CLIENTS | PEOPLE | PERFORMANCE

Shoalhaven Starches

Environmental Audit

Odour Sources

October 2007

Volume 2 - Appendices

Appendix A

Annexure B

Court order dated 2/11/06.

ANNEXURE "B"

1. Premises means the defendant's premises at Bomaderry to which environment protection licence no. 883 (or any amendment or replacement of that license) applies.

2. For the purposes of ensuring no offensive odours as defined by the *Protection of the Environment Operations Act 1997* are emitted from the premises, the defendant must engage a suitably qualified expert or experts to conduct an environmental audit that must:

   (a) Identify and list every process, activity and substance stored or used at the premises that generates or has the potential to generate odours.

   (b) Benchmark each process and activity identified at (a) against comparable international best available technology and industry best management practice relating to the control of odour from that process and activity.

   (c) Identify and list every actual and every potential source of offensive odour at the premises. This must include all point, diffuse and fugitive sources.

   (d) Identify for each odour source identified at (c) the cause or causes of the odour.

   (e) Quantify for each odour source identified at (c) the actual and potential nature, strength and duration of occurrence of the odour in accordance with the publication "NSW DEC 2005 Approved Methods for the Sampling and Analysis of Air Pollutants in NSW".

   (f) Model for each odour source identified at (c) the impacts and potential impacts of the odour at all sensitive receptors in accordance with the publication "NSW DEC 2005 Approved Methods of the Modelling and Assessment of Air Pollutants in NSW".

   (g) Identify all available options to prevent the generation of offensive odour for each actual and potential odour source identified at (c).

   (h) Where at (g) prevention is not possible, identify all available options to minimise the generation of offensive odour for each actual and potential odour source identified at (c).

   (i) Describe, quantify and model the likely environmental impacts of implementing each option identified at (g) and (h).

THE SEAL OF THE LAND AND ENVIRONMENT COURT NEW SOUTH WALES

(j) State for each actual and potential odour source identified at (c), the preferred option for the prevention or minimisation of the generation of offensive odour from that source.

(k) Review the adequacy of policies, procedures, standards, practices and training at the premises in relation to environmental performance and in particular odour management. Where any inadequacy is found to exist recommend options to address each inadequacy.

(l) Produce an audit report that details all of the above.

3. Within 12 months of the date of this order the defendant must:

(a) Submit to the Land and Environment Court;

(b) Submit to the Regional Manager South East Region, Department of Environment and Conservation;

(c) Make available for public viewing, free of charge, at the Shoalhaven Starches Pty Ltd administration offices in Bolong Road, Bomaderry; and

(d) Publish in an easily accessible format on its website www.manildra.com.au,

the environmental audit report and a statement from the defendant identifying what options identified in that report the defendant intends to implement and by when each such option will be implemented.

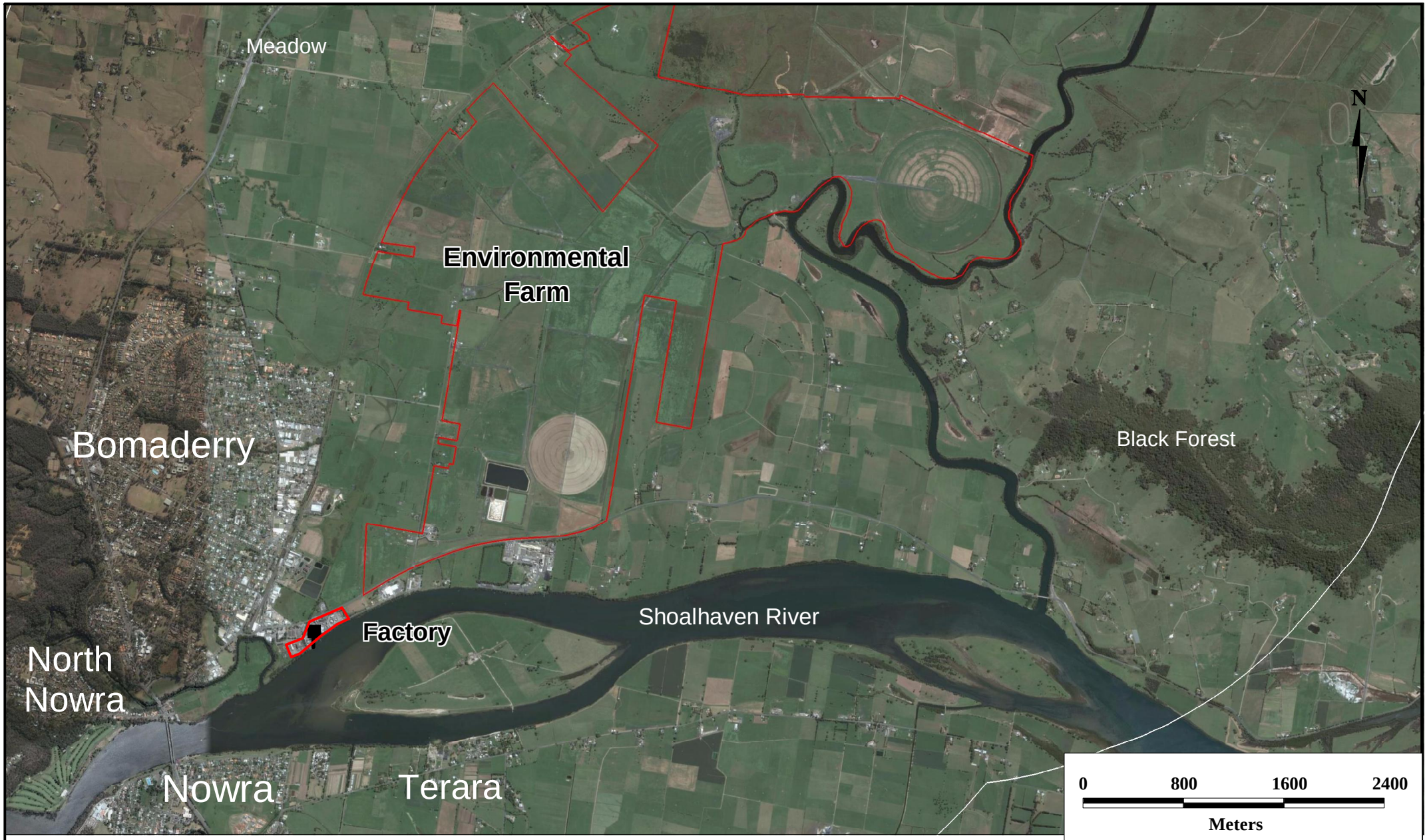
Note: The above orders do not allow the defendant to cause or permit the emission of any offensive odour from the premises.

Note: The suitably qualified expert or experts may seek information from the Department of Environment and Conservation in undertaking the environmental audit.

THE SEAL OF THE LAND AND ENVIRONMENT COURT NEW SOUTH WALES

Appendix B

Location Map



DATA SOURCE			
Prepared.	TG		Workspace odour.wor
Checked.	SA		Location 23\11918\technical\mapinfo\august 2007 plots
Approved.	DT		Map Grid GDA 94 (zone 56)

GHD
180 Lonsdale Steet
Melbourne Vic 3000
Tel: 61 3 8687 8000
Fax: 61 3 8687 8111

Project: **Shoalhaven Starches Environmetal Audit- Odour Sources**

Location Map

Project No:	Date:		Scale:		
23 / 11918	11/10/2007	A4	1:40000	Sh 1 of 1	Rev. 0

Appendix C

Documents Reviewed

Documents Reviewed

Document Ref	Document Title	Stated purpose
Environmental procedures		
EN-P-0010	Complaint Handling Procedure	Effective investigation of environmental complaints for any corrective action.
EN-P-0020	Filling Out and Using the Environ. Farm 24hr Report	Details methods to record and monitor daily irrigation operations.
EN-P-0030	Monthly Water Quality Monitoring	Details the requirements for the Environmental Farm Water Quality Monitoring
EN-P-0040	Environmental farm surface Soil Monitoring	Assess the impact of irrigation on the soil on an annual and a 3 yearly basis.
EN-P-0050	Cooling Water Release Monitoring	Details the monitoring and review actions required for cooling water release to Shoalhaven River
EN-P-0060	Soil Profile Monitoring	Assess the impact of applying waste waters to the approved irrigation area
EN-P-0070	Vegetation Monitoring	This document details the method utilised to perform the annual Vegetation Monitoring of the approved irrigation area
EN-P-0080	Environmental Licence Monitoring Quarterly Report	This document details the requirements of the Monitoring Quarterly Report that must be submitted to the Environmental Protection Authority
EN-P-0090	Environmental Farm – Pre Irrigation Checks	Details checks required prior to commencement of irrigation on the Approved Irrigation Area
EN-P-0100	Irrigation with Pivot Irrigators	Details the safe and correct method of irrigating using pivot Irrigators
EN-P-0110	Irrigation with Travelling Irrigators	Details the safe and correct method of irrigating using travelling irrigators and proper roll-up of irrigators
EN-P-0120	Flushing Irrigation Lines and Pivots	Details the safe and correct method of flushing irrigation lines and pivot irrigators
EN-P-0130	Noise Reduction Programme	Details the Company's policy for conformation of the EPA Licence and guidelines to maintain appropriate noise level criteria.

EN-P-0140	Performing the Monthly Bore Measurements and Water Sampling on the Approved Irrigation Area	Explains the correct method of checking the bore levels and obtaining samples of the bore water and the surface drains containing water
EN-P-0150	Storage Protocol for Waste Water Ponds	To maintain storage ponds in an acid environment to inhibit microbial activity and reduce potential odour generation.
EN-P-0160	Odour Reduction at Irrigation Start-up	Neutralise start-up odours using an oxidant
EN-P-0170	Clean up of Liquid or Chemical Spills at Factory and Farm.	Details the response by employees and contractors to liquid or chemical spills
EN-P-0171	Main Line Recirculation	Details the safe and correct method of recirculation of effluent in the main irrigation lines.
EN-P-0180	Procedure for Rainwater/Stormwater Management	To prevent rainwater contaminated with product, from being released into Abernethy Creek.
EN-P-0231	Road Traffic & Noise Management Protocol	This document details the company's policy for Licence and guidelines to maintain appropriate Road Traffic movements and Noise level criteria both within and on approaches to the premises.
EN-P-0232	Operational Instructions for Train Movements at the Manildra Group Site Nowra	To establish safe, efficient and effective working standards for the interaction of rail traffic between Australia Railroad Group and The Manildra Group Nowra site.
EN-WI-0010	Environmental Farm Hand Main Duties	Outlines the main duties that the Environmental Farm Hand carries out

Appendix D

Excluded Sources

Reasons for not sampling potential odour sources

Starch plant

Audit Ref	Equipment	Reason for exclusion
S16	Kraus Maffei starch conditioners	Vent is located within the building and has a low odour generating potential.

Glucose Plant

Audit Ref	Equipment	Reason for exclusion
Brewers glucose line		
B1	Starch tanks 1, 2 & 3	Starch suspension at ambient temperature with negligible odour.
B2	Hydrochloric acid tank	Tank has low odour generating potential, due to containment controls in place for OH&S purposes.
B4	Cooker B flash tank	Discharges via a common roof vent with B3, which was sampled.
B5	Storage (hydrolysis) tank	Odour represented by sample (B7).
B6	Enzyme tanks 2 – 6	Sample (B7) taken of Tank 18 to represent all tanks. Tank 18 reported to have a slightly greater odour.
B8	Drum filters A, B, C & D	Drum filters discharge via common vacuum receiver vent sampled as C4.
Confectioners glucose line		
C3	Rotary vacuum drum filter	Discharges via common external vent with C4, which was sampled.
C5	Units 1 & 2 feed tank 1	Receives demineralised glucose, which has negligible odour.
C6	Units 1 & 2 feed tank 2	Receives demineralised glucose, which has negligible odour.
C7	Units 3, 4 and 5 feed tank 1	Receives demineralised glucose, which has negligible odour.
C8	Units 3, 4 and 5 feed tank 2	Receives demineralised glucose, which has negligible odour.
C9	Units 3, 4 and 5 feed tank 3	Receives demineralised glucose, which has negligible odour.
C10	Della Toffola 2 & 4 feed tank	Receives raw glucose, which has negligible odour.
C11	Demin glucose buffer tank 1	Receives demineralised glucose, which has negligible odour.
C12	Demin glucose buffer tank 2	Receives demineralised glucose, which has negligible odour.
C13	Demin glucose concentrator feed tank 1	Receives demineralised glucose, which has negligible odour.

