrit. 2 |
| 6.4A | H319 | Causes serious eye irritation. | Eye Irrit. 2A |
| 6.8A | H360 | May damage fertility or the unborn child | Repr. 1A |
| 6.9B | H373 | May cause damage to organs through prolonged or repeated exposure | STOT RE 2 |
| 9.1C | H412 | Harmful to aquatic life with long lasting effects. | Aquatic Chronic 3 |
| 9.2C | H423 | Harmful to the soil environment. | - |

| Hazard Code | Hazard Statement |
|---|---|
| H315 | Causes skin irritation. |
| H320 | Causes eye irritation. |
| H360 | May damage fertility or the unborn child. |
| H373 | May cause damage to blood system through prolonged or repeated exposure. |
| H412 | Harmful to aquatic life with long lasting effects. |
| H423 | Harmful to the soil environment. |

| Prevention Code | Prevention Statement |
|---|---|
| P103 | Read label before use. |
| P104 | Read safety data sheet before use |
| P201 | Obtain special instructions before use. |

| | |
|---|---|
| P202 | Do not handle until all safety precautions have been read and understood. |
| P260 | Do not breathe mist or spray. |
| P264 | Wash hands thoroughly after handling. |
| P273 | Avoid release to the environment. |
| P280 | Wear protective gloves, protective clothing and eye protection. |
| P281 | Use personal protective equipment as required. |

| **Response code** | **Response Statement** |
|---|---|
| P314 | Get medical advice/attention if you feel unwell. |
| P321 | Specific treatment (see first aid instruction on product label). |
| P362 | Take off contaminated clothing and wash before re-use. |
| P302 + P352 | IF ON SKIN: Wash with plenty of soap and water. |
| P305 + P351+P338 | IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. |
| P308 + P313 | IF exposed or concerned: Get medical advice/ attention. |
| P332 + P313 | If skin irritation occurs: Get medical advice/ attention. |
| P337 + P313 | If eye irritation persists: Get medical advice/attention. |

| **Storage Code** | **Storage Statement** |
|---|---|
| P405 | Store locked up in original container in a cool well-ventilated area out of direct sunlight and away from strong acids oxidisers and reducing agents. |

| **Disposal Code** | **Disposal Statement** |
|---|---|
| P501 | Triple rinse container and add rinsing's to mixing vessel. Puncture empty container before disposal to landfill. Unwanted material should be disposed of as a hazardous waste via a licensed waste disposal company. |

## Section 3. Composition / Information on Ingredients

| Ingredients | Wt% | CAS NUMBER. |
|---|---|---|
| Sodium Chlorite | 1-2% | 7758-19-2 |
| Potassium Persulphate | <0.1% | 7727-21-1 |
| Surfactant | <1.0% | 1643-20-5 |
| Other Non-Hazardous Components | Balance | N/A |

## Section 4. First Aid Measures

Recommended on site emergency facilities: Eye Wash, Emergency Shower

Routes of Exposure:

IF SWALLOWED: Rinse mouth. Do NOT induce vomiting. Give plenty of water to drink. Call a POISON CENTER or doctor/physician if you feel unwell (0800 764 766).

Specific Treatment:

IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Wash affected areas with soap and water. If skin irritation or rash occurs get medical advice/attention.

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. If eye irritation persists: Get medical advice/attention.

Specific Measures:

IF INHALED: Remove to fresh air and keep at rest in a position comfortable for breathing. If breathing is difficult or if experiencing respiratory symptoms, remove to fresh air and keep at rest in a position comfortable for breathing. Immediately call a POISON CENTER (0800 764 766) or doctor/physician.

IF EXPOSED CONCERNED: Get medical advice/attention.

**Most important symptoms and effects, both acute and delayed**

Symptoms:

**Ingestion:** Not applicable.

| | |
|---|---|
| **Inhalation:** | Not applicable. |
| **Skin:** | Causes skin irritation. |
| **Eye:** | Causes eye irritation. |
| **Chronic:** | May damage fertility or the unborn child. May cause damage to organs through prolonged or repeated exposure. |

## Section 5. Fire Fighting Measures

| | |
|---|---|
| **Hazard Type** | Eye and skin irritant, ecotoxic liquid. |
| **Hazards from decomposition products** | Chlorine and oxides of sodium. |
| **Suitable Extinguishing media** | All |
| **Precautions for firefighters and special protective clothing** | Evacuate unnecessary personnel. Wear chemically resistant clothing. Wear self-contained breathing apparatus, rubber boots and heavy rubber gloves. Dilute with water spray to avoid oxidative decomposition. Intensifies fires and releases heat on decomposition. Reaction with strong acids liberates toxic gas (chlorine dioxide). Contain run off. Toxic to the aquatic environment. Contact with combustible materials may cause fire after impregnation and drying out. |
| **HAZCHEM CODE** | NA |

## Section 6. Accidental Release Measures

**Land Spill or Leaks**

Large spills should only be handled by appropriately trained personnel or the emergency services. Wear suitable PPE (see section 8 of this SDS). Avoid contact with skin or eyes. If possible and safe to do so, stop/cut off the source of the leak. Contain any released substance with suitable inert spill media (e.g. zeolite, kitty litter, sand. Recover if possible by pumping into suitable containers (HDPE). Transfer all solid spill residues into labeled hazardous waste containers. Do not allow spill residues to dry out. Clean contaminated surfaces with an excess of water. Wash clothing and equipment after handling. Dispose of spill residues using a licensed hazardous waste company.

## Section 7. Handling and Storage

Safe handling and storage of this substance must comply with the requirements of the site and storage conditions for ecotoxic substances (copies available from the NZ EPA website www.epa.govt.nz ).

**Precautions for safe handling**:

- Handle in accordance with good industrial hygiene and safety procedures.
- Reduce/avoid exposure and/or contact.
- Remove contaminated clothing immediately.
- Clean contaminated clothing.
- Keep container tightly closed.
- Keep away from: Heat sources, acids, food and feedstuffs.
- Collect spillages

**Conditions for safe storage:**

- Store in a cool well ventilated place out of direct sunlight.
- Avoid storing with acids, chlorine, hypochlorite and organic solvents.
- Keep containers closed when not in use.

## Section 8 Exposure Controls / Personal Protection

**WORKPLACE EXPOSURE STANDARDS (provided for guidance only)**

| | | TWA | | STEL | |
|---|---|---|---|---|---|
| **Substance** | **CAS # (a)** | **ppm(b)** | **mg/m3(c)** | **ppm(b)** | **mg/m3(c)** |

No components of this product are listed in the NZ WES tables.

Workplace Exposure Standard – Time Weighted Average (WES-TWA). The time-weighted average exposure standard designed to protect the worker from the effects of long-term exposure. Workplace Exposure Standard – Short-Term Exposure Limit (WESSTEL). The 15-minute average exposure standard. Applies to any 15- Minute period in the working day and is designed to protect the worker against adverse effects of irritation, chronic or irreversible tissue change, or narcosis that may increase the likelihood of accidents. The WES-STEL is not an alternative to the WES-TWA; both the short-term and time-weighted average exposures apply. Workplace Exposure Standards and Biological Exposure Indices NOV 2019 11TH EDITION.

**Engineering Controls:**

- Work under local exhaust/ventilation.

