



Report

Former Fruitgrowers Chemical Company Site (FCC), Mapua - Ammonia Gas Survey Investigation

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Prepared for
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Table of Contents

1	Introduction	1
1.1	Project Objectives.....	1
1.2	Scope of Works Undertaken	1
2	Background Information	3
2.1	Site Description.....	3
2.2	Site History and Previous Investigations	3
3	Field Methodology	7
3.1	Site Works Summary	7
3.2	Survey Methodology.....	7
4	Ammonia Gas Survey Results	9
5	Comparison with Relevant Guidelines.....	11
5.1	Background to Selected Guidelines	11
5.2	Comparison of Guidelines	11
6	Summary and Conclusions.....	13
7	References.....	15
8	Limitations	17

Tables

Table 4-1	Ammonia Gas Survey Results.....	9
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Figures

Figure 2-1	Site Location	4
Figure 2-2	Site Layout	5
Figure 3-1	Soil Vapour Point Locations.....	8

Abbreviations

Abbreviation	Description
URS	URS New Zealand Limited
TDC	Tasman District Council
the site	Former Fruitgrowers Chemical Company, 11 Tahi Street, Mapua – Eastern subgrades, SG3 SG7 and SG14.
SG	Subgrade
FCC	Former Fruitgrowers Chemical Company
mbgl	metres below ground level
magl	metres above ground level
MCD	mechano-chemical dehaligenation
SMP	Site Management Plan
TCEQ	Texas Commission on Environmental Quality
ESL	Effects Screening Levels
ppb	parts per billion
ppm	parts per million

Introduction

URS New Zealand Limited (URS) was engaged by Tasman District Council (TDC) to conduct an Ammonia Gas Survey at the former Fruitgrowers Chemical Company Site (FCC), located at 11 Tahurangi Street, Mapua. The investigation has been undertaken in general accordance with the scope of works detailed in the URS proposal dated 29 September 2009 and comprised the drilling and installation of 12 soil vapour points, with a follow up ammonia gas survey event of all soil vapour points.

1.1 Project Objectives

The objectives of the assessment were to:

- Eliminate the current uncertainty with respect to the potential for ammonia gas generation from MCD (mechano-chemical dehalogenation) treated soil found in the eastern region of the subject site, in identified subgrades SG3, SG7 and SG14;
- Assess if there is any risk of gas penetration into future buildings and migration into confined spaces;
- Assess if there is any risk to human and plant health via the inhalation of ammonia gas;
- Assess whether further investigation or remedial activities, if any, may be required to mitigate any unacceptable risks identified, or update the Site Management Plan (SMP) if required.

1.2 Scope of Works Undertaken

The Ammonia Gas Survey Investigation comprised the following works:

- Preparation of a site-specific Health and Safety Plan;
- Site walkover to determine locations of existing groundwater monitoring wells to mark out potential soil vapour points for drilling;
- Dipping of existing monitoring wells (BHH, BH2A and BH2) in the area under investigation to determine depth to groundwater;
- The advancement of 12 soil bores in the FCC eastern area, across subgrades, SG3, SG7, and SG14 to a maximum depth of 1.0 mbgl using hollow stem auger drilling techniques;
- The completion of all 12 soil bores as soil vapour points;
- Completion of an ammonia gas survey (including both ambient and at each soil vapour point) of each of the 12 soil vapour points installed;
- Assessment of any potential inhalation risks to human, plant health and gas penetration into future buildings at the site; and
- Preparation of this report.

Background Information

2.1 Site Description

The site is located at 11 Tahi Street, Mapua and is surrounded by commercial businesses to the north, residents to the west and south and Tasman Bay Harbour to the east. The geographical location of the site is shown in Figure 2-1, and site layout provided in Figure 2-2. The site is predominately grassed and currently not used for any specific purpose other than an undesignated parking lot for retail customers of the area.