Audit Ref	Equipment	Reason for exclusion
C14	Condenser vacuum pump (GBM23)	Receives vacuum air from demineralised glucose pre-evaporators, which has negligible odour.
C15	Weigand evaporator vacuum pump (GBM12)	Receives vacuum air from demineralised glucose pre-evaporators, which has negligible odour.
C16	Glucose tanks 1 - 15	Demineralised glucose product storage tanks, which have negligible odour.
C17	Roof vent	Could not be sampled due to configuration of rotative vent. Vented air from plant had a slight bleach odour form the cleaning processes.

Ethanol Plant

Audit Ref	Equipment	Reason for exclusion
Grain line		
E2	Grain elevators	Similar discharge to E1, which was sampled.
E3	Hammer mill	Similar discharge to E4, which was sampled.
E5	Not assigned	—
E6	No. 2 collection tank	Receives ground flour mixed with water in the Scott mixer under an open system, which is located indoors. Has negligible odour generation.
Starch line		
E12	Ammonia storage tank	Tank has low odour generating potential, due to containment controls in place for OH&S purposes.
E16	Fermenter No. 1	Vent from fermenter connected to carbon dioxide collection system.
E17	Fermenter No. 2	Vent from fermenter connected to carbon dioxide collection system.
E18	Fermenter No. 3	Vent from fermenter connected to carbon dioxide collection system.
E19	Fermenter No. 4	Vent from fermenter connected to grain retention tank “F7” which was sampled as E8.
E20	Fermenter No. 5	Vent from fermenter connected to grain retention tank “F7” which was sampled as E8.
E21	Fermenter No. 6	Vent from fermenter connected to grain retention tank “F7” which was sampled as E8.

Distillation Plant

Audit Ref	Equipment	Reason for exclusion
D1	Stage 2 product condenser flame arrestor (E683)	No emission under normal operating conditions.
D3	Stage 4 product condenser flame arrestor (E563)	No emission under normal operating conditions.
D4	Stage 4 product cooler flame arrestor (E519)	No emission under normal operating conditions.
D5	Stage 4 final product drum (E569)	No emission under normal operating conditions.
D7	Stage 1 condenser vent (E27)	No emission under normal operating conditions.
D8	Stage 1 condenser vent (E501)	No emission under normal operating conditions.
D9	Stage 1 condenser vent (E45/0)	No emission under normal operating conditions.
D10	Stage 1 condenser vent (C600)	No emission under normal operating conditions.

DDG Plant

Audit Ref	Equipment	Reason for exclusion
Solids line		
DDG3	Decanter No. 2 (Westphalia)	Represented by DDG2.
DDG4	Decanter No. 3 (Alpha Laval)	Represented by DDG5.
DDG6	Inclined screw conveyors	Sealed units.
DDG8	Paddle mixers (3 units)	Represented by DDG7 and DDG9.
DDG10	High speed mixer (3 units)	Sealed units.
DDG11	DDG dryer No. 1	Vapour captured, condensed and added to boiler air intake for destruction of residual odour.
DDG12	DDG dryer No. 2	Vapour captured, condensed and added to boiler air intake for destruction of residual odour.
DDG13	DDG dryer No. 3	Vapour captured, condensed and added to boiler air intake for destruction of residual odour.
DDG14	Cyclones 1, 2 & 3	Vapour captured and added to boiler air intake for destruction of residual odour.
DDG15	Palmer cooler	Air transferred to mill feed silo, from which the exhaust was sampled as DDG17.
Liquids line		
DDG21	Evaporators 1 & 2	Vents to finisher feed tank, sampled as DDG26.
DDG22	Evaporators 3 & 4	Vents to condensate tank, sampled as DDG23.
DDG27	Finisher	Vents to syrup hold tank, sampled as DDG31.
DDG28	Finisher pump tank (LT308)	Result from dryer feed tank (DDG30) used.
DDG29	Not assigned	—
DDG38	Cooling tower	Sampled as DDG46.
DDG41	Drains from heat exchanger for dryer No. 1	Odour emission rate from sample F18 used.
DDG42	Drains from heat exchanger for dryer No. 3	Odour emission rate from sample F18 used.
DDG43	Drain under dryers	Odour emission rate from sample F19 used.

Environmental Farm

Audit Ref	Equipment	Reason for exclusion
Solids line		
F6	Pond 4 covered section	Not expected to be a significant source due to presence of cover.

Appendix E

ETC Odour Survey Reports

Odour Survey: Manildra Group – January and February 2007

Odour Survey: Manildra Group – April 2007

EMISSION TESTING CONSULTANTS

Odour Survey

Manildra Group

Prepared for:

GHD Services

January and February 2007

Report No. **060316r**

Report prepared by-

Terry Burkitt

Director

terryburkitt@emission.com.au

NATA endorsed test report. This document shall not be reproduced, except in full.

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ABN 74 474 273 172

TABLE OF CONTENTS

INTRODUCTION

Tests were performed during January and February 2007 to determine odour emissions to air from various locations within the Bomaderry Plant of the Manildra Group.

DEFINITIONS

The following symbols and abbreviations are used in this test report:

Odour unit	One odour unit (ou) is that concentration of odorant(s) at standard concentrations that elicits a physiological response from a panel (detection threshold) equivalent to that elicited by one Reference Odour Mass (ROM), evaporated in one cubic metre of neutral gas at standard conditions.
NTP	Normal temperature and pressure. Gas volumes and concentrations are expressed on a dry basis at 0°C, at discharge oxygen concentration and an absolute pressure of 101.325 kPa, unless otherwise specified.
<	Less than the minimum limit of detection using the specified method.
NA	Not applicable

SUMMARY OF SAMPLING LOCATIONS

Odour sampling was conducted from the following locations:

Distillery

D2: Vacuum drum
D6: Incondensable gases vent
D11: Recycled water to wastewater
D12: DME vent

DDG section

DDG1: Decanter feed tank
DDG2: Decanter 1
DDG5: Decanter 4
DDG7: Paddle mixer
DDG9: Not named
DDG16: DDG dryer baghouse (palmer cooler)
DDG17: Mill feed silo exhaust
DDG18A: Feeds dryer 3 baghouses
DDG19: Light phase recovery tank
DDG20: Feed dump
DDG23: Condensate
DDG24: Vent condenser
DDG25: Vent condenser drain
DDG26: Finish feed
DDG30: Dryer feed tank
DDG31: Syrup holding tank
DDG32: Clean in progress (CIP) tank – fresh caustic
DDG33: Clean in progress (CIP) tank – spent caustic
DDG34: DDG product storage sheds
DDG35: Load out awning
DDG36: DDG tent storage area
DDG37: Grounds
DDG39: Dryer building
DDG40: Kestner dryer exhaust
DDG44: DDG condenser water recovery tank
DDG45: DDG heat exchanger

Farm

F1: Mixer tank vents
F3: Pond 2
F4: Pond 3
F5: Pond 4
F9: Pivot (mist nozzle) upwind and downwind
F10: Pivot (non-mist nozzle) upwind and downwind
F11: Traveller upwind and downwind
F12: Pivot (sopper) – wet grass
F13: Traveller - wet grass
F14: Pivot 2 (mist nozzle) - wet grass
F15: Pivot 2 (mist nozzle) - dry grass
F16: Non irrigated land
F17: Pivot (sopper) – dry grass
F18: Drains

Starch plant

S1: No. 1 starch dryer
S2: No. 1 gluten dryer baghouse
S3: No. 3 gluten dryer baghouse
S4: No. 2 gluten dryer baghouse
S5: No. 4 gluten dryer baghouse
S6: Flour bin motor drive
S7: Dry gluten roof bin
S8: High protein dust collector
S9: Pre-separator
S10: Flour bin
S11: Coarse bin
S12: Pellet silo
S13: Flour bin aspirator
S14: Day bin transfer baghouse
S15: Coarse gluten transfer baghouse
S17: Starch reaction tank
S18: No. 3 starch dryer
S19: No. 4 starch dryer
S20: Spray dryer

Confectionery section

C1: Flash vessel for jet cooker
C2: Sach tank
C4: Drum vacuum receiver
C18: Ion exchange effluent tank
C19: Condensate water collection tank

Ethanol plant

E1: Drain silo baghouse
E4: Hammer mill Buhler baghouse
E7: Jet cooker 2 and 4 / grain retention
E8: Grain retention – tank 2 (fermenter no. 7)
E9: Hammer mill
E10: Starch factory rejects collection tank
E11: Buffer tank
E13: Jet cooker 1 retention tank
E14: Yeast propagator
E15: Yeast propagator
E22: Feed transfer to distillery
E23: Cooling tower
E24: Hammer mill baghouse

Brewers section

B3: Cooker A and B flash tanks
B7: Enzyme tank

SAMPLING DESCRIPTIONS AND OBSERVATIONS

Distillery

D2: Vacuum drum

A single odour sample (grab sample) was taken from the exit vent.

Flow measurements were conducted at the angled exit using an anemometer.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** but the conditions of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** were met.

Refer to deviations from test methods (low flow vents and ducts) on page 32.

D6: Incondensable gases vent

A single odour sample (grab sample) was taken from the exit vent.

Flow measurements were conducted at the angled exit using an anemometer.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** and condition ***(b)*** of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** was not met.

(b) The gas velocity at all sampling points is greater than 3 m/sec.

Refer to deviations from test methods (low flow vents and ducts) on page 32.

D11: Recycled water to wastewater

A temporary duct was attached to the exit of the discharge to facilitate accurate flow measurements.

A single odour sample (grab sample) was taken from the temporary duct.

Flow measurements were conducted from the temporary duct using an anemometer.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** and condition ***(b)*** of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** was not met.

(b) The gas velocity at all sampling points is greater than 3 m/sec.

Refer to deviations from test methods (low flow vents and ducts) on page 32.

D12: DME vent

Flow from the DME vent was diverted to a ¼ inch sample line.

A single odour sample (grab sample) was taken from the exit of the ¼ inch sampling point.

Flow measurements were conducted by connecting a gas meter to the ¼ inch sampling point and timing the flow for 1 minute.

The discharge temperature was less than -10 ºC and was assumed to be equal to that of the boiling point of DME (-23 ºC). Liquid DME was observed exiting the ¼ inch sample line.

DDG Section

DDG1: Decanter feed tank

Sampling was conducted on 30/1/07 and repeated on 2/2/07.

A single odour sample (grab sample) was taken from the exit vent.

Flow measurements were conducted at the exit using an anemometer.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** and condition ***(b)*** of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** was not met.

(b) The gas velocity at all sampling points is greater than 3 m/sec.

Refer to deviations from test methods (low flow vents and ducts) on page 32.

DDG2: Decanter 1

A single odour sample (grab sample) was taken from the 4 inch sample port.

Flow measurements were conducted from the single 4 inch sample port using an anemometer.

The sampling plane was not located in accordance with **AS4323.1** and only one sample port was supplied. Condition ***(b)*** of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** was not met.

(b) The gas velocity at all sampling points is greater than 3 m/sec.

Refer to deviations from test methods (low flow vents and ducts) on page 32.

The accuracy of results may be less than stated in the method.

DDG5: Decanter 4

A single odour sample (grab sample) was taken from the 2 inch sample port on the exhaust stack.

Flow measurements were conducted from the single 2 inch port using a pitot tube and manometer.

As there was only one sample port the sampling plane was not in accordance with **AS4323.1** and condition ***(b)*** of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** was not met.

(b) The gas velocity at all sampling points is greater than 3 m/sec.

Refer to deviations from test methods (low flow vents and ducts) on page 32.

The accuracy of results may be less than stated in the method.

DDG 7: Paddle mixer

A single odour sample (grab sample) was taken from the headspace of the paddle mixer.

Flow measurements were not conducted.

DDG 9: Not named

Intermittent negative flow was observed. Sampling was conducted only when positive flow was observed.

A single odour sample (grab sample) was taken from the square grate (exit).

Flow measurements were conducted from the square grate (exit) using a pitot tube and manometer.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** and condition ***(b)*** of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** was not met.

(b) The gas velocity at all sampling points is greater than 3 m/sec.

The accuracy of results may be less than stated in the method.

DDG 16: DDG dryer baghouse (palmer cooler)

A single odour sample (grab sample) was taken from the 1 inch sample port on the exhaust stack.

Flow measurements were conducted from the single 1 inch port using a pitot tube and manometer.

The sampling plane was not located in accordance with ***Table 1*** of **AS4323.1** and only one sampling port was supplied but the conditions of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** were met.

The accuracy of results may be less than stated in the method.

DDG 17: Mill feed silo exhaust

A single odour sample (grab sample) was taken from the exit.

Flow measurements were conducted at the exit using a pitot tube and manometer.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** but the conditions of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** were met.