**Personal Protective Equipment:**

- Where exposure through inhalation may occur the use of approved respiratory protection equipment is recommended
- Use chemically resistant goggles or face shield with safety glasses.
- Protective gloves apron, boots, head and face protection should be worn.
- Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure.
- Avoid all unnecessary exposure.
- Ensure prompt removal from eyes, skin and clothing.

**General:**
Use of safe work practices are recommended to avoid eye or skin contact and inhalation. Observe good personal hygiene, including washing hands before eating. Prohibit eating, drinking and smoking in contaminated areas. Avoid all personal contact, including inhalation. Wear protective clothing.

## Section 9 Physical and Chemical Properties

| | |
|---|---|
| **Appearance** | Yellow Liquid |
| **Odour** | Characteristic mild chlorine-like odour |
| **Odour Threshold** | Not applicable |
| **pH** | 8-9 |
| **Decomposition temperature** | >170°C |
| **Melting Point** | Not applicable |
| **Freezing Point** | Not applicable |
| **Flash Point** | Not applicable |
| **Flammability** | Not applicable |
| **Upper and Lower Exposure Limits** | Not applicable |
| **Vapour Pressure** | Not applicable |
| **Vapour Density** | Not applicable |
| **Specific Gravity** | 1.05 g/cm$^3$ |
| **Solubilities** | Completely soluble in water. |
| **Partition Coefficient:** | Not applicable |
| **Auto-ignition Temperature** | Not applicable |
| **Decomposition Temperature** | Not applicable |
| **Kinematic Viscosity** | Not applicable |
| **Particle Characteristics** | Not applicable |

## Section 10. Stability and Reactivity

| | |
|---|---|
| **Stability of Substance** | This product is stable when stored under recommended normal temperature and pressures. |
| **Conditions to Avoid** | Keep away from strong acids. |

| | |
|---|---|
| **Incompatible Materials** | Acids, chlorine, hypochlorite, organic solvents and organic compounds. Will react with strong acids to liberate toxic gas (chlorine dioxide). |
| **Hazardous Decomposition Products** | On heating may release toxic and corrosive gases/vapours. |
| **Packaging materials and containers** | Recommended: Polyester, polyethylene, stainless steel, (small quantities: glass). Not recommended: Steel, Copper, Copper and its alloys, Aluminium and its alloys, rubber. |

## Section 11 Toxicological Information

**Acute Effects:**

| | |
|---|---|
| **Swallowed** | Not applicable. |
| **Dermal** | Not applicable. |
| **Inhalation** | Not applicable. |
| **Eye** | Causes severe irritation to eyes |
| **Skin** | Causes skin irritation. |

**Chronic Effects:**

| | |
|---|---|
| **Carcinogenicity** | Not applicable. |
| **Reproductive Toxicity** | Suspected of damaging fertility or the unborn child. |
| **Germ Cell Mutagenicity** | Not applicable. |
| **Aspiration** | Not applicable. |
| **STOT/SE** | Not applicable. |
| **STOT/RE** | Causes damage to organs through prolonged or repeated exposure. Not applicable. |

**Acute toxicity (calculated)**

| | |
|---|---|
| Oral | >5000mg/kg bw (Rat) |
| Dermal | >5000 mg/kg bw |
| Inhalation | >5 mg/l (mist) |

## Section 12. Ecotoxicological Information

**HSNO Ecotoxicity Classifications:** 9.1C = Harmful to aquatic life with harmful effects
9.2C = Harmful to the soil environment.

**Environmental hazards**

This substance in its undiluted form is harmful to fish and harmful in the soil environment. Do not discharge effluent containing this product into lakes, streams, rivers, ponds, oceans or other natural waters unless in accordance with local bylaws or unless you have a permit to do so. Do not discharge effluent containing this product into sewer systems unless you have a permit to do so. For guidance contact your local authority.

**Environmental Precautions:** Avoid release to the environment.

**Individual component toxicity data.**

**Sodium chlorite solution:**

SPECIES: Daphnia magna (Water flea)
TYPE OF EXPOSURE: Static
DURATION: 48 hr
ENDPOINT: EC50 (Intoxiciation)
VALUE: 0.0146, 0.012 - 0.018 PPM (= 0.0146 mg/l)
Bioccumulative: ND
Rapidly Degradable: Yes

SPECIES: Selenastrum capricornutum (Green algae)

TYPE OF EXPOSURE: Static
DURATION: 96 hr
ENDPOINT: EC50 (Intoxication)
VALUE: 1.32, 1.18 - 1.47 ppm (= 1.32 mg/l)
Bioccumulative: ND
Rapidly Degradable: Yes

SPECIES: Cyprinodon variegatus (Sheepshead minnow)
TYPE OF EXPOSURE: Flow-through
DURATION: 96 hr
ENDPOINT: LC50 (Mortality)
VALUE: 75 PPM (= 75 mg/l)
Bioccumulative: ND
Rapidly Degradable: Yes

SPECIES: Activated sludge, domestic
ENDPOINT: EC50
VALUE: 2.2 mg/l
Soil DT 50 > 30 days: ND

SPECIES: Rat
ENDPOINT: LD50
VALUE: 165 mg/kg

**Lauryl Dimethylamine oxide**

9.1A (fish) REMARK: Refer to CAS # 112-18-5.

Bioccumulative: Yes
Rapidly Degradable: Yes

CAS #: 1643-20-5 N,N-DODECYLDIMETHYLAMINE OXIDE
Parameter Type : Screening Test Study Biodeg Eval: BF
Rate : 96 Units : %
DEGRADATION Oxygen Condition: AEROBIC
Incub Time (days): 19 Chem Conc (ppm): 5 Inoculum : SEWAGE Temp (deg C) : 25

**Environmental Exposure Limits:** No EEL's are set.

## Section 13. Disposal Considerations

Waste information: Removal of residues: - Remove as a hazardous waste according to local and national regulations.

Polluted packaging: Remove as a waste according to local and national regulations.

**Provisions relating to waste:**

**Disposal methods:** Triple rinse container and add rinsing's to mixing vessel. Puncture empty container before disposal to landfill. Unwanted material should be disposed of as a hazardous waste via a licenced waste disposal company. Dispose of spills and residues as a hazardous

**Precautions or methods to avoid:** Avoid release to the environment.

## Section 14 Transport Information


**Land Transport**
**This product is not classified as a Dangerous Good for transport in NZ ; NZS 5433:2012**

**Rail, Sea and Air Transport**

| | |
|---|---|
| **UN No** | 3082 |
| **Class - Primary** | 9 |
| **Packing Group** | III |
| **Proper Shipping Name** | ENVIRONMENTALLY HAZARDOUS LIQUID, N.O.S (Sodium Chlorite) |
| **Marine Pollutant** | Yes |
| **Special Provisions** | If the product's individual container is below 5L/kg, it can be transported as a non-DG as long as the product packaging is still labelled as per DG requirements and the driver is given safety information in accordance with Chapter 3.4 of the UNRTDG. |

## Section 15 Regulatory Information

**EPA Approval Code:** HSR002530 Cleaning Products (Subsidiary Hazard) Group Standard

**HSNO Classification:** 6.3A, 6.4A, 6.8A, 6.9B, 9.1C, 9.2C

| HSW (HS) Regulations 2017 and EPA Notices | Trigger Quantity |
|---|---|
| Certified Handler | Not required |
| Location Certificate | Not required |
| Tracking Trigger Quantities | Not required |
| Signage Trigger Quantities | 1000L (9.1C) |
| Emergency Response Plan | 1000L (9.1C) |
| Secondary Containment | 1000L (9.1C) |
| Restriction of Use | Only use for the intended purpose. |

