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Odour Emissions Assessment for the Relocation of the Vesuvius Refractory Manufacturing Plant to Port Kembla, NSW

Note: ***This report in a Supplement to the Air Quality Assessment for the Vesuvius Refractory Plant Relocation to Port Kembla. This report is to provide additional assessment on air emissions from the above plant relocation.***

Prepared by: **M.G. O'Brien**
EDG File: **2010-100**

Version/Issue	Description	Date
1	Issued to Vesuvius	03/05/2011

Introduction

This report is a supplement to the original report prepared by Envirodyne Group P/L (EDG) on the Air Quality Assessment of the emissions from the Vesuvius plant relocated to the new site in Port Kembla.

Vesuvius management requested an odour emissions assessment to be undertaken on the manufacturing processes as reference sources for odours that would be emitted from the same operations at the relocated plant at Port Kembla. The work required the collection of air samples and the analysis using approved methodologies of the odour strengths from those processes at the existing Bulli plant identified as potentially odorous. These values would then be used in predictive dispersion modelling work to provide the assessment.

The odour assessment was conducted using the following:

- Olfactometry sampling and analysis were carried out in accordance with AS/NZS 4323.3 *Air Quality Determination of Odour Concentration by Dynamic Olfactometry* and was performed by NATA accredited personnel,
- Modelling work using the olfactometry results was conducted using the same terrain and meteorological files as used previously in the Air Quality Assessment Report, with the odour criteria of 2 Odour Units (OU) at 99%-ile.
- All odour assessment work was carried out in accordance with the NSW DECC *Guidelines for the Assessment of Emissions from Stationary Sources*.
- Predictive dispersion modelling of the results of olfactometry analysis used the same meteorological data and digitised terrain files as developed in previous work. Modelling was conducted using AUSPLUME Version as developed by Vic. EPA.
- Hours of plant operation as per data supplied for the original air quality assessment were used in the odour modelling for this report.

Refer to the odour emissions inventory attached to this report.

Refer also to the sampling and olfactometry results (pdf file) accompanying this report.

Results of Modelling

The outcomes of predictive dispersion modelling of odour emissions from the relocated plant as shown in the plot overleaf is that odours from the plant are expected to be well below criteria of 2OU at 99%-ile.

Essentially the results indicate that a plot of frequency of odour events at 2OU or greater is not possible due to the low level of the results predicted by the modelling.

Refer to the diagrams overleaf.

Assessment - Statement

From the results as shown, this assessment indicates that using the existing Bulli operations as a reference source for odour generation, odours from the manufacturing processes planned for the Port Kembla site are expected to be well within the prescribed limits under NSW DECC Guidelines.