DDG 18A: Feeds dryer 3 baghouses

Duplicate odour samples (grab sample) were taken from the diverted exit.

Flow measurements were conducted at the diverted exit using a pitot tube and manometer.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** and conditions ***(b)*** and ***(e)*** of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** were not met.

(b) The gas velocity at all sampling points is greater than 3 m/sec.

(e) The ratio of the highest to lowest pitot pressure difference shall not exceed 9:1 and the ratio of the highest to lowest gas velocities shall not exceed 3:1. For isokinetic testing with the use of impingers, the gas velocity ratio across the sampling plane shall not exceed 1.6:1.

The accuracy of results may be less than stated in the method.

DDG 19: Light phase recovery tank

A single odour sample (grab sample) was taken from the exit.

Flow measurements were conducted at the exit using a pitot tube and manometer.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** but the conditions of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** were met.

DDG 20: Feed dump

Sampling was conducted on 29/1/07 and repeated on 2/2/07.

Two exhaust vents were present on the tank.

A single odour sample (grab sample) was taken from vent 1.

Flow measurements were conducted at both vent exits using an anemometer.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** and condition ***(b)*** of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** was not met.

(b) The gas velocity at all sampling points is greater than 3 m/sec.

Refer to deviations from test methods (low flow vents and ducts) on page 32.

DDG 23: Condensate

Two exhaust vents were present on the tank.

Duplicate odour samples (grab sample) were taken from vent 1.

Flow measurements were conducted at both vent exits using an anemometer.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** and condition ***(b)*** of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** was not met.

(b) The gas velocity at all sampling points is greater than 3 m/sec.

Refer to deviations from test methods (low flow vents and ducts) on page 32.

DDG 24: Vent condenser

A single odour sample (grab sample) was taken from the vent exit.

Flow measurements were conducted at the vent exit using an anemometer.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** and condition ***(b)*** of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** was not met.

(b) The gas velocity at all sampling points is greater than 3 m/sec.

Refer to deviations from test methods (low flow vents and ducts) on page 32.

DDG25: Vent condenser drain

A temporary enclosure was constructed over the grate covering the drain (constructed by GHD personnel). Air was extracted using temporary ducting and an extraction fan. Sampling was conducted from the exit of the temporary ducting.

A single odour sample (grab sample) was taken from the exit of the temporary ducting.

Flow measurements were conducted at the vent exit using an anemometer.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** and condition ***(b)*** of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** was not met.

(b) The gas velocity at all sampling points is greater than 3 m/sec.

Refer to deviations from test methods (low flow vents and ducts) on page 32.

DDG26: Finish feed

Three exhaust vents were present on the tank.

A single odour sample (grab sample) was taken from the vent 1.

Flow measurements were conducted on all vent exits using an anemometer.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** and condition ***(b)*** of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** was not met.

(b) The gas velocity at all sampling points is greater than 3 m/sec.

Refer to deviations from test methods (low flow vents and ducts) on page 32.

DDG30: Dryer feed tank

A single odour sample (grab sample) was taken from the vent exit.

Flow measurements were conducted at the vent exit using an anemometer.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** and condition ***(b)*** of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** was not met.

(b) The gas velocity at all sampling points is greater than 3 m/sec.

Refer to deviations from test methods (low flow vents and ducts) on page 32.

DDG31: Syrup holding tank

Two exhaust vents were present on the tank.

A single odour sample (grab sample) was taken from the vent 1.

Flow measurements were conducted on all vent exits using an anemometer.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** and condition ***(b)*** of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** was not met.

(b) The gas velocity at all sampling points is greater than 3 m/sec.

Refer to deviations from test methods (low flow vents and ducts) on page 32.

DDG32: Clean in process (CIP tank) – fresh caustic

A single odour sample (grab sample) was taken from the vent exit.

Flow measurements were conducted at the vent exit using an anemometer.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** and condition ***(b)*** of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** was not met.

(b) The gas velocity at all sampling points is greater than 3 m/sec.

Refer to deviations from test methods (low flow vents and ducts) on page 32.

DDG33: Clean in process (CIP tank) – spent caustic

A single odour sample (grab sample) was taken from the vent exit.

Flow measurements were conducted at the vent exit using an anemometer.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** and condition ***(b)*** of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** was not met.

(b) The gas velocity at all sampling points is greater than 3 m/sec.

Refer to deviations from test methods (low flow vents and ducts) on page 32.

DDG34: DDG product storage sheds

Downwind sampling was conducted on 31/1/07 at the north door (open) of the product storage shed. A single odour sample (grab sample) was taken as an integrated sample across the face of the open door. Flow rate measurements were conducted simultaneously with the odour sampling at equal grid points (conducted by GHD personnel).

Upwind sampling taken for DDG35 (29/1/07) was assumed to be applicable.

DDG35: Load out awning

Downwind sampling was conducted directly above a truck tipper during loading. A single odour sample (grab sample) was taken as an integrated sample from the level of the truck tipper to the top of the loading chute. Flow rate measurements were conducted at the plume centre line above the truck bed (conducted by GHD personnel).

Upwind sampling was conducted simultaneously approximately 100m south of the product storage shed over a 10 minute period.

DDG36: DDG tent storage area

Downwind sampling was conducted at the north end (open) of the tent storage area. A single odour sample (grab sample) was taken as an integrated sample across the face of the open end. Flow rate measurements were conducted simultaneously with the odour sampling at equal grid points (conducted by GHD personnel).

Upwind sampling taken for DDG35 was assumed to be applicable.

DDG37: Grounds

A single odour sample (isolation flux) was taken from the surface of grounds at the north end of the load out awning (approximately 5m from the building).

DDG39: Dryer building

Downwind sampling was conducted on the upper level of the eastern open face of building. A single odour sample (grab sample) was taken as an integrated sample across the face. Flow rate measurements were conducted simultaneously with the odour sampling at equal grid points (conducted by GHD personnel).

DDG40: Kestner dryer exhaust

A single odour sample (grab sample) was taken from the horizontal exit (crane access).

Flow measurements were conducted at the exit face using a pitot tube and manometer.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** and conditions ***(b)*** *and* ***(e)*** of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** were not met.

(b) The gas velocity at all sampling points is greater than 3 m/sec.

(e) The ratio of the highest to lowest pitot pressure difference shall not exceed 9:1 and the ratio of the highest to lowest gas velocities shall not exceed 3:1. For isokinetic testing with the use of impingers, the gas velocity ratio across the sampling plane shall not exceed 1.6:1.

The accuracy of results may be less than stated in the method.

DDG44: DDG condenser water recovery tank

A temporary enclosure was constructed over the top of the open tank (constructed by GHD personnel). Air was extracted using temporary ducting and an extraction fan. Sampling was conducted from the exit of the temporary ducting.

A single odour sample (grab sample) was taken from the exit of the temporary ducting.

Flow measurements were conducted at the vent exit using an anemometer.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** and condition ***(b)*** of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** was not met.

(b) The gas velocity at all sampling points is greater than 3 m/sec.

Refer to deviations from test methods (low flow vents and ducts) on page 32.

DDG45: DDG heat exchanger

The vent exit face was annular in shape with an outer diameter of 160 mm and an inner diameter of 40 mm.

A single odour sample (grab sample) was taken from the vent exit face.

Flow measurements were conducted at the vent exit face using an anemometer (4 points around the annulus).

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** and conditions **(*b*)** and ***(e)*** of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** were not met.

(b) The gas velocity at all sampling points is greater than 3 m/sec.

(e) The ratio of the highest to lowest pitot pressure difference shall not exceed 9:1 and the ratio of the highest to lowest gas velocities shall not exceed 3:1. For isokinetic testing with the use of impingers, the gas velocity ratio across the sampling plane shall not exceed 1.6:1.

Refer to deviations from test methods (low flow vents and ducts) on page 32.

Farm

F1: Mixer tank vents

Three exhaust vents were present on the tank. Only one of the three could be accessed; an L-shaped opening with a cross sectional area of 0.267m² (excluding the seven pipes leading into the tank). The two remaining vents were estimated to be 150 mm and 400 mm in diameter.

A single odour sample (grab sample) was taken from the exit face of the L-shaped accessible opening.

Flow measurements were conducted at the vent exit face of the L-shaped accessible opening using an anemometer. The velocities at the two inaccessible openings were assumed to be equal to that of the opening measured.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** and condition ***(b)*** of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** was not met.

(b) The gas velocity at all sampling points is greater than 3 m/sec.

Refer to deviations from test methods (low flow vents and ducts) on page 32.

F3: Pond 2

A single odour sample (isolation flux) was taken from the centre of the western bank approximately 3m from the edge.

F4: Pond 3

A single odour sample (isolation flux) was taken the platform located at the centre of the western bank. Sampling was conducted approximately 8m from the western bank.

F5: Pond 4

Duplicate odour samples (isolation flux) were taken from the uncovered north western corner approximately 2m from the edge.

F9: Pivot (mist nozzle) - upwind and downwind

Downwind (duplicate grab samples) and upwind (singleton grab sample) odour samples were taken approximately 5 - 8m either side of the centre of the pivot at the centre line of the pivot arm. Sampling was conducted simultaneously at a height of 1m above ground level.

Wind speed and direction measurements were conducted at 1m and 2m above ground level by GHD personnel.

F10: Pivot (non-mist nozzle) - upwind and downwind

Downwind (duplicate grab samples) and upwind (duplicate grab samples) odour samples were taken approximately 5 - 8m either side of the centre of the pivot at the centre line of the pivot arm. Sampling was conducted simultaneously at a height of 1m above ground level.

Wind speed and direction measurements were conducted at 1m and 2m above ground level by GHD personnel.

F11: Traveller - upwind and downwind

Downwind (single grab sample) and upwind (single grab sample) odour samples were taken approximately 1 - 2m either side of the area irrigated by the traveller (upwind and downwind). Sampling was conducted simultaneously at a height of 1m to 3m (integrated) above ground level.

Wind speed and direction measurements were conducted at 2m above ground level by GHD personnel.

F12: Pivot (sopper) - wet grass

A single odour sample (isolation flux) was taken one third the way along the pivot. Sampling was conducted on wet grass at the perimeter of the nozzle reach after the pivot had passed over the sample location.

F13: Traveller - wet grass

A single odour sample (isolation flux) was taken on wet grass approximately 1m within the perimeter of the traveller reach at the rear of the traveller.

F14: Pivot 2 (mist nozzle) - wet grass

A single odour sample (isolation flux) was taken one third the way along the pivot. Sampling was conducted on wet grass at the perimeter of the nozzle reach after the pivot had passed over the sample location.

F15: Pivot 2 (mist nozzle) - dry grass

A single odour sample (isolation flux) was taken one third the way along the pivot. Sampling was conducted on dry grass approximately 10m ahead of the pivot.

F16: Non irrigated land

A single odour sample (isolation flux) was taken on non-irrigated dry land. Sampling was conducted in a paddock on the northern side of the roadway between the Farm office and the pond system.

F17: Pivot (sopper) - dry grass

A single odour sample (isolation flux) was taken one third the way along the pivot. Sampling was conducted on dry grass approximately 10m ahead of the pivot.

F18: Drains

18 openings were present on the tank.

A temporary enclosure was constructed by covering all openings except two. Temporary ducting and an extraction fan were used to draw air from one of the two remaining openings. The other opening left uncovered served as an inlet point (the overflow). Sampling was conducted from the exit of the temporary ducting.

The temporary enclosure was constructed by GHD personnel.

A single odour sample (grab sample) was taken from the exit of the temporary ducting.

Flow measurements were conducted at the vent exit using an anemometer.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** and condition ***(b)*** of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** was not met.

(b) The gas velocity at all sampling points is greater than 3 m/sec.

Refer to deviations from test methods (low flow vents and ducts) on page 32.

Starch plant

S1: No. 1 starch dryer

A single odour sample (grab sample) was taken from the exit face.

Flow measurements were conducted from the single 4 inch sample port using a pitot tube and manometer.

The sampling plane was not located in accordance with ***Table 1*** of **AS4323.1** and only one sampling port was supplied but the conditions of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** were met.

The accuracy of results may be less than stated in the method.

S2: No. 1 gluten dryer baghouse

Duplicate odour samples (grab sample) were taken from one of the 4 inch sample ports.

Flow measurements were conducted from two 4 inch sample ports using a pitot tube and manometer.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** but the conditions of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** were met.

S3: No. 3 gluten dryer baghouse

A single odour sample (grab sample) was taken from the exit face.

Flow measurements were conducted from across the exit face using a pitot tube and manometer.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** and conditions ***(b)*** and ***(e)*** of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** were not met.