## Section 16 Other Information

**Glossary**

| | |
|---|---|
| $EC_{50}$ | Median effective concentration. |
| EEL | Environmental Exposure Limit. |
| EPA | Environmental Protection Authority |
| HSNO | Hazardous Substances and New Organisms. |
| HSW | Health and Safety at Work. |
| $LC_{50}$ | Lethal concentration that will kill 50% of the test organisms inhaling or ingesting it. |
| $LD_{50}$ | Lethal dose to kill 50% of test animals/organisms. |
| LEL | Lower explosive level. |
| OSHA | American Occupational Safety and Health Administration. |
| TEL | Tolerable Exposure Limit. |
| TLV | Threshold Limit Value-an exposure limit set by responsible authority. |
| UEL | Upper Explosive Level |
| WES | Workplace Exposure Limit |

References:


1. EPA Hazardous Substances (Safety Data Sheets) Notice 2017
2. Workplace Exposure Standards and Biological Exposure Indices Nov 2017 edition.
3. Assigning a hazardous substance to a HSNO Approval (Aug 2013).
4. Transport of Dangerous goods on land NZS 5433:2012
5. HSW (Hazardous Substances) Regulations 2017


Disclaimer

This document has been prepared by TCC (NZ) Ltd and serves as the suppliers Safety Data Sheet ('SDS'). It is based on information concerning the product which has been provided to TCC (NZ) Ltd or obtained from third party sources and is believed to represent the current state of knowledge as to the appropriate safety and handling precautions for the product at the time of issue. Further clarification regarding any aspect of the product should be obtained directly from the manufacturer. While TCC (NZ) have taken all due care to include accurate and up-to-date information in this SDS, it does not provide any warranty as to accuracy or completeness. As far as lawfully possible, TCC (NZ) Ltd accept no liability for any loss, injury or damage (including consequential loss) which may be suffered or incurred by any person as a consequence of their reliance on the information contained in this SDS

The information herein is given in good faith, but no warranty, express or implied is made.

Please contact the New Zealand distributor, if further information is required.

| | | | |
|---|---|---|---|
| Issue Date: | 7 April 2020 | Review Date: | 7 April 2025 |

# Appendix B: Health Risk Assessment

Environmental Risk Sciences Pty Ltd
P.O. Box 2537
Carlingford Court, NSW 2118

Phone: +61 2 9614 0297

www.enrisks.com.au

24 October 2024

Air Quality Consulting NZ
9A Cajero Place
Green Bay
Auckland 0604

Attention: Peter Stacey

# Seaview wastewater treatment plant odour deodoriser – human health risk assessment

## 1 Introduction

Environmental Risk Sciences Pty Ltd (enRiskS) has been engaged by Air Quality Consulting NZ (AQCNZ) to perform a focused human health risk assessment (HHRA) to inform AQCNZ's air quality assessment (AQA) performed for Wellington Water Limited's (WWL) Seaview wastewater treatment plant located in Lower Hutt, Wellington, New Zealand (the "site").

WWL is seeking a resource consent to authorise the operation of up to four deodorises as a tool to suppress odour generation during maintenance activities when the treatment plant has the potential to generate odours. To support an air discharge consent application to the Greater Wellington Regional Council, WWL has engaged AQCNZ to perform an AQA to assess the potential effects associated with discharges to air from the deodorises. This HHRA was performed to provide human health risk assessment information to support AQCNZ's air quality assessment.

It is understood that the proposed deodorisers (up to four operating at the same time) will generate a constant stream of very fine water aerosols between 20-50 µm in diameter, containing low concentrations of the following odour-neutralising agents that will be mixed with water at a ratio of 1 part neutraliser to 500 parts water prior to being dispersed by the deodoriser:

- Hi Chem – Disinfectant Reodorant (HPC)
- Oda-Ban Concentrate (biOx International)
- Odour Neutraliser PLUS (biOx International).

The following safety data sheets (SDS) for the proposed neutralisers are provided in Appendix A of AQCNZ's AQA report:

- HCP 2020. Hi Chem – Disinfectant Reodorant, Safety Data Sheet. October 2020
- biOx International 2020. Oda-Ban Concentrate, Safety Data Sheet, 7 April 2020
- biOx International 2020. Odour Neutraliser PLUS, Safety Data Sheet, 7 April 2020.

## 2 Objectives

The overall objective of this HHRA is to assess the potential health risks to offsite sensitive populations (residents and recreational users) that have the potential to be exposed to aerosols generated by the deodorisers during maintenance activities at the wastewater treatment plant.

This HHRA has focused on impacts to community health for populations located outside the site boundary and has not addressed risks to workers involved in operation of the deodorisers on the site. Workers

involved in operation of the deodorisers would be managed under the New Zealand *Health and Safety at Work Act 2015* and associated regulations and instruments.

This assessment has relied upon the information provided to enRiskS (described in AQCNZ's report) up to 14 October 2024 and has only considered exposure (via inhalation of aerosols) to the four chemicals described in the SDS (as listed in **Table 1**).

# 3 Methodology

In general, New Zealand has limited detailed guidance in relation to the assessment of risks to community health from environmental exposures resultant from the operation of industrial facilities such as the deodoriser at the wastewater treatment plant. Therefore, this HHRA has been undertaken in accordance with the following guidance from New Zealand, Australia and the United States:

- enHealth, Environmental Health Risk Assessment, Guidelines for Assessing Human Health Risks from Environmental Hazards (enHealth 2012)
- Ministry for the Environment (MfE) Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health (MfE 2011)
- Ministry for the Environment (MfE) Contaminated land management guidelines No 1, reporting on contaminated sites in New Zealand (MfE 2021)
- NEPM, National Environmental Protection Measure – Assessment of Site Contamination referred to as NEPM (2013), including:
    - Schedule B1 Investigation Levels for Soil and Groundwater (NEPC 1999 amended 2013a)
    - Schedule B4 Guideline on Health Risk Assessment Methodology (NEPC 1999 amended 2013b)
    - Schedule B7 Guideline on Health-Based Investigation Levels (NEPC 1999 amended 2013c).
- United States Environmental Protection Agency (USEPA) Risk Assessment Guidance (USEPA 2009).

The HHRA framework and key steps for undertaking a HHRA comprise of:

- Issue identification: which identifies the key chemicals, offsite sensitive human populations and exposure pathways that need to be evaluated in the assessment (**Section 4**).
- Hazard identification: which relates to the toxicity or hazards posed by exposure to the key chemicals evaluated, with quantitative dose-response values identified for each chemical evaluated (**Section 5**)
- Exposure assessment: which relates to who may be exposed to the key chemicals and how (via inhalation), with quantitative values adopted to characterise exposure (**Section 6**)
- Risk characterisation: where the above elements are combined to provide a quantitative assessment of potential risks to human health (**Section 7**).

# 4 Issue identification

## 4.1 Key chemicals

The individual chemicals that are described in the odour neutraliser SDS are summarised in **Table 1**. A quantitative assessment of exposure to these chemicals by offsite sensitive human populations is undertaken in this HHRA.