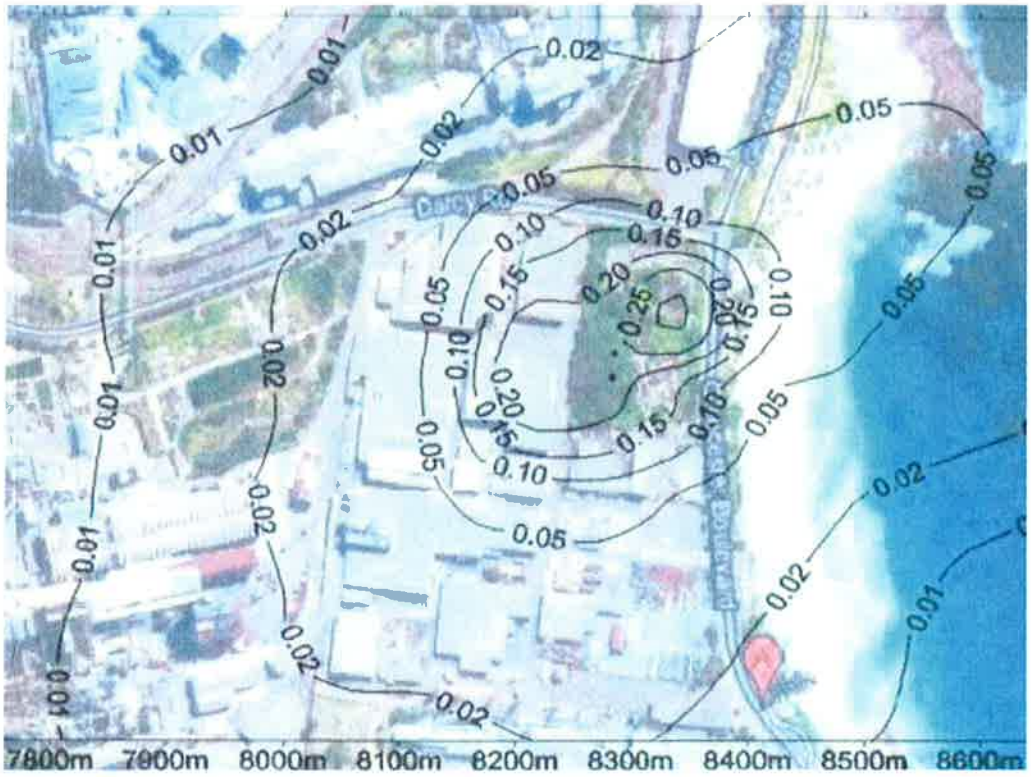

Fig. #1
Predicted Dispersion of Odours from Proposed Vesuvius Plant
Gloucester Boulevarde, Port Kembla.

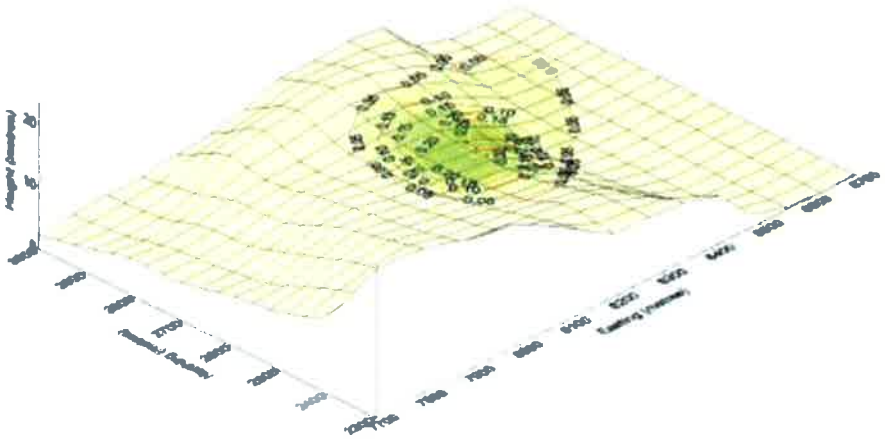

Fig.#2
3D Representation of Predicted Odour Dispersion

File Name: VESUV1151.INV
Modified on: 01/05/2011

VESUVIUS - EMISSIONS INVENTORY
ODOUR DISPERSION MODELLING

TERRAIN FILE:	VESUV10B1.TER
METEOROLOGICAL FILE:	WO2004.MET
INPUT FILE:	VESUV1151.CFG
OUTPUT FILE:	VESUV1151.TXT
CONCENTRATION FILE:	VESUV1151.DAT
FREQUENCY FILE:	VESUV1151F.FRQ
CALENDAR FILE:	VESUV1151.CAL
STATISTICAL FILE:	VESUV1151.STA

Building Corners coordinates: A(8305.6; 2755.6), B(8249.2; 2758.7), C(8288.1; 2613.1), D(8233.5; 2617.2).
Building Base elevation = 7 m.
Building height = 15.7 m.

EMISSION RATE
$OU.m^3/s$

TEKA Machine

TEKA Stack Source 8289.7, 2700.0, 6 — 217
h = 18.7 m t = 30 °C d = 0.45 m v = 15 m/s
Emission rate depends on time. From 6 to 14 it is 0.7*217 = 151.9 $OU.m^3/s$.
From 14 to 22 it is 0.3*217 = 65.1 $OU.m^3/s$. From 22 to 6 it is 0 $OU.m^3/s$.
No gravitational settling or scavenging.

RAM Machine

RAM Stack Source 8283.4, 2650.7, 6 — 23.6
h = 18.7 m t = 30 °C d = 0.25 m v = 15 m/s
Emission rate depends on time. From 6 to 14 it is 0.8*23.6 = 18.88 $OU.m^3/s$.
From 14 to 22 it is 0.2*23.6 = 4.7 $OU.m^3/s$. From 22 to 6 it is 0 $OU.m^3/s$.
No gravitational settling or scavenging.