(b) The gas velocity at all sampling points is greater than 3 m/sec.

(e) The ratio of the highest to lowest pitot pressure difference shall not exceed 9:1 and the ratio of the highest to lowest gas velocities shall not exceed 3:1. For isokinetic testing with the use of impingers, the gas velocity ratio across the sampling plane shall not exceed 1.6:1.

The accuracy of results may be less than stated in the method.

S4: No. 2 gluten dryer baghouse

A single odour sample (grab sample) was taken from one of the 4 inch sample ports.

Flow measurements were conducted from one of the 4 inch sample ports (one port could not be removed) using a pitot tube and manometer.

The sampling plane was not located in accordance with ***Table 1*** of **AS4323.1** and only one sampling port was supplied but the conditions of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** were met.

The accuracy of results may be less than stated in the method.

S5: No. 4 gluten dryer baghouse

A single odour sample (grab sample) was taken from one of the 4 inch sample ports.

Flow measurements were conducted from three 4 inch sample ports using a pitot tube and manometer.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** but the conditions of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** were met.

S6: Flour bin motor drive

A single odour sample (grab sample) was taken from the exit face.

Flow measurements were conducted from across the exit face using a pitot tube and manometer.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** but the conditions of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** were met.

S7: Dry gluten roof bin

A single odour sample (grab sample) was taken from the exit face.

Flow measurements were conducted from across the exit face using a pitot tube and manometer.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** and conditions ***(b)*** and ***(e)*** of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** were not met.

(b) The gas velocity at all sampling points is greater than 3 m/sec.

(e) The ratio of the highest to lowest pitot pressure difference shall not exceed 9:1 and the ratio of the highest to lowest gas velocities shall not exceed 3:1. For isokinetic testing with the use of impingers, the gas velocity ratio across the sampling plane shall not exceed 1.6:1.

The accuracy of results may be less than stated in the method.

S8: High protein dust collector

A single odour sample (grab sample) was taken from the exit face.

Flow measurements were conducted from across the exit face using a pitot tube and manometer.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** but the conditions of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** were met.

S9: Pre-separator

A single odour sample (grab sample) was taken from the exit face (crane access).

Flow measurements were conducted from across the exit face using a pitot tube and manometer.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** but the conditions of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** were met.

S10: Flour bin

A single odour sample (grab sample) was taken from the exit face.

Flow measurements were conducted from across the exit face using a pitot tube and manometer.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** but the conditions of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** were met.

S11: Coarse bin

A single odour sample (grab sample) was taken from the exit face.

Due to access difficulties, flow measurements were conducted from a centre point at the exit face using a pitot tube and manometer.

The sampling plane was not in accordance with **AS4323.1**.

The accuracy of results may be less than stated in the method.

S12: Pellet silo

A single odour sample (grab sample) was taken from the exit face.

Flow measurements were conducted from across the exit face using a pitot tube and manometer.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** but the conditions of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** were met.

S13: Flour bin aspirator

A single odour sample (grab sample) was taken from the exit face.

Flow measurements were conducted from across the exit face using a pitot tube and manometer.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** but the conditions of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** were met.

S14: Day bin transfer baghouse

A single odour sample (grab sample) was taken from the exit face.

Flow measurements were conducted from across the exit face using a pitot tube and manometer.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** but the conditions of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** were met.

S15: Coarse gluten transfer baghouse

A single odour sample (grab sample) was taken from the exit face.

Flow measurements were conducted from across the exit face using an anemometer.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** and condition ***(b)*** of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** was not met.

(b) The gas velocity at all sampling points is greater than 3 m/sec.

Refer to deviations from test methods (low flow vents and ducts) on page 32.

S17: Starch reaction tank

A single odour sample (grab sample) was taken from the exit.

Flow measurements were conducted at the exit using a pitot tube and manometer.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** and conditions ***(b)*** and ***(e)*** of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** were not met.

(b) The gas velocity at all sampling points is greater than 3 m/sec.

(e) The ratio of the highest to lowest pitot pressure difference shall not exceed 9:1 and the ratio of the highest to lowest gas velocities shall not exceed 3:1. For isokinetic testing with the use of impingers, the gas velocity ratio across the sampling plane shall not exceed 1.6:1.

Flow rate and velocity results reported as below detection.

S18: No. 3 starch dryer

A single odour sample (grab sample) was taken from the exit face.

Flow measurements were conducted from across the exit face using a pitot tube and manometer.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** but the conditions of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** were met.

S19: No. 4 starch dryer

Sampling was conducted on 31/1/07 and repeated on 2/2/07.

A single odour sample (grab sample) was taken from the exit face.

Flow measurements were conducted from across the exit face using a pitot tube and manometer.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** but the conditions of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** were met.

S20: Spray dryer

A single odour sample (grab sample) was taken from the exit face.

Flow measurements were conducted from across the exit face using a pitot tube and manometer.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** and conditions ***(b)*** and ***(e)*** of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** were not met.

(b) The gas velocity at all sampling points is greater than 3 m/sec.

(e) The ratio of the highest to lowest pitot pressure difference shall not exceed 9:1 and the ratio of the highest to lowest gas velocities shall not exceed 3:1. For isokinetic testing with the use of impingers, the gas velocity ratio across the sampling plane shall not exceed 1.6:1.

The accuracy of results may be less than stated in the method.

Confectionery section

C1: Flash vessel for jet cooker

A single odour sample (grab sample) was taken from under the rain cover on the stack.

Flow measurements were not conducted due to access difficulties.

Flow rates were calculated based upon a filling rate of 12,000 L/Hr (supplied by GHD personnel).

C2: Sach tank

A single odour sample (grab sample) was taken from the exit face.

Flow measurements were conducted from across the exit face using an anemometer.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** and condition ***(b)*** of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** was not met.

(b) The gas velocity at all sampling points is greater than 3 m/sec.

Refer to deviations from test methods (low flow vents and ducts) on page 32.

C4: Drum vacuum receiver

A single odour sample (grab sample) was taken from the exit face.

Flow measurements were conducted from across the exit face using a pitot tube and manometer.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** but the conditions of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** were met.

C18: Ion exchange effluent tank

Two exhaust vents were present on the tank. One was 380mm x 240mm and the other 280mm x 280mm. Both vents had a 160mm diameter pipe passing through (this was subtracted from the vent area).

A single odour sample (grab sample) was taken from vent 1.

Flow measurements were conducted at both vent exits using an anemometer.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** and condition ***(b)*** of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** was not met.

(b) The gas velocity at all sampling points is greater than 3 m/sec.

Refer to deviations from test methods (low flow vents and ducts) on page 32.

C19: Condensate water collection tank

A single odour sample (grab sample) was taken from the exit face.

Flow measurements were conducted from across the exit face using an anemometer.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** and condition ***(b)*** of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** was not met.

(b) The gas velocity at all sampling points is greater than 3 m/sec.

Refer to deviations from test methods (low flow vents and ducts) on page 32.

Ethanol plant

E1: Drain silo baghouse

A single odour sample (grab sample) was taken from the exit face.

Flow measurements were conducted from across the exit face using an anemometer.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** and condition ***(b)*** *and* ***(e)*** of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** were not met.

(b) The gas velocity at all sampling points is greater than 3 m/sec.

(e) The ratio of the highest to lowest pitot pressure difference shall not exceed 9:1 and the ratio of the highest to lowest gas velocities shall not exceed 3:1. For isokinetic testing with the use of impingers, the gas velocity ratio across the sampling plane shall not exceed 1.6:1.

Refer to deviations from test methods (low flow vents and ducts) on page 32.

E4: Hammer mill Buhler baghouse

A single odour sample (grab sample) was taken from the exit face.

Flow measurements were conducted from the single 1 inch sample port using a pitot tube and manometer.

As there was only one sample port the sampling plane was not in accordance with **AS4323.1** but the conditions of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** were met.

The accuracy of results may be less than stated in the method.

E7: Jet cooker 2 and 4 / grain retention

One exhaust vent was present on the tank.

Significant leakage was observed from around the edge of the cladding around the agitator. The exit area around the agitator was approximated to a half circle 850mm in diameter raised 50mm at the centre.

Duplicate odour samples (grab sample) were taken from the vent.

Flow measurements were conducted at both the vent and the area around the agitator using a pitot tube and manometer.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** and condition ***(b)*** of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** was not met.

(b) The gas velocity at all sampling points is greater than 3 m/sec.

The accuracy of results may be less than stated in the method.

E8: Grain retention – tank 2 (fermenter no. 7)

One exhaust vent was present on the tank.

Some leakage was observed from a broken flexible duct joint on ducting associated with the tank. This was not taken into consideration.

Duplicate odour samples (grab sample) were taken from the vent.

Flow measurements were conducted from across the exit face using a pitot tube and manometer.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** but the conditions of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** were met.

E9: Hammer mill

A single odour sample (grab sample) was taken from the exit face.

Flow measurements were conducted from across the exit face using a pitot tube and manometer.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** but the conditions of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** were met.

E10: Starch factory rejects collection tank

A single odour sample (grab sample) was taken from the exit face.

Flow measurements were conducted from across the exit face using an anemometer.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** and condition ***(b)*** of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** was not met.

(b) The gas velocity at all sampling points is greater than 3 m/sec.

Refer to deviations from test methods (low flow vents and ducts) on page 32.

E11: Buffer tank

A single odour sample (grab sample) was taken from the exit face.

Flow measurements were conducted from across the exit face using an anemometer.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** and condition ***(b)*** of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** was not met.

(b) The gas velocity at all sampling points is greater than 3 m/sec.

Refer to deviations from test methods (low flow vents and ducts) on page 32.

E13: Jet cooker 1 retention tank

Two exhaust vents were present on the tank.

A single odour sample (grab sample) was taken from vent 1.

Flow measurements were conducted at both vent exits using an anemometer.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** and condition ***(b)*** of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** was not met.

(b) The gas velocity at all sampling points is greater than 3 m/sec.

Refer to deviations from test methods (low flow vents and ducts) on page 32.

E14: Yeast propagator

One exit point was present; a hatch elliptical exit 460mm and 350mm across the axis.

A single odour sample (grab sample) was taken from the exit face.

Flow measurements were conducted from across the exit face using an anemometer.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** and conditions ***(b)*** and ***(e)*** of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** were not met.

(b) The gas velocity at all sampling points is greater than 3 m/sec.

(e) The ratio of the highest to lowest pitot pressure difference shall not exceed 9:1 and the ratio of the highest to lowest gas velocities shall not exceed 3:1. For isokinetic testing with the use of impingers, the gas velocity ratio across the sampling plane shall not exceed 1.6:1.

Refer to deviations from test methods (low flow vents and ducts) on page 32.

E15: Yeast propagator

Three exhaust vents were present on the tank.

Duplicate odour samples (grab sample) were taken from vent 1.

Flow measurements were conducted at all vent exits using an anemometer.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** and condition ***(b)*** of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** was not met.

(b) The gas velocity at all sampling points is greater than 3 m/sec.

Refer to deviations from test methods (low flow vents and ducts) on page 32.

E22: Hammer mill baghouse

Two exhaust vents were present on the tank.

A single odour sample (grab sample) was taken from vent 1.

Flow measurements were conducted at vent 1 using an anemometer. Due to accessibility flow measurements were not obtained for vent 2. The velocity from vent 2 was assumed to be equal to that of vent 1.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** and conditions ***(b)*** and ***(e)*** of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** were not met.

(b) The gas velocity at all sampling points is greater than 3 m/sec.

(e) The ratio of the highest to lowest pitot pressure difference shall not exceed 9:1 and the ratio of the highest to lowest gas velocities shall not exceed 3:1. For isokinetic testing with the use of impingers, the gas velocity ratio across the sampling plane shall not exceed 1.6:1.

Refer to deviations from test methods (low flow vents and ducts) on page 32.

E23: Cooling tower

A single odour sample (grab sample) was taken from the exit face.

Flow measurements were conducted from across the exit face using a pitot tube and manometer.

Swirl was measured at approximately 45 degree.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** and conditions **(*b*)**, **(*c*)** and **(*e*)** of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** were not met.

(b) The gas velocity at all sampling points is greater than 3 m/sec.

(c) The gas flow profile at the sampling plane shall be steady, evenly distributed and not have a cyclonic component which exceeds an angle of 15° to the duct axis, when measured near the periphery of a circular sampling plane.

(e) The ratio of the highest to lowest pitot pressure difference shall not exceed 9:1 and the ratio of the highest to lowest gas velocities shall not exceed 3:1. For isokinetic testing with the use of impingers, the gas velocity ratio across the sampling plane shall not exceed 1.6:1.