2.2 Site History and Previous Investigations

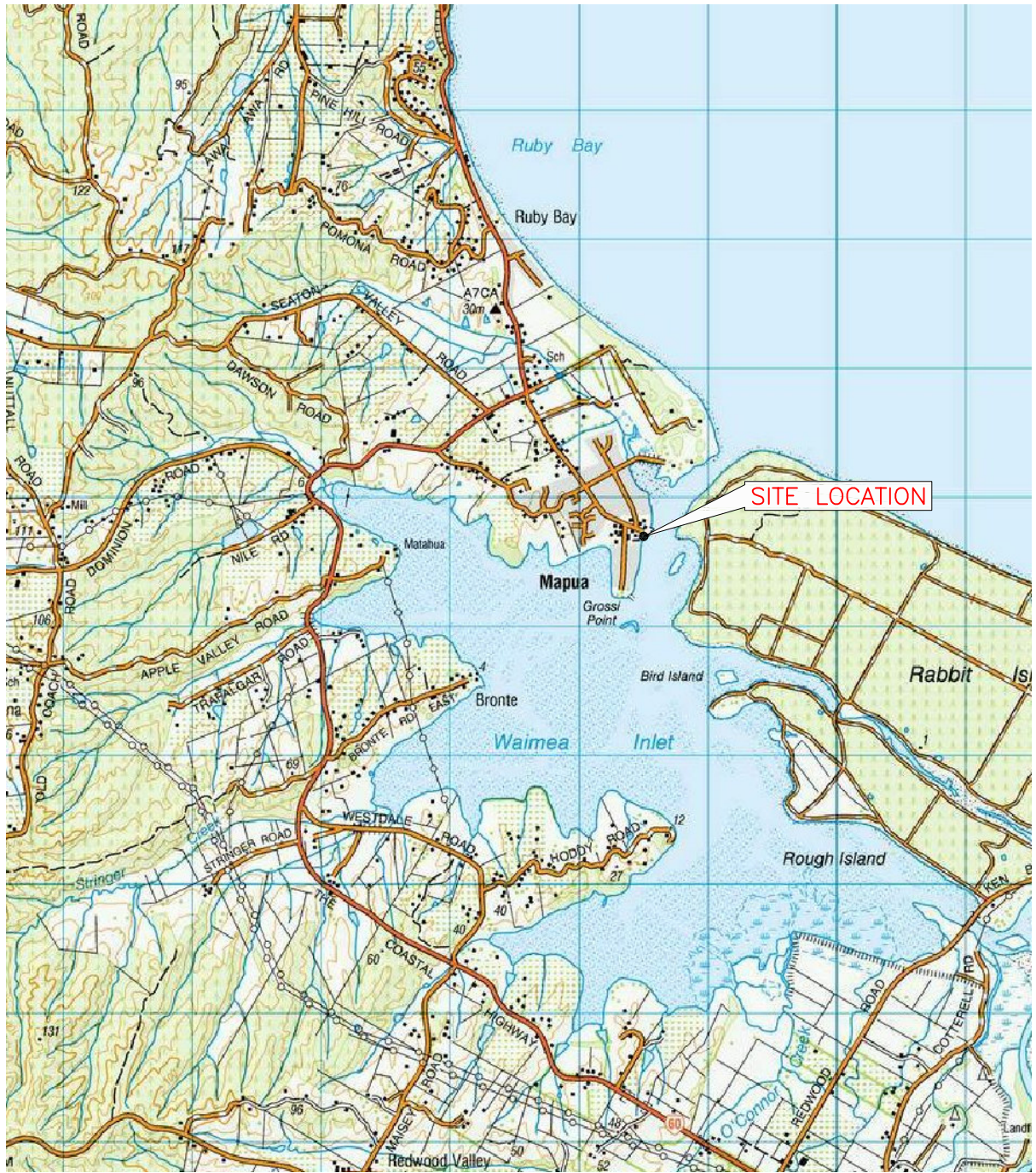
In order to prevent further effects on the marine environment and restore the site to a usable condition, a remediation programme was undertaken from October 2004 to early 2008. With specific reference to the FCC eastern area of the subject site, remediation incorporated an MCD soil remediation process. This process involved the de-chlorination of organic compounds and the incorporation of additives including, iron, copper, nitrogen compounds, and treatment reagents such as the compound urea. The QA/QC sampling showed concentrations of several hundred up to 5000 mg/kg of ammoniacal-N in mixed and unmixed treated material. There is an unknown potential for ammonia gas to be generated from these materials which increases if the pH of the soil is elevated.

The audit of the Remediation of the former Fruitgrowers Chemical Company undertaken by Pattle Delamore Partners (PDP) in June 2009, identified the uncertainty in the FCC East site with respect to the potential for ammonia gas to be generated from the MCD-treated soil (arising from the additives used in the treatment) and possible effects on human health and the possibility of adverse effects on deep-rooted plant species used in future amenity planting. The same uncertainty regarding ammonia generation was noted at the FCC landfill site.