Taphole Plant

TAPH1 Stack Source 8284.6, 2674.1, 6 — 527.5
h = 18.7 m t = 30 °C d = 0.2 m v = 15 m/s
Emission rate depends on time. From 6 to 14 it is 0.8*527.5 = 422 $OU.m^3/s$.
From 14 to 22 it is 0.2*527.5 = 105.5 $OU.m^3/s$. From 22 to 6 it is 0 $OU.m^3/s$.
No gravitational settling or scavenging.

Notes:
1. Meteorological data used are from 01/01/2004 to 31/12/2004.
2. Altogether 8,784 entries. 1.0 % represents 87.84 hours.
3. Averaging time = 1 hour.
4. Frequency analysis decision making level for odour >2 OU for nose response time and 99.0 % of time (based on EPA NSW odour criterion).
5. Roughness height at the wind vane site = 0.3 m.
6. Surface roughness height = 0.4 m.
7. Anemometer height = 10 m.
8. Horizontal dispersion curves for sources <100 m high – Sigma Theta.
9. Vertical dispersion curves for sources <100 m high – Pasquill-Gifford.
10. Horizontal dispersion curves for sources >100 m high – Briggs Rural.
11. Vertical dispersion curves for sources >100 m high – Briggs Rural.
12. Wind Profile Exponent: Irwin – Rural.

THE ODOUR UNIT PTY LTD

THE ODOUR UNIT

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NATA
Accreditation Number: 14974

Form 06 - Sydney Laboratory
Odour Concentration Measurement Results

This Document is Issued in Accordance with NATA's Accreditation Requirements

The measurement was commissioned by:

Organisation	Envirodyne Group Pty Ltd	Telephone	(02) 4272 53 77
Contact	Mike O'Brien	Facsimile	(02) 4272 7722
Sampling Site	Vesuvius Plant	Email	mobco@bigpond.com
Sampling Method	Drum & Pump	Sampling Team	J. Schulz (TOU)

Order details:

Order requested by	M. O'Brien	Order accepted by	J. Schulz
Date of order	13/04/2011	TOU Project #	N1694L
Order number	Refer to correspondence	Project Manager	J. Schulz
Signed by	Refer to correspondence	Testing operator	A. Schulz

Investigated Item	Odour concentration in odour units 'ou', determined by sensory odour concentration measurements, of an odour sample supplied in a sampling bag.
Identification	The odour sample bags were labelled individually. Each label recorded the testing laboratory, sample number, sampling location (or Identification), sampling date and time, dilution ratio (if dilution was used) and whether further chemical analysis was required.
Method	The odour concentration measurements were performed using dynamic olfactometry according to the Australian Standard 'Determination of Odour Concentration by Dynamic Olfactometry AS/NZS4323.3:2001. The odour perception characteristics of the panel within the presentation series for the samples were analogous to that for butanol calibration. Any deviation from the Australian standard is recorded in the 'Comments' section of this report.
Measuring Range	The measuring range of the olfactometer is $2^2 \leq \chi \leq 2^{18}$ ou. If the measuring range was insufficient the odour samples will have been pre-diluted. The machine is not calibrated beyond dilution setting 2^{17}. This is specifically mentioned with the results.
Environment	The measurements were performed in an air- and odour-conditioned room. The room temperature is maintained between 22°C and 25°C.
Measuring Dates	The date of each measurement is specified with the results.
Instrument Used	The olfactometer used during this testing session was: ODORMAT SERIES V05
Instrumental Precision	The precision of this instrument (expressed as repeatability) for a sensory calibration must be $r \leq 0.477$ in accordance with the Australian Standard AS/NZS4323.3:2001. ODORMAT SERIES V05: $r = 0.2569$ (August/September 2010) Compliance – Yes
Instrumental Accuracy	The accuracy of this instrument for a sensory calibration must be $A \leq 0.217$ in accordance with the Australian Standard AS/NZS4323.3:2001. ODORMAT SERIES V05: $A = 0.2037$ (August/September 2010) Compliance – Yes
Lower Detection Limit (LDL)	The LDL for the olfactometer has been determined to be 16 ou (4 times the lowest dilution setting)
Traceability	The measurements have been performed using standards for which the traceability to the national standard has been demonstrated. The assessors are individually selected to comply with fixed criteria and are monitored in time to keep within the limits of the standard. The results from the assessors are traceable to primary standards of n-butanol in nitrogen.