The accuracy of results may be less than stated in the method.

E24: Hammer mill baghouse

A single odour sample (grab sample) was taken from the exit face.

Flow measurements were conducted from across the exit face using a pitot tube and manometer.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** but the conditions of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** were met.

Brewers section

B3: Cooker A and B flash tanks

A single odour sample (grab sample) was taken from the exit face.

Flow measurements were conducted from across the exit face using a pitot tube and manometer.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** and condition ***(b)*** of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** was not met.

(b) The gas velocity at all sampling points is greater than 3 m/sec.

The accuracy of results may be less than stated in the method.

B7: Enzyme tank

Two exhaust vents were present on the tank.

A single odour sample (grab sample) was taken from vent 1.

Flow measurements were conducted at both vent exits using an anemometer.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** and condition ***(b)*** of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** was not met.

(b) The gas velocity at all sampling points is greater than 3 m/sec.

Refer to deviations from test methods (low flow vents and ducts) on page 32.

SAMPLING METHODOLOGY

On site sampling guidelines: according to ETC method 1.

Sampling plane criteria: according to AS 4323.1-1995. Selection of sampling positions. **(TM-1)**

Flow rate and velocity: according to USEPA Method 2, using a pitot tube and differential manometer. Temperature determined using a calibrated thermocouple and digital pyrometer. **(TM-2)**

Isolation flux (quiescent surfaces): according to ETC method 130 using an equilibrium flux chamber.

* *Given the recent development of the draft Australian Standard for area source measurement (AS4323.4), quality control protocols outlined in the draft standard were adopted if not otherwise stated in ETC method 130. Isolation flux chambers which are compliant with the draft standard and the* specifications of USEPA user guide (1986 EPA/600/8) *were used.*

Where static pre-dilution was conducted odour-free air was used.

Grab samples (stacks, ducts, fugitive and ambient samples): sample collection according to AS4323.3, by collection into Nalophan sample bags using the 'lung' principle.

Where static pre-dilution was conducted odour-free air (zero grade) was used.

ANALYSIS METHODOLOGY

Odour: according to AS4323.3, by dynamic olfactometry (forced-choice technique). Panel n-butanol threshold determination by analysis against a NATA certified n-butanol gas standard.

All odour analysis was conducted with 6 member odour panels.

All samples were analysed within 30 hours of collection.

DEVIATIONS FROM TEST METHODS

Low flow vents, ducts

Stacks and ducts with a velocity of less than 3 m/s cannot be measured accurately using a pitot tube and manometer as stipulated in USEPA method 2 (TM-2). In these cases velocity was measured using a digital impellor anemometer. This method of velocity measurement is more accurate for low velocity measurement. The number of sampling points was determined in accordance with AS4323.1 in the usual manner.

Temperature determined using a calibrated thermocouple and digital pyrometer.

Where applicable this deviation is indicated in the 'sampling descriptions and observations' section of this report.

High odour sources

Odour sources with a very high odour concentration required a pre-dilution greater than specified in AS4323.3. Where applicable this is indicated in the 'results' section of this report.

WEATHER OBSERVATIONS

Weather conditions at the time of sampling are recorded in the results section of this report. Readings were obtained from the Bureau of Meteorology weather station at Nowra RAN Air station AWS (station 068072).

Refer to appendix for details.

RESULTS

D2: Vacuum drum

1 February 2007

No photograph taken

Flow Results			D2
Time of flow tests	1053	hrs	
Stack dimensions at sampling plane	80	mm	
Velocity at sampling plane	13	m/s	
Average temperature	64	°C	
Flow rate at discharge conditions	3.8	m³/min	
Flow rate at wet NTP conditions	3.1	m³/min	

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	54	1055-1057	26,000 ou	81,000 ouv/min

Panel n-butanol threshold	25 ppb
Odour character (hedonic tone)	Mildly unpleasant
Odour character	Beer, fermentation, yeast, sweet

D6: Incondensable gases vent

1 February 2007

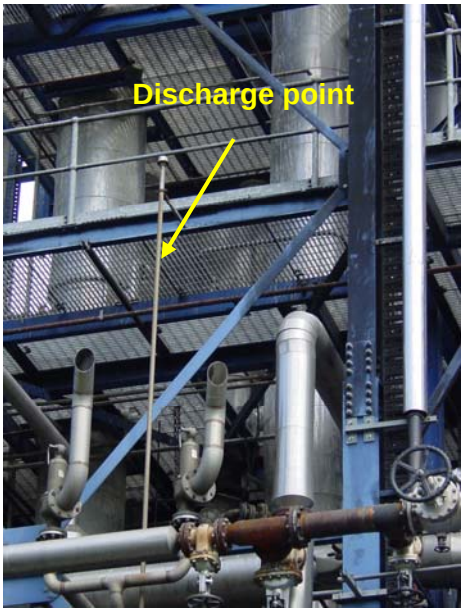
Flow Results			D6
Time of flow tests	1202	hrs	
Stack dimensions at sampling plane	180	mm	
Velocity at sampling plane	0.85	m/s	
Average temperature	36	°C	
Flow rate at discharge conditions	1.3	m³/min	
Flow rate at wet NTP conditions	1.2	m³/min	

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	64	1204-1205	21,000 ou	24,000 ouv/min

Panel n-butanol threshold	25 ppb
Odour character (hedonic tone)	Mildly - very unpleasant
Odour character	Beer, rotten, fermentation, alcohol

D11: Recycled water to waste water

1 February 2007



Flow Results			D11
Time of flow tests	1140	hrs	
Stack dimensions at sampling plane	40	mm	
Velocity at sampling plane	1.6	m/s	
Average temperature	100	°C	
Flow rate at discharge conditions	0.12	m³/min	
Flow rate at wet NTP conditions	0.089	m³/min	

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	117	1144-1145	11,000 ou	990 ouv/min

Note: Flow rate and odour measurements were conducted from temporary ducting attached to the discharge point. The diameter stated refers to the diameter of the temporary ducting.

Panel n-butanol threshold 25 ppb

Odour character (hedonic tone) Mildly unpleasant

Odour character Yeast, fermentation, alcohol

D12: DME vent

29 January 2007

No photograph taken

Flow Results			D12
Time of flow tests	0706	hrs	
Average temperature	-23	°C*	
Flow rate at discharge conditions	0.031	m³/min	
Flow rate at wet NTP conditions	0.034	m³/min	

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	16	0716-0717	190,000 ou	6,400 ouv/min

Note: Flow was diverted to a ¼ inch sample line. Flow rate was measured directly using a gas meter over a given time period.

* Assumed from the boiling point of DME

Note: A further 1 in 6 dilution was required to bring within the scale of the olfactometer. This ratio is greater than recommended by AS4323.3.

Panel n-butanol threshold 43 ppb

Odour character (hedonic tone) Mildly to very unpleasant

Odour character Sweet, alcohol, acetone, solvent

DDG1: Decanter feed tank (Test 1)

30 January 2007

Flow Results			DDG1
Time of flow tests	1345	hrs	
Stack dimensions at sampling plane	95	mm	
Velocity at sampling plane	1.7	m/s	
Average temperature	69	°C	
Flow rate at discharge conditions	0.74	m³/min	
Flow rate at wet NTP conditions	0.59	m³/min	

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	180	1347-1348	15,000 ou	9,000 ouv/min

Panel n-butanol threshold	25 ppb
Odour character (hedonic tone)	Mildly pleasant – mildly unpleasant
Odour character	Yeast, brewery, beer, stale, bread

DDG1: Decanter feed tank (Test 2)

2 February 2007

Flow Results			DDG1
Time of flow tests	0711	hrs	
Stack dimensions at sampling plane	95	mm	
Velocity at sampling plane	1.2	m/s	
Average temperature	57	°C	
Flow rate at discharge conditions	0.52	m³/min	
Flow rate at wet NTP conditions	0.43	m³/min	

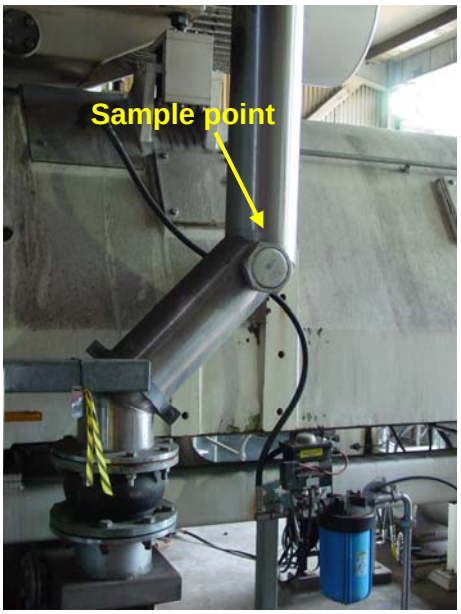
Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	43	0713-0714	31,000 ou	13,000 ouv/min

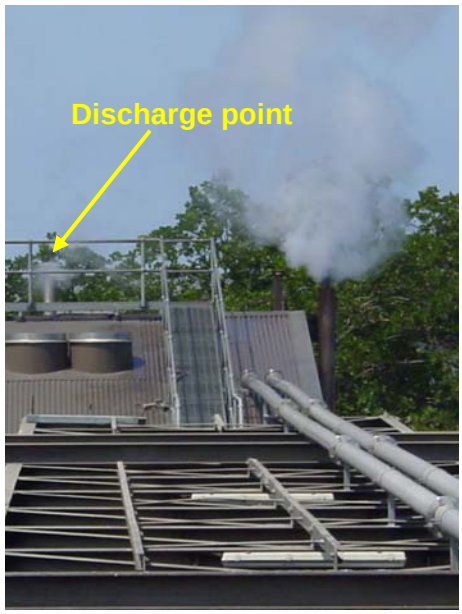
Note: A further 1 in 10 dilution was required to bring within the scale of the olfactometer. This ratio is greater than recommended by AS4323.3.

Panel n-butanol threshold	30 ppb
Odour character (hedonic tone)	Mildly unpleasant – very unpleasant
Odour character	Grain, vegemite, sweet, stale, burnt

DDG2: Decanter 1

29 January 2007





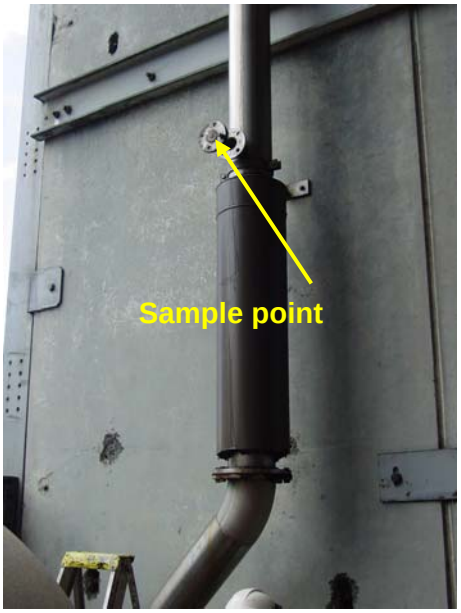
Flow Results			DDG2
Time of flow tests	1306	hrs	
Stack dimensions at sampling plane	190	mm	
Velocity at sampling plane	0.40	m/s	
Average temperature	56	°C	
Flow rate at discharge conditions	0.68	m³/min	
Flow rate at wet NTP conditions	0.56	m³/min	

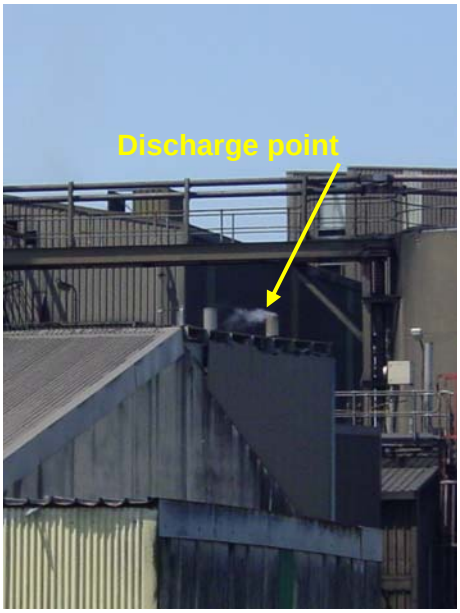
Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	100	1319-1320	14,000 ou	7,800 ouv/min

Panel n-butanol threshold	23 ppb
Odour character (hedonic tone)	Pleasant – mildly unpleasant
Odour character	Yeast, stale, beer, bread, flour, sweet, fermentation

DDG5: Decanter 4

29 January 2007





Flow Results			DDG5
Time of flow tests	1240	hrs	
Stack dimensions at sampling plane	210	mm	
Velocity at sampling plane	2.1	m/s	
Average temperature	74	°C	
Flow rate at discharge conditions	4.4	m³/min	
Flow rate at wet NTP conditions	3.4	m³/min	

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	10	1241-1242	15,000 ou	51,000 ouv/min

Panel n-butanol threshold	23 ppb
Odour character (hedonic tone)	Mildly unpleasant
Odour character	Sour, grain, yeast, alcohol

DDG7: Paddle mixer

29 January 2007

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	135	1308-1309	19,000 ou	NA

Note: No flow measurements conducted. Odour samples were taken from the headspace.