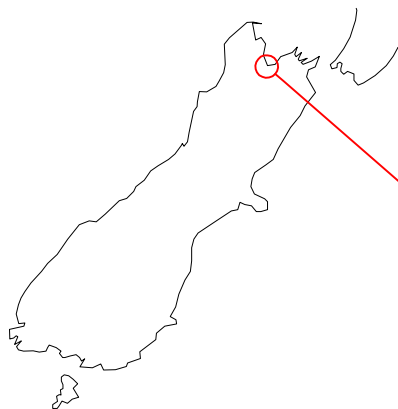
The recommendation section of the PDP report contains the following specific recommendation with regard to the potential for generation of ammonia gas at the site:

- A program of soil gas sampling and analysis should be carried out for ammonia gas in locations where buried fines or mixed material exists. This should include subgrades SG3, SG7 and SG14 where cement-stabilised material and treated fines co-exist. If ammonia is found, interpretation should include consideration of migration into confined spaces and whether further testing at specific building locations may be required at the time of development.

Depth to groundwater in the FCC eastern area of the subject site (after remedial activities) was recorded at depths ranging between 1.4-1.8 m bgl. Remedial activities have left a combination of different soil types with different origins including, a 0.5 m capping layer (residential quality soil) with the top 0.15 m imported topsoil.



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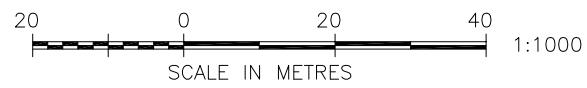



FCC MAPUA
AMMONIA GAS
SURVEY



**TASMAN DISTRICT COUNCIL
FCC MAPUA AMMONIA GAS SURVEY
SITE LOCATION PLAN**

FIGURE 2-1



LEGEND:	
	SG3, SG7, SG14 - SUBGRADES ON FCC EAST

**TASMAN DISTRICT COUNCIL
FCC MAPUA AMMONIA GAS SURVEY
SITE LAYOUT PLAN**

FIGURE 2-2

Field Methodology

3.1 Site Works Summary

Site works were undertaken in two phases. The first involving soil borehole drilling, completed on 28 January 2010. Soil borehole drilling was undertaken by CW Drilling and Investigation Limited (CW Drilling) using a hollow stem auger drill rig. All drilling works were carried out under the supervision of a URS field scientist. The second phase of works was the ammonia gas survey which was undertaken on 29 January 2010 by a URS field scientist.

Twelve soil borings (SVP1 – SVP12) were drilled to depths of approximately 1.0 m bgl and completed as temporary upstanding soil vapour points. The vapour points were screened from a depth between 0.7 – 1.0 mbgl, and extended out of the ground approximately 0.6 metres above ground level (magl). The locations of the soil vapour points are shown on Figure 3-1.

Soil removed during drilling works was removed and placed in a lined, covered trailer, and transported to the Eves Valley Landfill for disposal.

3.2 Survey Methodology

The ammonia gas survey was undertaken using an aeroqual handheld gas monitor with an attached ammonia sensor head. The sensor was initially calibrated prior to the survey commencing. Initially, an ambient survey for ammonia was undertaken across the site from around each soil vapour point. For measurements at each specific soil vapour point, the top cap was removed and a plug (attached to a pressure gauge and pump) was inserted into the top of the piezometer. The pump was used to draw air from within the column and applied for up to two minutes. Immediately after pumping, the plug was removed and the ammonia sensor head placed in the top end of the vapour point. Readings were recorded for a period of five minutes.

Soil vapour points which recorded a reading above 0.0 ppm after five minutes were re-tested for a duration of 30 minutes.

Ammonia Soil Gas Survey Results

A full set of ammonia soil gas results collected on 29 January 2010 are provided in Table 4-1.