**Table 1: Key chemicals listed in the odour neutraliser SDS**

| Chemical name | CAS No. | Proportion |
|---|---|---|
| **Hi Chem – Disinfectant Reodorant** | | |
| Benzalkonium chloride | 8001-54-5 | <10% |
| Non-hazardous ingredients | - | Balance |
| **Oda-Ban Concentrate** | | |
| Non-hazardous ingredients | - | 100% |
| **Odour Neutraliser PLUS** | | |
| Sodium chlorite | 7758-19-2 | 1-2% |
| Potassium persulphate | 7727-21-1 | <0.1% |
| Dodecyldimethylamine oxide (surfactant) | 1643-20-5 | <1.0 % |
| Non-hazardous ingredients | - | Balance |

Environment Protection Authority (EPA) New Zealand (NZ) (2022)[1] states that the disclosure of 'non-hazardous' confidential ingredient names in an SDS is not required for those ingredients that do not have a prescribed workplace exposure standard (as defined in the Health and Safety Work (Hazardous Substances) Regulations 2017[2]) and are classified within the following Globally Harmonised System (GHS) for the classification and labelling of chemicals health hazard categories (UN 2023).

The GHS provides characteristics and cut-off values or concentrations limits for substances and mixtures for which information is required to be included in a SDS, which include the following:

- acute toxicity – category 5 (oral, dermal and inhalation) (i.e. where toxicity/effects occur at concentrations >1%)
- skin and/or eye irritation – category 3 (i.e. where toxicity/effects occur at concentrations >1%)
- specific target organ toxicity – single exposure category 4 (i.e. where toxicity/effects occur at concentrations >1%)
- aspiration hazard – category 2 (where toxicity/effects occur at concentrations >1%).

It is noted that it is not possible to assess the products or parts of products listed as non-hazardous. Assessing potential risks to human health requires an understanding of the specific chemicals and the potential for adverse effects to occur as a result of exposure. It is assumed that the toxicity of the non-hazardous chemicals in the products evaluated is higher (less toxic) than the chemicals evaluated in this assessment (i.e. listed on the SDSs).

[1] https://www.epa.govt.nz/assets/Uploads/Documents/Hazardous-Substances/EPA-Notices/Hazardous-Substances-Safety-Data-Sheets-Notice-2017-EPA-Consolidation-30-September-2022.pdf

[2] https://www.legislation.govt.nz/regulation/public/2017/0131/latest/DLM7309401.html

## 4.2 Offsite sensitive populations

**Figure 1** illustrates the location of the site (and typical location of the deodoriser on the site) and offsite sensitive populations that comprise:

- Owhiti Urupā: located approximately 100 m to the north of the site boundary and comprises a cemetery that is zoned 'Community Iwi' in the Hutt City District Plan
- recreational facility: located approximately 300 m to the northeast of the site and comprises an indoor recreational facility
- Wellington Top 10 Holiday Park: located approximately 450 m to the northeast of the site and comprises a recreational facility for holiday makers
- residential area: located 400 m to the north of the site and comprises the nearest low-density residential area.

These areas are all located in the direction where the hourly average wind speeds are recorded to be the highest as measured by WWL's automatic weather station (data measured between 15 December 2023 to 20 August 2024) (refer to Section 3.1 of AQCNZ's AQA report). Since windspeed can have a significant impact on the potential for transporting fine aerosols from the deodorisers, assessment of the offsite populations to the north/northeast is appropriate for this HHRA. Therefore, potential health risks for the populations to the north/northeast will be protective for offsite populations in different directions from the site.

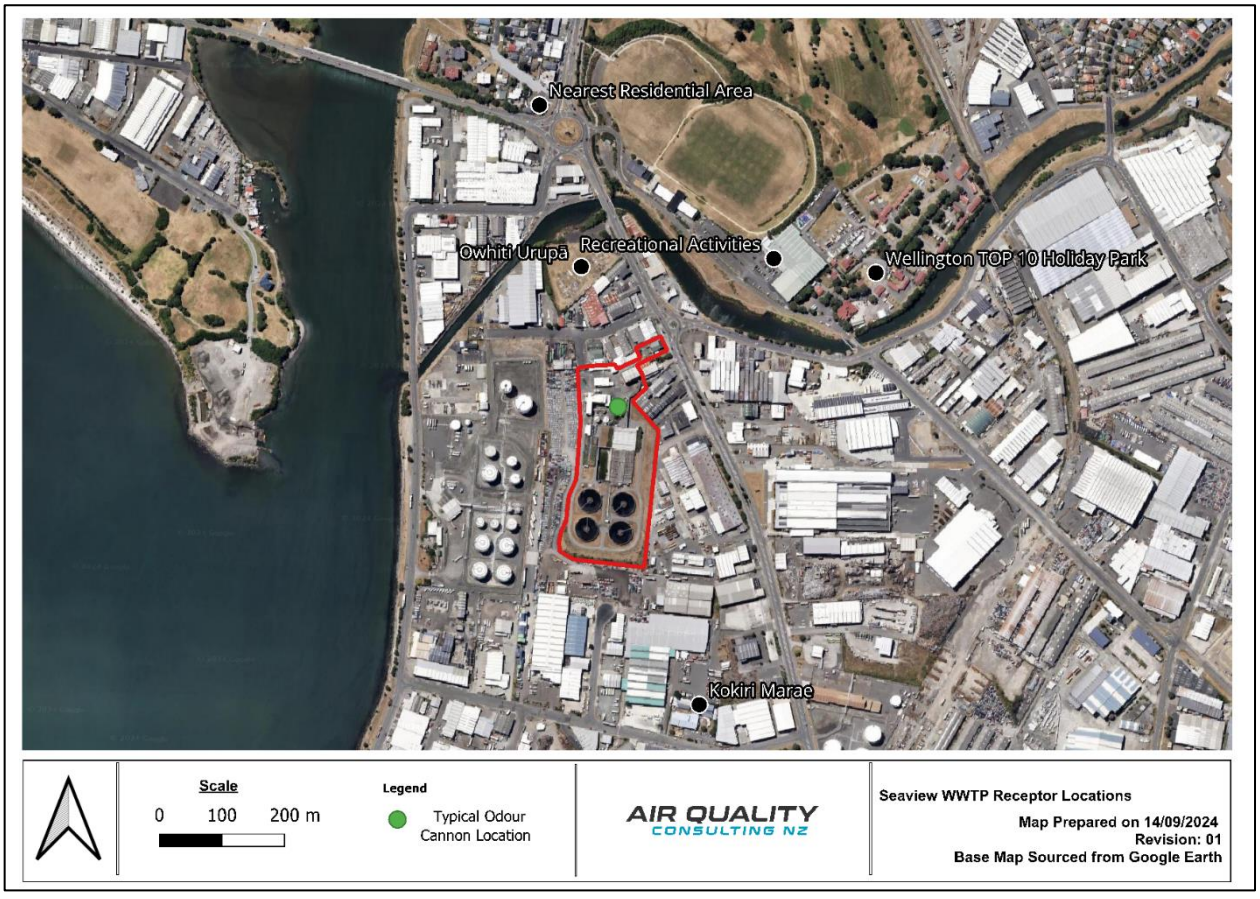


**Figure 1: location of the site (red outline) and nearest offsite sensitive populations**

The exposure pathway of concern for this HHRA comprises the inhalation of aerosols that contain concentrations of the key chemicals listed in **Table 1**.