Panel n-butanol threshold 23 ppb

Odour character (hedonic tone) Mildly pleasant - pleasant

Odour character Vegemite, vita-weets, bread, flour, sweet

DDG9: Not named

29 January 2007

Flow Results			DDG9
Time of flow tests	1255	hrs	
Stack dimensions at sampling plane	200 x 200	mm	
Velocity at sampling plane	2.2	m/s	
Average temperature	86	°C	
Flow rate at discharge conditions	5.3	m³/min	
Flow rate at wet NTP conditions	4.0	m³/min	

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	58	1257-1258	32,000 ou	130,000 ouv/min

Panel n-butanol threshold	23 ppb
Odour character (hedonic tone)	Mildly unpleasant
Odour character	Marmite, yeast, sour, burnt, sweet

DDG16: DDG dryer baghouse (palmer cooler)

29 January 2007

Flow Results			DDG16
Time of flow tests		1213	hrs
Stack dimensions at sampling plane		700	mm
Velocity at sampling plane		16	m/s
Average temperature		62	°C
Flow rate at discharge conditions		370	m³/min
Flow rate at wet NTP conditions		300	m³/min

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	43	1216-1217	1,700 ou	530,000 ouv/min

Panel n-butanol threshold	23 ppb
Odour character (hedonic tone)	Neutral - mildly unpleasant
Odour character	Yeast, stale, beer

DDG17: Mill feed silo exhaust

29 January 2007

Flow Results			DDG17
Time of flow tests	106	hrs	
Stack dimensions at sampling plane	340 x 250	mm	
Velocity at sampling plane	10.0	m/s	
Average temperature	35	°C	
Flow rate at discharge conditions	51	m³/min	
Flow rate at wet NTP conditions	45	m³/min	

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	38	1345-1346	380 ou	17,000 ouv/min

Panel n-butanol threshold	23 ppb
Odour character (hedonic tone)	Neutral
Odour character	Grain, sour, grass

DDG18A: Feeds dryer 3 baghouses

29 January 2007

Flow Results			DDG18a
Time of flow tests	0914	hrs	
Stack dimensions at sampling plane	250	mm	
Velocity at sampling plane	19	m/s	
Average temperature	47	°C	
Flow rate at discharge conditions	57	m³/min	
Flow rate at wet NTP conditions	48	m³/min	

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	29	0916-0917	1,000 ou	49,000 ouv/min
	82	0918-0919	1,100 ou	55,000 ouv/min
Average Results			**1,100 ou**	**52,000 ouv/min**

Panel n-butanol threshold	43 ppb
Odour character (hedonic tone)	Pleasant – mildly unpleasant
Odour character	sweet, yeast, alcohol

DDG19: Light phase recovery tank

29 January 2007

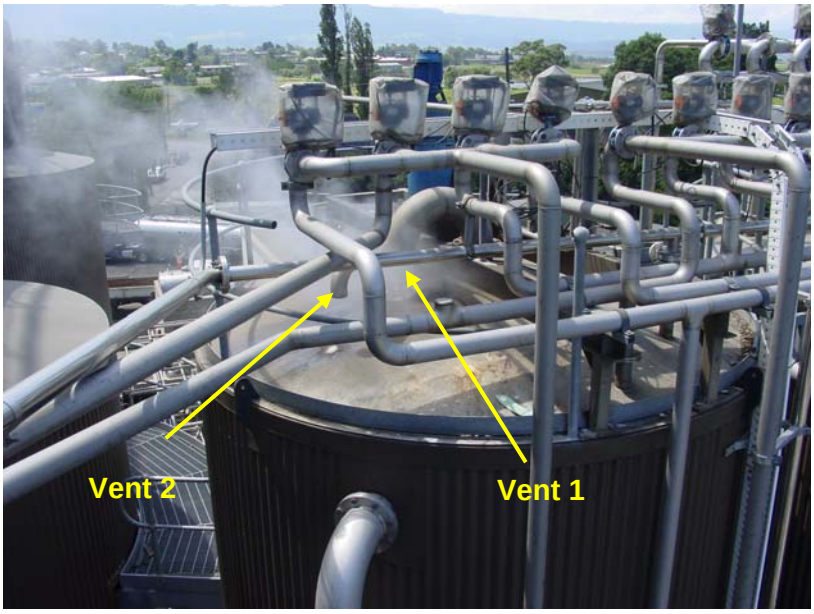
Flow Results			DDG19
Time of flow tests	1226	hrs	
Stack dimensions at sampling plane	100	mm	
Velocity at sampling plane	3.3	m/s	
Average temperature	89	°C	
Flow rate at discharge conditions	1.6	m³/min	
Flow rate at wet NTP conditions	1.2	m³/min	

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	21	1227-1228	23,000 ou	27,000 ouv/min

Panel n-butanol threshold	23 ppb
Odour character (hedonic tone)	Mildly pleasant - mildly unpleasant
Odour character	Grain, alcohol, yeast, bread, flour, fermentation, sweet

DDG20: Feed dump (Test 1)

29 January 2007



Flow Results			DDG20
Time of flow tests		0854	hrs
Stack dimensions at sampling plane (vent 1)		210	mm
Velocity at sampling plane (vent 1), m/s		2.4	m/s
Stack dimensions at sampling plane (vent 2)		95	mm
Velocity at sampling plane (vent 2), m/s		0.6	m/s
Average temperature		88	°C
Flow rate at discharge conditions		5.2	m^3/min
Flow rate at wet NTP conditions		3.9	m^3/min

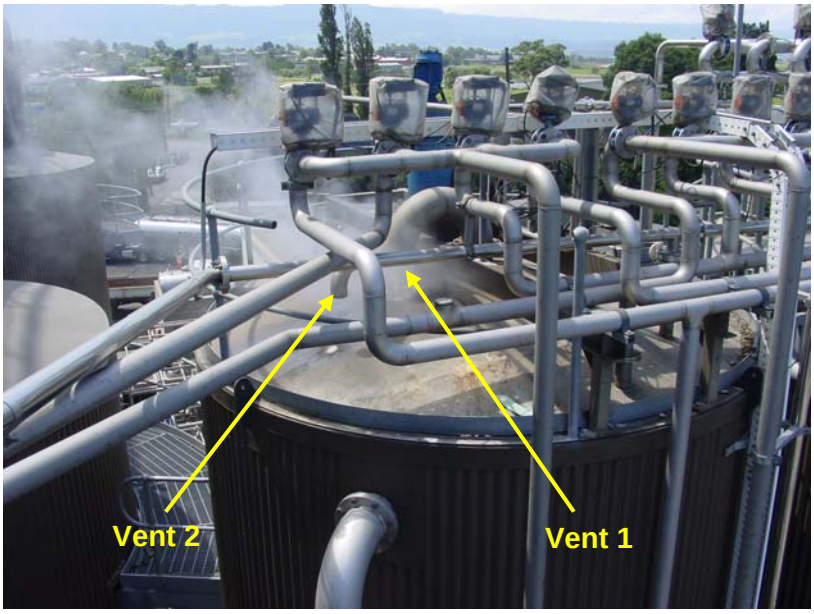
Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	69	0856-0857	240,000 ou	950,000 ouv/min

Note: A further 1 in 6 dilution was required to bring within the scale of the olfactometer. This ratio is greater than recommended by AS4323.3.

Panel n-butanol threshold	43 ppb
Odour character (hedonic tone)	Neutral - mildly unpleasant
Odour character	Bread, alcohol, sweet, stale

DDG20: Feed dump (Test 2)

2 February 2007



Flow Results			DDG20
Time of flow tests	0732	hrs	
Stack dimensions at sampling plane (vent 1)	210	mm	
Velocity at sampling plane (vent 1)	2.1	m/s	
Stack dimensions at sampling plane (vent 2)	95		
Velocity at sampling plane (vent 2)	1.1	m/s	
Average temperature	85	°C	
Flow rate at discharge conditions	4.9	m³/min	
Flow rate at wet NTP conditions	3.8	m³/min	

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	164	0735-0736	33,000 ou	120,000 ouv/min

Note: A further 1 in 6 dilution was required to bring within the scale of the olfactometer. This ratio is greater than recommended by AS4323.3.

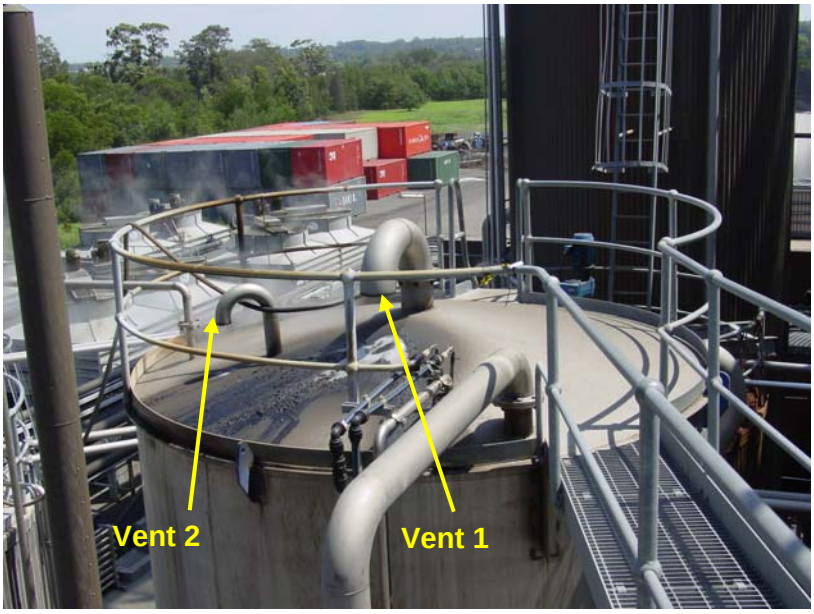
Panel n-butanol threshold 30 ppb

Odour character (hedonic tone) Mildly unpleasant

Odour character Sour, fermentation, grain, stale, sweet, yeast

DDG23: Condensate

29 January 2007



Flow Results			DDG23
Time of flow tests	0805 and 0811	hrs	
Stack dimensions at sampling plane (vent 1)	230	mm	
Velocity at sampling plane (vent 1)	2.4	m/s	
Stack dimensions at sampling plane (vent 2)	100	mm	
Velocity at sampling plane, (vent 2)	1.4	m/s	
Average temperature	85	°C	
Flow rate at discharge conditions	6.7	m^3/min	
Flow rate at wet NTP conditions	5.1	m^3/min	

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	71	0806-8070	270,000 ou	1,400,000 ouv/min
	81	0800-0809	200,000 ou	1,000,000 ouv/min
Average Results			**240,000 ou**	**1,200,000 ouv/min**

Note: A further 1 in 6 dilution was required to bring within the scale of the olfactometer. This ratio is greater than recommended by AS4323.3.

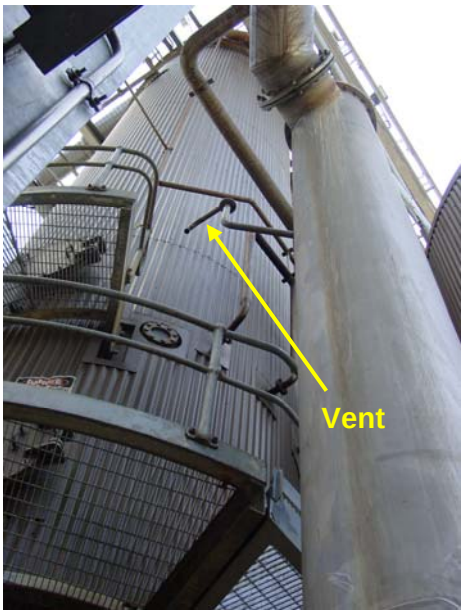
Panel n-butanol threshold 43 ppb

Odour character (hedonic tone) Mildly pleasant – mildly unpleasant

Odour character Sweet, bread, fermentation, rotting grass, yeast

DDG24: Vent condenser

29 January 2007



Flow Results			DDG24
Time of flow tests	0720 and 0722	hrs	
Stack dimensions at sampling plane	95	mm	
Velocity at sampling plane	1.8	m/s	
Average temperature	17	°C	
Flow rate at discharge conditions	0.75	m³/min	
Flow rate at wet NTP conditions	0.71	m³/min	

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	51	0721-0722	300,000 ou	210,000 ouv/min

Note: A further 1 in 6 dilution was required to bring within the scale of the olfactometer. This ratio is greater than recommended by AS4323.3.