Date: Thursday, 28th April 2011 Panel Roster Number: SYD20110420_039

T. Schulz
Managing Director

J. Schulz
Authorised Signatory

THE ODOUR UNIT PTY LIMITED

Accreditation Number: 14974

Odour Sample Measurement Results
Panel Roster Number: SYD20110420_039

Sample Location	TOU Sample ID	Sampling Date & Time	Analysis Date & Time	Panel Size	Valid ITEs	Nominal Sample Dilution	Actual Sample Dilution (Adjusted for Temperature)	Sample Odour Concentration (as received, in the bag) (ou)	Sample Odour Concentration (Final, allowing for dilution) (ou)	Specific Odour Emission Rate ($ou.m^3/m^2/s$)
Sample #1 – TEKA Plant (vertical duct)	SC11267	19/04/2011 0938hrs	20/04/2011 1032hrs	4	8	-	-	91	91	N/A
Sample #2 – TEKA Plant (horizontal duct)	SC11268	19/04/2011 1000hrs	20/04/2011 1103hrs	4	8	-	-	54	54	N/A
Sample #3 – RAM (operating)	SC11269	19/04/2011 1019hrs	20/04/2011 1137hrs	4	8	-	-	32	32	N/A
Sample #4 – THC Building (ambient)	SC11270	19/04/2011 1037hrs	20/04/2011 1242hrs	4	8	-	-	21	21	N/A
Sample #5 – THC Mixer (mixing without resin)	SC11271	19/04/2011 1053hrs	20/04/2011 1319hrs	4	8	-	-	16	16	N/A
Sample #6 – THC Mixer (event 1 mixing)	SC11272	19/04/2011 1103hrs	20/04/2011 1358hrs	4	8	-	-	724	724	N/A
Sample #7 – THC Mixer (event 2 mixing)	SC11273	19/04/2011 1109hrs	20/04/2011 1433hrs	4	8	-	-	861	861	N/A

Note: The following are not covered by the NATA Accreditation issued to The Odour Unit Pty.Ltd:
1. The collection of Isolation Flux Hood (IFH) samples and the calculation of the Specific Odour Emission Rate (SOER).
2. Final results that have been modified by the dilution factors where parties other than The Odour Unit Pty. Ltd. have performed the dilution of samples.

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Accreditation Number: 14974

Odour Sample Measurement Results
Panel Roster Number: SYD20110420_039

Sample Location	TOU Sample ID	Sampling Date & Time	Analysis Date & Time	Panel Size	Valid ITEs	Nominal Sample Dilution	Actual Sample Dilution (Adjusted for Temperature)	Sample Odour Concentration (as received, in the bag) (ou)	Sample Odour Concentration (Final, allowing for dilution) (ou)	Specific Odour Emission Rate ($ou.m^3/m^2/s$)
Sample #9 – THC Mixer (end cycle)	SC11275	19/04/2011 1130hrs	20/04/2011 1559hrs	4	8	-	-	1,120	1,120	N/A
Sample #8 – THC Conveyor Belt (1 of 2)	SC11274	19/04/2011 1115hrs	20/04/2011 1526hrs	4	8	-	-	118	118	N/A
Sample #10 – THC Conveyor Belt (2 of 2)	SC11276	19/04/2011 1138hrs	20/04/2011 1631hrs	4	8	-	-	724	724	N/A

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Odour Panel Calibration Results

Reference Odorant	Reference Odorant Panel Roster Number	Concentration of Reference gas (ppb)	Panel Target Range for n-butanol (ppb)	Measured Concentration (ou)	Measured Panel Threshold (ppb)	Does this panel calibration measurement comply with AS/NZS4323.3:2001 (Yes / No)
n-butanol	SYD20110420_039	49,900	$20 \leq \chi \leq 80$	724	69	Yes

Comments None.

Disclaimer Parties, other than TOU, responsible for collecting odour samples hereby certify that they have voluntarily furnished these odour samples, appropriately collected and labelled, to The Odour Unit Pty Limited for the purpose of odour testing. The collection of odour samples by parties other than The Odour Unit Pty Limited relinquishes The Odour Unit Pty Limited from all responsibility for the sample collection and any effects or actions that the results from the test(s) may have.

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