When particulates are inhaled and not exhaled, they will either:

1. reach the lungs (alveoli)
2. be swallowed and enter the gastrointestinal tract, or
3. will be gradually removed from the respiratory tract via mucus lining.

The potential for these processes to occur will depend on the particle diameter. Particles that are ≤50 µm are referred to as inspirable particles. Particles that are inspirable but not respirable will not reach the alveoli (in the lungs) but instead they are removed via mucus lining (enHealth 2012). Particles <2.5 µm are considered to represent the respirable fraction (that will reach the alveoli) and particles <10-2.5 µm represent the respirable and thoracic fraction (enHealth 2012). Aerosols emitted from the deodorisers are reported to have particle diameters ranging between 20-50 µm[3], therefore the majority of these particles are unlikely to be inhaled and reach the alveoli. This HHRA has assumed that 100% of aerosols are inhaled and deposited into the lungs (alveoli) which is a conservative assumption given that these particles are unlikely to be inhaled and reach the alveoli. The conservative assumption, however, accounts for the deposition of larger aerosols in the upper airway and swallowing or ingestion of these aerosols.

# 5 Toxicity assessment

A human health toxicity summary for the key chemicals listed in **Table 1** is provided in **Table 2**. These data and information were obtained from the supplied SDS, peer-reviewed literature and the following New Zealand and international agencies:

- European Chemicals Agency (ECHA)
- Hazardous Substances Data Bank (HSDB database)
- International Agency for Research on Cancer (IARC)
- National Health and Medical Research Council (NHMRC)
- National Industrial Chemicals Notification and Assessment Scheme (NICNAS) (now referred to as Australian Industrial Chemicals Introduction Scheme (AICIS)
- New Zealand Environmental Protection Authority (NZ EPA) Chemical Classification and Information Database (CCID)
- Organisation for Economic Co-Operation and Development (OECD)
- Safe Work Australia (SWA)
- United States Environmental Protection Agency (USEPA)
- Worksafe New Zealand.

It should be recognised that the acute and chronic health effects summarised in **Table 2** assume that the chemical is present in an undiluted form. Therefore, these effects will overestimate exposure to the offsite recreational users and residents who will be exposed to the chemicals in aerosol in which the chemical has been significantly diluted and will comprise between <0.1% and <10% of the odour neutraliser product (refer to **Table 1**). These concentrations will be further diluted prior to use in the deodorisers at 1 part neutraliser to 500 parts of water.

[3] The AQCNZ modelling assumed that the aerosol particles behaved similar to $PM_{10}$ particles which is likely to overestimate the distance aerosols will travel given they have a larger diameter (20-50 µm).

**Table 2: Chemical profiles**

| Category | Description | Reference |
|---|---|---|
| **Benzalkonium chloride (CAS No. 8001-54-5)** | | |
| Acute health effects | Health effects from exposure to this compound are principally associated with acute exposures in occupational environments.<br>Hazardous in case of skin contact (irritant), eye contact (irritant), ingestion, or inhalation. Hazardous in case of skin contact (corrosive) and eye contact (corrosive). Causes severe skin burns and eye damage. The amount of tissue damage depends on the length of contact. Eye contact can result in corneal damage or blindness. Severe over-exposure can produce lung damage, choking, unconsciousness or death. Inflammation of the eye is characterised by redness, watering and itching. Skin inflammation is characterised by itching, scaling, reddening or occasionally blistering. | NZ EPA (2024)<br>USEPA (2006) |
| Chronic health effects | May be toxic to kidneys, liver, heart, gastrointestinal tract, cardiovascular system and central nervous system. Possible reproductive system toxin. Repeated or prolonged exposure of the eyes to a low level of dust can produce eye irritation. Repeated skin exposure can produce local skin destruction or dermatitis. Repeated inhalation of dust can produce varying degrees of respiratory irritation or lung damage. | USEPA (2006) |
| Classifications | Not assessed by IARC. USEPA classified as not carcinogenic or mutagenic. | IARC[1]<br>USEPA (2006) |
| Guidelines | **Inhalation**: short-, intermediate- and long-term no observed adverse effect level (NOAEL) (inhalation) of 3 mg/kg/day from an oral development study in rabbits (laboured breathing). Inhalation absorption is assumed to be equivalent to oral absorption (100%).<br>An oral toxicity reference value (TRV) 0.03 mg/kg/day can be derived by dividing the NOAEL by safety factor of 100 (10x for interspecies variation, 10x intraspecies variation[3]). An inhalation TRV of 0.105 mg/m$^3$ is derived via route-to-route extrapolation assuming a body weight of 70 kg and a breathing rate of 20 m$^3$/day.<br>**Dermal:** intermediate-term dermal NOAEL of 20 mg/kg/day based on a 21-day dermal toxicity study in rats for a 4% active ingredient formulated product.<br>**Incidental oral**: short- and intermediate-term NOAEL of 10 mg/kg/day from a rat development toxicity study.<br>Worksafe New Zealand and Work Safe Australia do not provide a workplace exposure standards. | USEPA (2006) |
| Background exposure | Used for a range of domestic, agricultural and commercial purposes such as fabric softeners, shampoo/conditioner, body lotions, residential and commercial pools, pulp paper products and wood preservation. | Pereira and Tagkopoulos (2019) |
| **Sodium chlorite (CAS No. 7758-19-2)** | | |
| Acute health effects | Sodium chlorite is rapidly absorbed following oral administration and is also absorbed through the skin. Health effects from exposure to this compound are principally associated with acute exposures in occupational environments.<br>Can cause severe skin burns (irritation) and eye damage (irritation). Not known to be a skin sensitiser. Has moderate acute oral toxicity and high acute dermal toxicity. In a solution at 31% concentration in water, the compound is not irritating or exhibits evidence of skin sensitisation. | NZ EPA (2024)<br>NICNAS (2014)<br>ECHA (2023) |
| Chronic health effects | Not considered to be toxic to the reproductive or developmental systems. May cause damage to kidneys through prolonged or repeat exposure. | NICNAS (2014) |
| Classifications | Classified by IARC as Group 3, not classifiable as to its carcinogenicity in humans (evaluation year 1990). Not considered to be carcinogenic or mutagenic. | IARC[1] |
| Guidelines | **Inhalation**: A no observed adverse effect concentration (NOAEC) of 1.74 mg/m$^3$ based on an oral exposure two-generational study in rats measuring the effect on fertility. An inhalation TRV of 0.0174 mg/m$^3$ can be derived by dividing the NOAEL by safety factor of 100 (10x for interspecies variation, 10x intraspecies variation[3]).<br>**Oral**: NOAEL of 4 mg/kg/day based on a two-generational rat study. | EHCA (2023)<br>NHMRC (2011 updated 2022) |