Panel n-butanol threshold 43 ppb

Odour character (hedonic tone) Mildly - very unpleasant

Odour character Yeast, fermentation, sulphide

DDG25: Vent condenser drain

29 January 2007

Flow Results			DDG25
Time of flow tests		0949	hrs
Stack dimensions at sampling plane		340	mm
Velocity at sampling plane		0.32	m/s
Average temperature		27	°C
Flow rate at discharge conditions		1.8	m³/min
Flow rate at wet NTP conditions		1.6	m³/min

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	59	0950-0951	120,000 ou	190,000 ouv/min

Note: A temporary enclosure was constructed over the vent condenser drain. The diameter stated refers to the diameter of the temporary ducting.

Note: The predilution ratio of 1 in 11 is greater than recommended by AS4323.3.

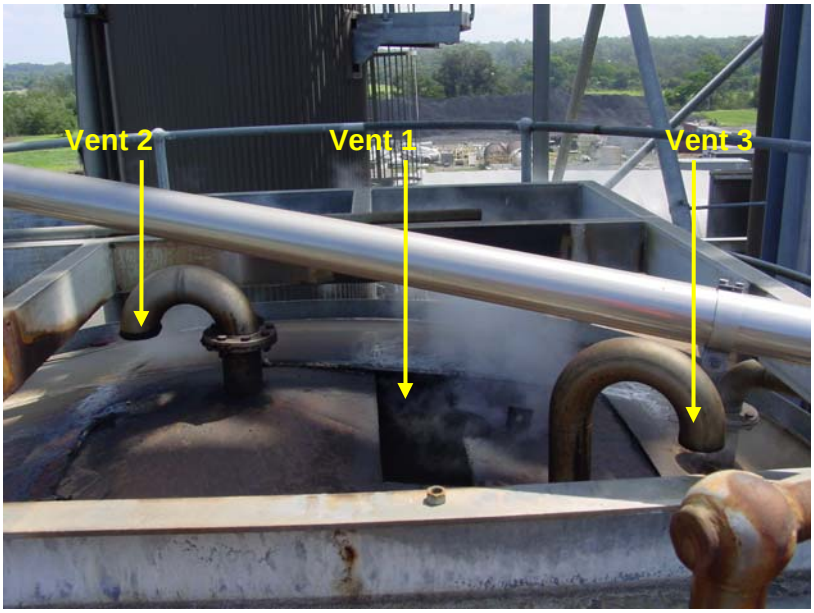
Panel n-butanol threshold 43 ppb

Odour character (hedonic tone) Neutral - mildly unpleasant

Odour character Sweet, bread, grain, rotting grass, yeast

DDG26: Finish feed

29 January 2007



Flow Results			DDG26
Time of flow tests	0825	hrs	
Stack dimensions at sampling plane (vent 1)	790 x 260	mm	
Velocity at sampling plane (vent 1)	0.53	m/s	
Stack dimensions at sampling plane (vent 2)	95	mm	
Velocity at sampling plane (vent 2)	0.5	m/s	
Stack dimensions at sampling plane (vent 3)	105	mm	
Velocity at sampling plane (vent 3)	1.1	m/s	
Average temperature	91	°C	
Flow rate at discharge conditions	7.4	m³/min	
Flow rate at wet NTP conditions	5.5	m³/min	

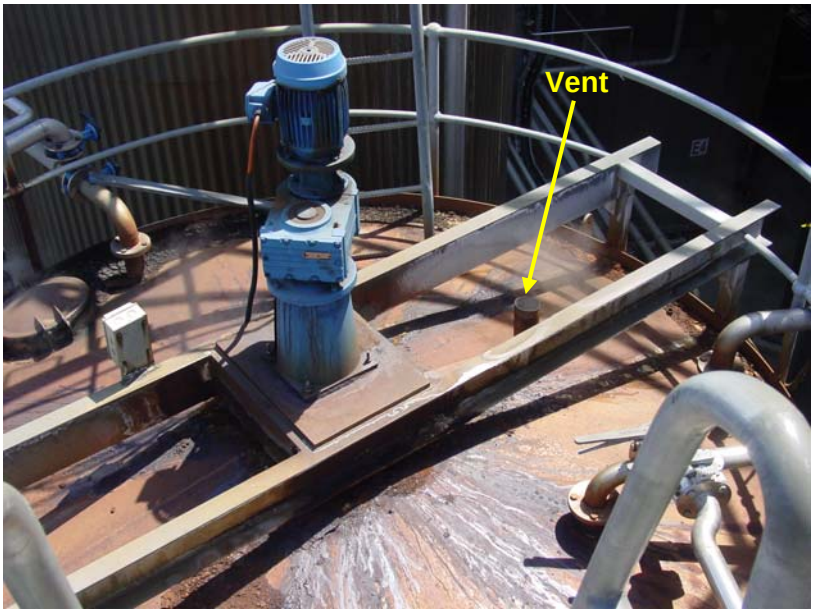
Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	7	0842-0843	200,000 ou	1,100,000 ouv/min

Note: A further 1 in 6 dilution was required to bring within the scale of the olfactometer. This ratio is greater than recommended by AS4323.3.

Panel n-butanol threshold	43 ppb
Odour character (hedonic tone)	Mildly pleasant - very unpleasant
Odour character	Bread, fermentation, sweet, yeast

DDG30: Dryer feed tank

29 January 2007



Flow Results			DDG30
Time of flow tests	0825	hrs	
Stack dimensions at sampling plane	95	mm	
Velocity at sampling plane	2.5	m/s	
Average temperature	96	°C	
Flow rate at discharge conditions	1.1	m³/min	
Flow rate at wet NTP conditions	0.78	m³/min	

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	65	0826-0827	110,000 ou	86,000 ouv/min

Note: A further 1 in 6 dilution was required to bring within the scale of the olfactometer. This ratio is greater than recommended by AS4323.3.

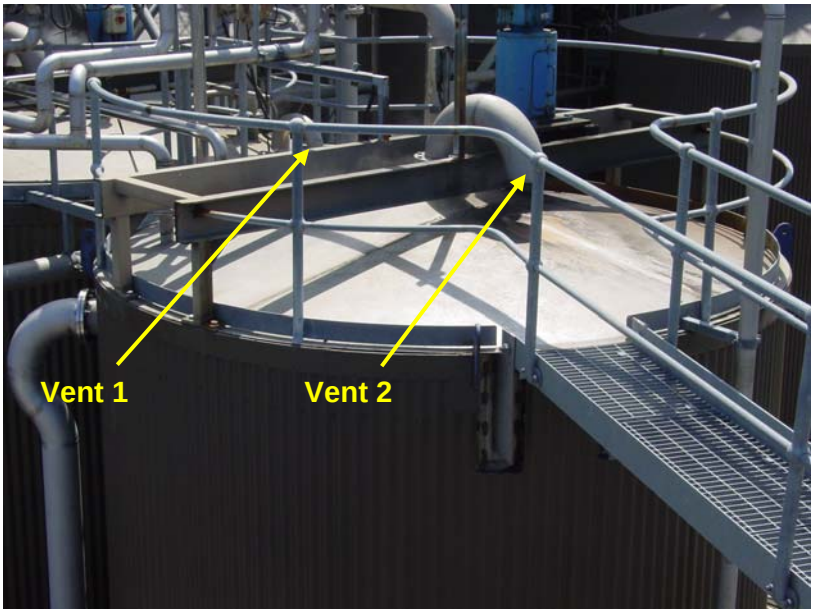
Panel n-butanol threshold 43 ppb

Odour character (hedonic tone) Mildly pleasant – mildly unpleasant

Odour character Toast, sweet, burnt, yeast, bread

DDG31: Syrup holding tank

2 February 2007



Flow Results			DDG31
Time of flow tests	0741	hrs	
Stack dimensions at sampling plane (vent 1)	210	mm	
Velocity at sampling plane (vent 1)	1.0	m/s	
Stack dimensions at sampling plane (vent 2)	95	mm	
Velocity at sampling plane (vent 2)	0.9	m/s	
Average temperature	56	°C	
Flow rate at discharge conditions	2.5	m^3/min	
Flow rate at wet NTP conditions	2.1	m^3/min	

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	28	0746-0747	38,000 ou	79,000 ouv/min

Note: A further 1 in 11 dilution was required to bring within the scale of the olfactometer. This ratio is greater than recommended by AS4323.3.

Panel n-butanol threshold	30 ppb
Odour character (hedonic tone)	Mildly – very unpleasant
Odour character	Vegemite, grain, bread, stale, acrid, solvent

DDG32: Clean in progress (CIP) tank – fresh caustic

29 January 2007

Flow Results			DDG32
Time of flow tests	1141	hrs	
Stack dimensions at sampling plane	105	mm	
Velocity at sampling plane	1.9	m/s	
Average temperature	73	°C	
Flow rate at discharge conditions	0.99	m³/min	
Flow rate at wet NTP conditions	0.78	m³/min	

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	73	1144-1145	32,000 ou	25,000 ouv/min

Panel n-butanol threshold	23 ppb
Odour character (hedonic tone)	Mildly pleasant - mildly unpleasant
Odour character	Yeast, bread, fermentation, sweet

DDG33: Clean in progress (CIP) tank – spent caustic

30 January 2007

Flow Results			DDG33
Time of flow tests		1335	hrs
Stack dimensions at sampling plane		105	mm
Velocity at sampling plane		2.4	m/s
Average temperature		100	°C
Flow rate at discharge conditions		1.2	m³/min
Flow rate at wet NTP conditions		0.91	m³/min

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	4	1325-1326	20,000 ou	18,000 ouv/min

Panel n-butanol threshold	25 ppb
Odour character (hedonic tone)	Very unpleasant
Odour character	Yeast, fermentation, rotten, bread, sour

DDG34: DDG product storage sheds

31 January 2007

Flow Results		
Time of flow tests	0938 to 0948	hrs
Stack dimensions at sampling plane	3000 x 4000	mm
Velocity at sampling plane	1.0	m/s
Average temperature	21	°C
Flow rate at discharge conditions	720	m³/min
Flow rate at wet NTP conditions	670	m³/min

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Downwind)	169	0848-0849	550 ou	370,000 ouv/min
Odour (Upwind)	172	0938-0948	100 ou	67,000 ouv/min

Notes: Upwind sample collected on 29/1/07.

Downwind results not corrected for upwind contribution.

Flow measurements conducted by GHD personnel.

UPWIND

Panel n-butanol threshold 43 ppb

Odour character (hedonic tone) Neutral – mildly unpleasant

Odour character Yeast

DOWNWIND

Panel n-butanol threshold 25 ppb

Odour character (hedonic tone) Neutral - mildly unpleasant

Odour character Earthy, dough, salty, play-dough, gas

DDG35: Load out awning

29 January 2007

Flow Results			DDG35
Time of flow tests	0938 to 0948	hrs	
Stack dimensions at sampling plane	2500 x 1000	mm	
Velocity at sampling plane	1.1	m/s	
Average temperature	22	°C	
Flow rate at discharge conditions	170	m³/min	
Flow rate at wet NTP conditions	150	m³/min	

Odour Results	Sample ID	Sampling Times	Concentration		Mass rate	
Odour (Downwind)	113	0938-0948	120	ou	18,000	ouv/min
Odour (Upwind)	172	0938-0948	100	ou	15,000	ouv/min

Notes: Downwind results not corrected for upwind contribution.
Flow measurements conducted by GHD personnel.

UPWIND

Panel n-butanol threshold	43 ppb
Odour character (hedonic tone)	Neutral – mildly unpleasant
Odour character	Yeast

DOWNWIND

Panel n-butanol threshold	43 ppb
Odour character (hedonic tone)	Neutral - mildly unpleasant
Odour character	Cooked eggs (fresh)

DDG36: DDG tent storage area

29 January 2007

Flow Results			DDG36
Time of flow tests	0958 to 1005	hrs	
Stack dimensions at sampling plane	6000 x 6000	mm	
Velocity at sampling plane	0.65	m/s	
Average temperature	22	°C	
Flow rate at discharge conditions	1,400	m³/min	
Flow rate at wet NTP conditions	1,300	m³/min	

Odour Results	Sample ID	Sampling Times	Concentration		Mass rate	
Odour (Downwind)	1	0958-1005	690	ou	900,000	ouv/min
Odour (Upwind)	172	0938-0948	100	ou	130,000	ouv/min

Notes: Downwind results not corrected for upwind contribution.
Flow measurements conducted by GHD personnel.