Table 4-1 Ammonia Soil Gas Survey Results

Soil Vapour Point	Subgrade	Location (GPS coordinates)		Duration of test at each soil point		Ambient Ammonia Concentration	Ammonia Concentration at Soil Vapour Point		Ammonia ESL*
		E	N	minutes		ppm	ppm		ppm
1	SG14	2518443	5994383	5		0.0	0.0		0.25
2		2518455	5994386	5		0.0	0.0		0.25
3		2518458	5994397	5		0.0	0.0		0.25
4	SG7	2518467	5994410	5		0.0	0.0		0.25
5	SG3	2518470	5994424	5	30	0.0	3.8	0.10	0.25
6		2518459	5994431	5		0.0	0.0		0.25
7		2518446	5994423	5		0.0	0.0		0.25
8	SG7	2518438	5994423	5		0.0	0.0		0.25
9		2518454	5994421	5		0.0	0.0		0.25
10		2518451	5994409	5		0.0	0.0		0.25
11		2518436	5994410	5		0.0	0.0		0.25
12	SG14	2518438	5994399	5		0.0	0.0		0.25

*Texas Commission on Environmental Quality, Effects Screening Levels (ESL), October 2009.

Bold exceeds Ammonia ESL

The ambient survey of ammonia gas around the site recorded concentrations of ammonia at 0.0 ppm. The ammonia concentrations at each individual soil vapour point after a duration of five minutes recorded 0.0 ppm, with the exception of soil vapour point five, which recorded a value of 3.8 ppm. Soil vapour point five (located in subgrade SG3) was re-tested for a duration of 30 minutes and the value decreased to 0.10 ppm.

Comparison with Relevant Guidelines

5.1 Background to Selected Guidelines

The Texas Commission on Environmental Quality (TCEQ) Toxicology Division have established a list of Effects Screening Levels (ESLs) for air permitting. These ESLs evaluate the potential for effects to occur as a result of exposure to concentrations of constituents in the air. ESLs are based on data concerning health effects, odour/nuisance potential, and effects on vegetation. As there are no specific air quality guidelines for ammonia in New Zealand, the TCEQ ESL guideline value for ammonia has been applied for this investigation. The current investigation collected readings over a 'short term period' therefore the short term ESL has been selected for comparison, and is based on a one hour averaging period, measured in units of parts per billion by volume in air (ppb).

5.2 Comparison of Guidelines

The short term ESL value for ammonia is 250 ppb (assuming this value is sustained for a period of one hour exposure), and equates to 0.25 ppm. Soil point five recorded a value of 3.8 ppm over a period of five minutes, however over a duration of 30 minutes this value decreased to 0.10 ppm. In comparing this data to the applicable guidelines, the value for ammonia does not exceed the short term ESL value.

Summary and Conclusions

This investigation has been undertaken to assess if there is any ammonia gas inhalation risk to human and plant health or potential for gas penetration into future buildings at the FCC site at Mapua. The purpose of this investigation was to eliminate the current uncertainty with respect to the potential for ammonia gas generation from MCD-treated soil found in the eastern region of the FCC, Mapua site.

Twelve soil vapour points were installed on the FCC eastern area of the site at subgrades, SG3, SG7 and SG14. An ambient and gas survey for ammonia was undertaken on each of the installed points. With the exception of soil vapour point five, (located on subgrade 3) all soil vapour points recorded an ammonia concentration of 0.0 ppm, over a testing period of five minutes. Soil vapour point five recorded a reading of 3.8 ppm for ammonia, after five minutes, however after a duration of 30 minutes this value decreased to 0.10 ppm. In comparing the later data to the TCEQ ESL guideline for ammonia, (based on one hour exposure) this value does not exceed the short term ESL value.

Ammonia concentrations collected during this investigation suggest that the ammonia gas generation in the eastern region of the site in identified subgrades, SG3, SG7 and SG14 is limited and is therefore unlikely to pose any risk to human and plant health via inhalation or gas penetration into future buildings.

References

- Texas Commission on Environmental Quality, Effects Screening Levels (ESL), October 2009.

Limitations

URS New Zealand Limited (URS) has prepared this report in accordance with the usual care and thoroughness of the consulting profession for the use of Tasman District Council and only those third parties who have been authorised in writing by URS to rely on the report. 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 scope of work and for the purpose outlined in the Proposal dated 29 September 2009.

The methodology adopted and sources of information used by URS are outlined in this report. URS has made no independent verification of this information beyond the agreed scope of works and URS assumes no responsibility for any inaccuracies or omissions. No indications were found during our investigations that information contained in this report as provided to URS was false.

This report was prepared in February 2010 and is based on the conditions encountered and information reviewed at the time of preparation. URS 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.



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