| Category | Description | Reference |
|---|---|---|
| | **Dermal**: NOAEL of 40 mg/kg/day based on a two-generational rat study, calculated via route-to-route extrapolation assuming 10% dermal absorption.<br>The Australian Drinking Water Standard for chlorite is 0.8 mg/L, based on a no-effect level of 2.9 mg/kg/day from a two-generation rat study, with a safety factor of 100 (10 for intraspecies differences, and 10 for intraspecies differences). The NZ Drinking Water Standard for chlorite is also 0.8 mg/L.<br>Worksafe New Zealand and Work Safe Australia do not provide a workplace exposure standards. | |
| Background exposure | Sodium chlorite is used in washing and cleaning products, and in the manufacture of textiles. | ECHA (2023) |
| **Potassium persulphate (CAS No. 7727-21-1)** | | |
| Acute health effects | Persulphate salts rapidly dissociate in water, and ingested potassium ions will be readily taken up in the gastrointestinal tract however the persulphate ions is poorly absorbed. The main critical effects to human health are associated with skin and respiratory sensitisation and irritation. Can cause skin irritation and allergic reaction, and eye irritation. May cause allergy, irritation or asthma symptoms or breathing difficulties if inhaled.<br>Persulfate salts have low acute dermal and inhalation toxicity. Acute inhalation studies with potassium persulphate in rats indicated median lethal concentration (LC50) values greater than the maximum attainable concentration of 42.9 mg/L.<br>Persulfate salts have moderate acute toxicity via the oral route. | NZ EPA (2024)<br>NICNAS (2016) |
| Chronic health effects | Persulfates have low repeat dose toxicity via the oral and inhalation routes. Based on limited data for ammonium persulphate (that has very similar physical/chemical/toxicological properties), potassium persulfate is not considered to be toxic to reproduction or development.<br>Pulmonary function tests conducted on employees of a persulfate production factory indicated no adverse effects on pulmonary function (including long-term observations) at concentrations of 0.5 mg/m$^3$. | NICNAS (2016)<br>OECD (2005) |
| Classifications | Not assessed by IARC. Not considered to be mutagenic or carcinogenic. | NICNAS (2016) |
| Guidelines | **Oral**: NOAEL of 131.5 mg/kg/day based on a 28-day repeat dose oral (dietary) toxicity study conducted on male rats.<br>**Inhalation**: NOAEC of 10.3 mg/m$^3$ based on a 90-day repeat dose inhalation toxicity study (dust aerosol concentrations) using ammonium persulfate on rats. An inhalation TRV of 0.0103 mg/m$^3$ can be derived by dividing the NOAEL by safety factor of 100 (10x for interspecies variation, 10x intraspecies variation[3]).<br>Safe Work Australia provides a workplace exposure time weighted average (TWA) standard of 0.01 mg/m$^3$ (peak limitation). Worksafe New Zealand does not provide a workplace exposure standard. | OECD (2005)<br>Safe Work Australia (2022) |
| Background exposure | Potassium persulphate is used as a bleaching, oxidising and colouring agent for uses such as hair and textiles colouring. | NICNAS (2016) |
| **Dodecyldimethylamine oxide (CAS No. 1643-20-5)** | | |
| Acute health effects | Causes severe skin burns (irritation) and eye damage (irritation).<br>Instillation of a 30% solution into the eyes of rabbits was reported to be slightly irritating.<br>A LD50 of >20 g/kg per undiluted formulation containing 0.3% active dodecylidmethylamine oxide is reported in a rat oral toxicity study. No adverse effects were observed at the highest test concentration.<br>A LC50 of 5.3 mg/L was reported in a 4 hour rat inhalation toxicity study exposing rats to liquid droplet aerosol formulation containing 0.3% active dodecylidmethylamine oxide. No adverse effects observed at the highest test concentration. | ECHA<br>HSDB<br>USEPA (2020) |
| Chronic health effects | No evidence of reproductive toxicity or fertility effects in a study in a rat dietary study over two generations. | OECD (2006) |
| Classifications | Not assessed by IARC. Not considered to be mutagenic or carcinogenic. | OECD (2006)<br>HSDB[2] |
| Guidelines | Developmental NOAEL of >40 mg/kg/day based on a multi-generational rat dietary study where no macroscopic or histopathological changes were | OECD (2006) |

| Category | Description | Reference |
|---|---|---|
| | observed. An oral TRV of 0.4 mg/kg/day can be derived by dividing the NOAEL by safety factor of 100 (10x for interspecies variation, 10x intraspecies variation[3]). An inhalation TRV of 1.4 mg/m$^3$ is derived via route-to-route extrapolation assuming a body weight of 70 kg and a breathing rate of 20 m$^3$/day.<br>Worksafe New Zealand and Work Safe Australia do not provide a workplace exposure standards. | |
| Background exposure | Used in washing, cleaning, cosmetics and personal care products such as hair mousse, foaming hand soap, foaming face wash and carpet cleaner foam/spray. | ECHA |

**Notes for Table 2**:
1. IARC: https://monographs.iarc.who.int/list-of-classifications
2. HSDB: https://pubchem.ncbi.nlm.nih.gov/source/11933
3. Safety factors adopted consistent with methodology adopted in the Australian Drinking Water Guidelines (NHMRC 2011 updated 2022).

A summary of the inhalation TRVs used to assess potential health risks to offsite sensitive populations is provided in **Table 3**. These inhalation TRVs are based on toxicity studies that assessed chronic exposure that either considered multi-generational or repeat dose exposure. This HHRA has conservatively allocated 10% of the inhalation TRV to background exposure given the reported use of the key chemicals in a variety of domestic and personal care products.

**Table 3: Summary of toxicity reference values**

| Chemical name | Inhalation toxicity reference value (mg/m$^3$) | Reference | Background exposure allocation | Reference |
|---|---|---|---|---|
| Benzalkonium chloride | 0.105 | USEPA (2006) | 10% | Pereira and Tagkopoulos (2019) |
| Sodium chlorite | 0.0174 | EHCA (2023) | 10% | EHCA (2023) |
| Potassium persulphate | 0.0103 | OECD (2005) | 10% | NICNAS (2016) |
| Dodecyldimethylamine oxide | 1.4 | OECD (2006) | 10% | ECHA |

# 6 Exposure assessment

## 6.1 General

The assessment presented has addressed potential worst-case exposure to the key chemicals in aerosol spray and exposure has been calculated for a ***Reasonable Maximum Exposure (RME)*** scenario estimated by using intake variables and chemical concentrations that define the highest exposure that is reasonably likely to occur. The RME is likely to provide a conservative or overestimate of total exposure and therefore health risk.

The quantification of exposure has involved consideration of the following:

- Identification of relevant ***exposure parameters*** for the inhalation pathway and potentially exposed populations. The magnitude of the exposure is a function of a number of variables (termed exposure parameters), which describe the physical, and behavioural parameters relevant to the potentially exposed population. Exposure parameters which are considered representative have been selected. Where available, additional exposure data have been obtained from New Zealand sources (MfE 2011).
- Estimation of the ***chemical concentration*** in aerosol spray relevant to the offsite populations and inhalation pathway. This has involved the use of the maximum 1-hour average offsite concentrations modelled to the nearest sensitive population (i.e., the Owhiti Urupā located approximately 100 m to the north), as reported in Section 4.1 of the AQCNZ's report.

Since the assessment of chronic health risks to offsite populations is the focus of this HHRA, the maximum 1-hour average concentrations were converted to an annual average exposure concentration in accordance with the Ontario MfE (2004) guidelines.

A summary of the maximum 1-hour average concentrations, and the converted maximum annual average concentrations, is provided in **Table 4**.

**Table 4: Maximum 1-hr and annual average concentrations for key chemicals**

| Chemical name | Maximum 1-hour average concentration ($mg/m^3$) | Converted maximum annual average concentration ($mg/m^3$)[1] |
|---|---|---|
| Benzalkonium chloride | $4.7 \times 10^{-2}$ | $3.7 \times 10^{-3}$ |
| Sodium chlorite | $9.2 \times 10^{-3}$ | $7.4 \times 10^{-4}$ |
| Potassium persulphate | $4.0 \times 10^{-4}$ | $3.2 \times 10^{-5}$ |
| Dodecyldimethylamine oxide | $4.8 \times 10^{-3}$ | $3.8 \times 10^{-4}$ |

**Notes for Table 4**:

1. The maximum 1-hour average concentration was converted to a maximum annual average by dividing the 1-hour average concentration by 12.5 in accordance with Ontario MfE (2004) guidelines (refer to Table A).

## 6.2 Exposure assumptions

Intakes via inhalation have been assessed on the basis of the following equation, where an inhalation exposure concentration is calculated (enHealth 2012; NEPC 1999 amended 2013c). The exposure parameters adopted are presented in **Table 5** and included in the risk calculations in **Attachment A**.

$$\text{Inhalation exposure concentration } \left(\frac{mg}{m^3}\right) = C_a \times \frac{ET \times EF \times ED}{AT}$$

**Table 5: Summary of adopted exposure parameters**

| Parameter | | Offsite recreational users | Offsite residents |
|---|---|---|---|
| Ca | Concentration in air at the point of exposure ($mg/m^3$) | Represents the maximum annual average concentration modelled by AQCNZ at the nearest recreational facility (Owhiti Urupā). Refer to **Table 4**. | Represents the maximum annual average concentration modelled by AQCNZ at the nearest recreational facility (Owhiti Urupā). Refer to **Table 4**. This assumption is conservative given the nearest residential area is located 400 m from the site boundary where the aerosol concentrations will be lower than at Owhiti Urupā. |
| ET | Exposure time (hours/day) | 2 hours per day as per ASC NEPM (NEPC 1999 amended 2013c) for recreational land use (no guidance provided in MfE 2011) | 24 hours per day as per MfE (2011) for residential land use |
| EF | Exposure Frequency (days/year) | 200 days per year as per MfE (2011) for recreational land use | 350 days per year as per MfE (2011) for residential land use |
| ED | Exposure Duration (years) | 14 years as per MfE (2011) for recreational land use | 20 years as per MfE (2011) for residential land use |
| AT | Averaging Time (hours) | Threshold: ED x 365 days x 24 hours as per MfE (MfE 2011), enHealth (enHealth 2012) and USEPA (USEPA 2009) | |

The calculation of inhalation exposures is not dependent on age or body weight consistent with USEPA (2009) guidance. Therefore, risk estimates are not calculated separately for children and adults, rather as a person who is exposed to an aerosol concentration for an assumed period of time.

# 7 Risk characterisation

## 7.1 Approach

The quantification of potential exposure and risks to human health associated with the presence of chemicals where a threshold dose-response approach is appropriate has been undertaken by comparing the estimated intake (or exposure concentration) with the threshold values adopted that represent a tolerable intake (or concentration), with consideration for background intakes[4]. The calculated ratio is termed a Hazard Index (HI), which is the sum of all ratios (termed Hazard Quotients (HQ)) over all relevant pathways of exposure. These are calculated using the following equations for inhalation exposures:

$$\text{Hazard Quotient (HQ) (inhalation)} = \frac{\text{Exposure concentration}}{\text{(TRV - background)}}$$

$$\text{Hazard Index (HI)} = \sum_{\text{All pathways/chemicals}} \text{HQ}$$

The interpretation of an acceptable HI needs to recognise an inherent degree of conservatism that is built into the establishment of appropriate TRVs adopted (using many uncertainty factors) and the exposure assessment. Hence, in reviewing and interpreting the calculated HI the following is noted:

- A HI less than or equal to a value of 1 (where intake or exposure is less than or equal to the threshold) represents no cause for concern as outlined in MfE (2011).
- A HI greater than 1 requires further consideration within the context of the assessment undertaken, particularly with respect to the level of conservatism in the assumptions adopted for the quantification of exposure and the level of uncertainty within the toxicity (threshold) values adopted.

## 7.2 Calculated risks

The quantification of risk in relation to potential inhalation exposures to the key chemicals requires the calculation of a threshold HI. The calculated risks relevant to exposures for offsite recreational users and residents are presented in **Table 6**.

**Appendix A** presents the calculations undertaken to quantify potential exposures and risks associated with exposure to key chemicals within the aerosol spray.

**Table 6: Calculated risks**

| Exposure pathway and population group | Hazard Index |
|---|---|
| Inhalation by recreational users | 0.004 |
| Inhalation by residents | 0.09 |
| | |
| **Acceptable risk/HI/RI** | **≤ 1** |

[4] Background intakes are intakes of a chemical that are derived from sources other than the contamination being assessed. This may include dietary intakes and intakes from domestic/personal products, drinking water or urban air.

Based on the calculated risks presented in **Table 6**, the following is concluded:

- potential health risks to offsite recreational users are low and acceptable in accordance with New Zealand guidelines
- potential health risks to offsite residents are low and acceptable in accordance with New Zealand guidelines.

## 7.3 Uncertainty assessment

### 7.3.1 General

Uncertainty in any assessment refers to a lack of knowledge (that could be better refined through the collection of additional data or conduct of additional studies) and is an important aspect of the risk assessment process. An assessment of uncertainty is a qualitative process relating to the selection and rejection of specific data, estimates or scenarios within the risk assessment. In general, to compensate for uncertainty, conservative assumptions are often made that result in an overestimate rather than an underestimate of risk.

### 7.3.2 Toxicity information

In general, the available scientific information is insufficient to provide a thorough understanding of all of the potential toxic properties of chemicals to which humans may be exposed. It is necessary, therefore, to extrapolate these properties from data obtained under other conditions of exposure and involving experimental laboratory animals. The majority of the toxicological knowledge of chemicals comes from experiments with laboratory animals, although there may be interspecies differences in chemical absorption, metabolism, excretion and toxic response. There may also be uncertainties concerning the relevance of animal studies using exposure routes that differ from human exposure routes. In addition, the necessity to extrapolate results of short-term or sub-chronic animal studies to humans exposed over a lifetime has inherent uncertainty.

Overall, the toxicological data presented are considered to be current and adequate for the assessment of risks to human health associated with the potential exposure to the key chemicals identified at the site. The uncertainties inherent in the toxicological values adopted are considered likely to result in an overestimation of actual risk assessed for long-term or chronic exposures.

### 7.3.3 Exposure assessment

The quantification of exposure has assumed the following conservative assumptions, which are intended to provide a worst-case or conservative assessment of potential exposure and risk:

- the predicted aerosol concentrations will be present at a constant concentration over the assumed exposure duration, whereas realistically, aerosol spray emitted from the onsite deodorisers will only be present during periods when the wastewater treatment plant is undergoing maintenance activities
- risk estimates for the offsite residents (approximately 400 m from the site) assumed exposure to the same air concentration that was predicted to occur to the nearest recreational area (100 m from the site). Therefore, risk estimates calculated for the offsite residents will be overestimated considering the aerosol air concentration will reduce with distance from the recreational area
- risk estimates for the offsite residents assumed that the aerosol concentrations represents an indoor air concentration where a resident is present 20 hours per day. This is likely to overestimate concentrations because less aerosol spray will enter residential dwellings via open windows and doors

- the air quality modelling performed by AQCNZ incorporated a number of conservative assumptions that have the potential to overestimate the predicted air concentrations such as:
    - all four deodorisers will be operating at the same time
    - all four deodorisers will be located in the same location to give a concentrated discharge rate. This is unlikely as the deodorisers are likely to be spread around the site a varying distances
    - all four deodorisers will operate continuously i.e. every hour of the day for the entire modelling period
    - the Oda-ban deodoriser has no hazardous compounds (refer to **Table 1**), if this was to be used, or even partially used, predicted concentrations would be lower
    - the aerosol behaves like particles that are 10 µm, whereas the aerosols have size range of between 20 – 50 µm. This would result in the model overpredicting the distance in which the aerosol may travel.

# 8 Conclusions

Environmental Risk Sciences Pty Ltd (enRiskS) was engaged by Air Quality Consulting NZ (AQCNZ) to perform a HHRA to inform AQCNZ's air quality assessment performed for WWL's Seaview wastewater treatment plant located in Lower Hutt, Wellington, New Zealand. The air quality assessment has been prepared to support an air discharge consent application to the Greater Wellington Regional Council for the use of four deodorises on the site to manage odours generated from the wastewater treatment plant during maintenance activities.

This HHRA assessed the potential risks to the nearest offsite sensitive populations (recreational users and residents) from exposure to the following chemicals (present in the odour neutralising agents) in aerosol spray that will be emitted during operation of the deodorisers:

- benzalkonium chloride
- sodium chlorite
- potassium persulphate
- dodecyldimethylamine oxide

The predicted air concentrations, of the above listed chemicals, modelled by AQCNZ were used to assess potential health risks to the offsite sensitive populations in accordance with New Zealand and relevant international HHRA guidance.

Based on the calculated risks and identified uncertainties presented in this HHRA, the following is concluded:

- potential health risks to offsite recreational users are low and acceptable in accordance with New Zealand guidelines
- potential health risks to offsite residents are low and acceptable in accordance with New Zealand guidelines.

# 9 Limitations

Environmental Risk Sciences Pty Ltd has prepared this report for the use of Air Quality Consulting NZ in accordance with the usual care and thoroughness of the consulting profession. It is based on generally accepted practices and standards at the time it was prepared. No other warranty, expressed or implied, is made as to the professional advice included in this report.

It is prepared in accordance with the objective and methodology and for the purpose outlined in **Section 1** of this report.

The methodology adopted and sources of information used are outlined in this report. Environmental Risk Sciences Pty Ltd has made no independent verification of this information beyond the agreed scope of works

and assumes no responsibility for any inaccuracies or omissions. No indications were found that information provided for use in this assessment was false.

This report was prepared in October 2024 and is based on the information provided and reviewed at that time. Environmental Risk Sciences Pty Ltd disclaims responsibility for any changes that may have occurred after this time.



This report should be read in full. No responsibility is accepted for use of any part of this report in any other context or for any other purpose or by third parties. This report does not purport to give legal advice. Legal advice can only be given by qualified legal practitioners.

# 10 Closure

If you require any additional information, please do not hesitate to contact me on +61 2 9614 0297.

Yours sincerely,

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# Attachment A: Risk calculations

## Inhalation of volatiles

$$\text{Inhalation exposure concentration} = C_a \times \frac{ET \times FI \times EF \times ED}{AT} \quad (mg/m^3)$$

| Parameters relevant to quantification of exposure by nearest recreational users (Owhiti Urupa) | | |
|---|---|---|
| Exposure Time Indoors (ET, hr/day) | 2 | Recreational exposure appropriate for a cemetery (Owhiti Urupa) |
| Fraction Inhaled from Contaminated Source (FI, unitless) | 1 | |
| Exposure Frequency (EF, days/yr) | 200 | Default park/recreation scenario (MfE 2011) |
| Exposure Duration (ED, years) | 14 | Default park/recreation scenario (MfE 2011) |
| Averaging Time - Threshold (Atn, hours) | 122640 | ED x 365 x 24 (MfE, 2011) |

| Key Chemical | Toxicity Data | | | Concentration | Daily Exposure | | |
|---|---|---|---|---|---|---|---|
| | Chronic TC Air ($mg/m^3$) | Background Intake (% Chronic TC) | Chronic TC Allowable for Assessment (TC-Background) ($mg/m^3$) | Estimated Concentration in Air (Ca) ($mg/m^3$) | Inhalation Exposure Concentration - Threshold ($mg/m^3$) | Chronic Hazard Quotient (unitless) | % Total HI |
| Benzalkonium chloride | 1.1E-01 | 10% | 9.5E-02 | 3.7E-03 | 1.7E-04 | 1.81E-03 | 44% |
| Sodium chlorite | 1.7E-02 | 10% | 1.6E-02 | 7.4E-04 | 3.4E-05 | 2.15E-03 | 52% |
| Potassium persulphate | 1.0E-02 | 10% | 9.3E-03 | 3.2E-05 | 1.5E-06 | 1.58E-04 | 4% |
| Dodecyldimethylamine oxide | 1.4E+00 | 10% | 1.3E+00 | 3.8E-04 | 1.8E-05 | 1.39E-05 | 0% |
| | | | | | **TOTAL** | **0.004** | |

## Inhalation of volatiles

$$\text{Inhalation exposure concentration} = C_a \times \frac{ET \times FI \times EF \times ED}{AT} \quad (mg/m^3)$$

| Parameters relevant to quantification of exposure by residents | | |
|---|---|---|
| Exposure Time Indoors (ET, hr/day) | 24 | Default for residental land use (MfE 2011) |
| Fraction Inhaled from Contaminated Source (FI, unitless) | 1 | |
| Exposure Frequency (EF, days/yr) | 350 | Default for residental land use (MfE 2011) |
| Exposure Duration (ED, years) | 20 | Default for residental land use (MfE 2011) |
| Averaging Time - Threshold (Atn, hours) | 175200 | ED x 365 x 24 (MfE, 2011) |

| Key Chemical | Toxicity Data | | | Concentration | Daily Exposure | | |
|---|---|---|---|---|---|---|---|
| | Chronic TC Air ($mg/m^3$) | Background Intake (% Chronic TC) | Chronic TC Allowable for Assessment (TC-Background) ($mg/m^3$) | Estimated Concentration in Air (Ca) ($mg/m^3$) | Inhalation Exposure Concentration - Threshold ($mg/m^3$) | Chronic Hazard Quotient (unitless) | % Total HI |
| Benzalkonium chloride | 1.1E-01 | 10% | 9.5E-02 | 3.7E-03 | 3.6E-03 | 3.80E-02 | 44% |
| Sodium chlorite | 1.7E-02 | 10% | 1.6E-02 | 7.4E-04 | 7.1E-04 | 4.51E-02 | 52% |
| Potassium persulphate | 1.0E-02 | 10% | 9.3E-03 | 3.2E-05 | 3.1E-05 | 3.31E-03 | 4% |
| Dodecyldimethylamine oxide | 1.4E+00 | 10% | 1.3E+00 | 3.8E-04 | 3.7E-04 | 2.92E-04 | 0% |
| | | | | | **TOTAL** | **0.087** | |