UPWIND

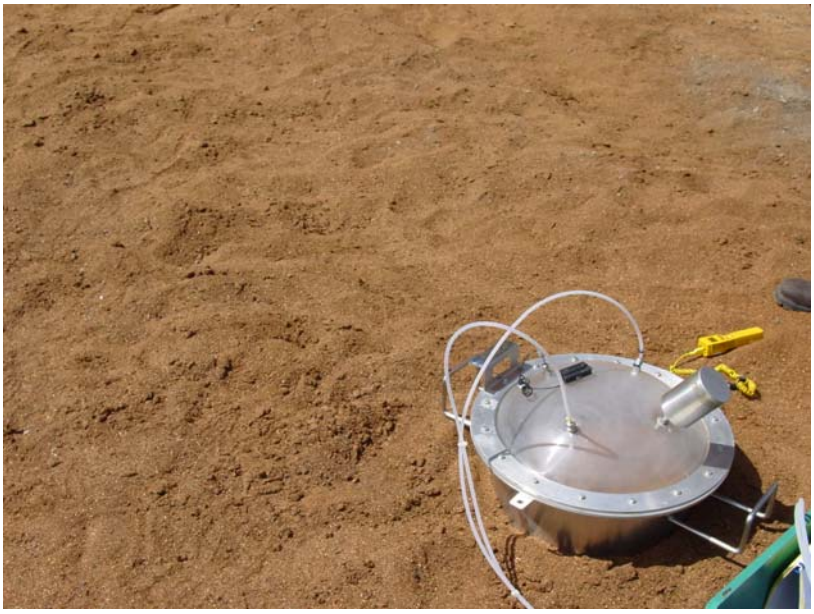
Panel n-butanol threshold	43 ppb
Odour character (hedonic tone)	Neutral – mildly unpleasant
Odour character	Yeast

DOWNWIND

Panel n-butanol threshold	23 ppb
Odour character (hedonic tone)	Neutral
Odour character	Sour, stale

DDG37: Grounds

29 January 2007

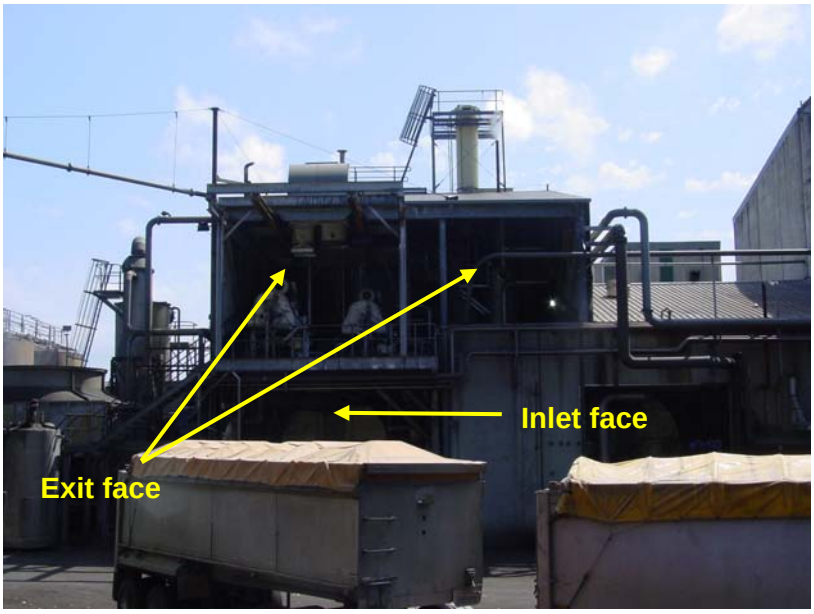


Location DDG37	DDG37 (outside load out awning)
Date tested	29/01/2007
Equilibration time, hrs	1028 - 1104
Sample ID	176
Dilution ratio	Nil
Sampling time, hrs	1104 - 1111
odour concentration, ou	**1800**
odour flux rate, ou/m²/min	**61**
Surface temperature (°C)	29.2
Chamber temperature (°C)	42.3
Ambient temperature (°C)	29.3

Panel n-butanol threshold	23 ppb
Odour character (hedonic tone)	Neutral –mildly pleasant
Odour character	Hay, chicken feed, grain, grass, fermentation

DDG39: Dryer building

31 January 2007



Flow Results			DDG39
Time of flow tests	0709 to 0719	hrs	
Stack dimensions at sampling plane	5000 x 11000	mm	
Velocity at sampling plane	0.77	m/s	
Average temperature	27	°C	
Flow rate at discharge conditions	2,500	m³/min	
Flow rate at wet NTP conditions	2,300	m³/min	

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	105	0709-0717	830 ou	1,900,000 ouv/min

Panel n-butanol threshold	25 ppb
Odour character (hedonic tone)	Mildly pleasant - very unpleasant
Odour character	Grain, yeast, vegemite, vita-weets, acidic, vomit

DDG40: Kestner dryer exhaust

2 February 2007

Flow Results			DDG40
Time of flow tests	0830	hrs	
Stack dimensions at sampling plane	870 x 760	mm	
Velocity at sampling plane	7.5	m/s	
Average temperature	56	°C	
Flow rate at discharge conditions	300	m³/min	
Flow rate at wet NTP conditions	250	m³/min	

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	79	0842-0844	710 ou	180,000 ouv/min

Panel n-butanol threshold	30 ppb
Odour character (hedonic tone)	Mildly pleasant – mildly unpleasant
Odour character	Sour, grain, stale

DDG44: DDG condenser water recovery tank

29 January 2007

Flow Results			DDG44
Time of flow tests	1406	hrs	
Stack dimensions at sampling plane	330	mm	
Velocity at sampling plane	1.9	m/s	
Average temperature	28	°C	
Flow rate at discharge conditions	9.9	m³/min	
Flow rate at wet NTP conditions	8.9	m³/min	

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	79	1401-1402	12,000 ou	110,000 ouv/min

Note: A temporary enclosure was constructed over the vent condenser drain. The diameter stated refers to the diameter of the temporary ducting

Panel n-butanol threshold	23 ppb
Odour character (hedonic tone)	Mildly pleasant - pleasant
Odour character	Yeast, rye bread, bread, flour, sweet, fermentation

DDG45: DDG heat exchanger

29 January 2007

Flow Results			DDG45
Time of flow tests	1406	hrs	
Stack dimensions at sampling plane	-*	mm	
Velocity at sampling plane	4.1	m/s	
Average temperature	36	°C	
Flow rate at discharge conditions	4.7	m³/min	
Flow rate at wet NTP conditions	4.1	m³/min	

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	14	1405-1406	34,000 ou	140,000 ouv/min

* The exit face was an annulus with an inner diameter of 40mm and an outer diameter of 160mm. The diameter reported is an equivalent diameter.

Panel n-butanol threshold 23 ppb

Odour character (hedonic tone) Mildly pleasant - pleasant

Odour character Vegemite, vita-weets, bread, flour, sweet, fermentation

F1: Mixer tank vents

31 January 2007

Flow Results		
Time of flow tests	1520	hrs
Stack dimensions at sampling plane	-*	mm
Velocity at sampling plane	2.8	m/s
Average temperature	26	°C
Flow rate at discharge conditions	46	m³/min
Flow rate at wet NTP conditions	42	m³/min

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	163	1241-1247	210,000 ou	8,800,000 ouv/min

* Sampling conducted on the open area shown in the right photograph above. Flow rate calculated assuming the two inaccessible openings (left photo) were 150mm and 400mm in diameter and had the same average exit velocity as the open area measured. Odour mass rate calculated using the total flow rate (42 m^3/min) calculated from the sum of all three openings.

Note: A further 1 in 121 dilution was required to bring within the scale of the olfactometer. This ratio is greater than recommended by AS4323.3.

Panel n-butanol threshold	30 ppb
Odour character (hedonic tone)	Very unpleasant
Odour character	Rotten, stale, grain, fermentation, sour

F3: Pond 2

30 January 2007

Location F3	Pond 2
GPS co-ordinates	150.6295°E, 34.84594°S
Date tested	30/01/2007
Equilibration time, hrs	0738 - 0808
Sample ID	93
Dilution ratio	1 in 6
Sampling time, hrs	0804 - 0806
Odour concentration, ou	**3800**
Odour flux rate, ou/m²/min	**140**
Surface temperature (°C)	25.6
Chamber temperature (°C)	26.2
Ambient temperature (°C)	23.5

Panel n-butanol threshold	22 ppb
Odour character (hedonic tone)	Mildly pleasant - mildly unpleasant
Odour character	Alcohol, yeast, sweet, sugar, garden waste

F4: Pond 3

30 January 2007

Location F4	Pond 3
GPS co-ordinates	150.62983°E, 34.84655°S
Date tested	30/01/2007
Equilibration time, hrs	1209 - 1239
Sample ID	77
Dilution ratio	1 in 6
Sampling time, hrs	1239 - 1241
Odour concentration, ou	**13000**
Odour flux rate, ou/m²/min	**470**
Surface temperature (°C)	32.7
Chamber temperature (°C)	34.9
Ambient temperature (°C)	28.6

Panel n-butanol threshold	25 ppb
Odour character (hedonic tone)	Mildly pleasant – mildly unpleasant
Odour character	Bread, yeast, fermentation, alcohol

F5: Pond 4

30 January 2007

Location	F5 Pond 4	
GPS co-ordinates	150.62983°E, 34.84655°S	
Date tested	30/01/2007	
Equilibration time, hrs	1222 - 1247	
Sample identification	44	56
Sample dilution	1 in 6	1 in 6
Sampling time, hrs	1247 - 1249	1249 - 1251
Odour concentration, ou	16000	9600
Average odour concentration, ou	**13000**	
Average odour flux rate, ou/m²/min	**450**	
Surface temperature (°C)	33.5	
Chamber temperature (°C)	38.1	
Ambient temperature (°C)	32.1	

Panel n-butanol threshold	25 ppb
Odour character (hedonic tone)	Mildly – very unpleasant
Odour character	Yeast, chemical, beer, rotten

F9: Pivot (mist nozzle) – upwind and downwind

31 January 2007

Flow Results			F9
Time of flow tests	1327 to 1337	hrs	
Stack dimensions at sampling plane	420000 x 1500	mm	
Velocity at sampling plane	3.3	m/s	
Average temperature	20	°C	
Flow rate at discharge conditions	120,000	m³/min	
Flow rate at wet NTP conditions	120,000	m³/min	

Odour Results	Sample ID	Sampling Times	Concentration		Mass rate	
Odour (Downwind)	39	1327-1332	590	ou	68,000,000	ouv/min
	165	1332-1337	640	ou	74,000,000	ouv/min
Average Results			**610**	**ou**	**71,000,000**	**ouv/min**
Odour (Upwind)	92	1326-1339	47	ou	5,500,000	ouv/min

Notes: Downwind results not corrected for upwind contribution.
Flow measurements conducted by GHD personnel.
Photograph taken 30/1/07.

UPWIND

Panel n-butanol threshold 30 ppb
Odour character (hedonic tone) Neutral
Odour character No discernable odour, grass, alcohol

DOWNWIND

Panel n-butanol threshold 30 ppb
Odour character (hedonic tone) Mildly pleasant – mildly unpleasant
Odour character Fermentation, grain, yeast, sweet, alcohol

F10: Pivot (non-mist nozzle) – upwind and downwind

30 January 2007

No photograph taken

Flow Results			F10
Time of flow tests	1330 to 1353	hrs	
Stack dimensions at sampling plane	420000 x 1500	mm	
Velocity at sampling plane	4.2	m/s	
Average temperature	27	°C	
Flow rate at discharge conditions	160,000	m³/min	
Flow rate at wet NTP conditions	140,000	m³/min	

Odour Results	Sample ID	Sampling Times	Concentration		Mass rate	
Odour (Downwind)	34	1330-1337	260	ou	37,000,000	ouv/min
	104	1348-1353	290	ou	41,000,000	ouv/min
Average Results			**270**	**ou**	**39,000,000**	**ouv/min**
Odour (Upwind)	130	1330-1337	79	ou	11,000,000	ouv/min
	42	1348-1353	94	ou	14,000,000	ouv/min
Average Results			**87**	**ou**	**12,000,000**	**ouv/min**

Notes: Downwind results not corrected for upwind contribution.
Flow measurements conducted by GHD personnel.

UPWIND

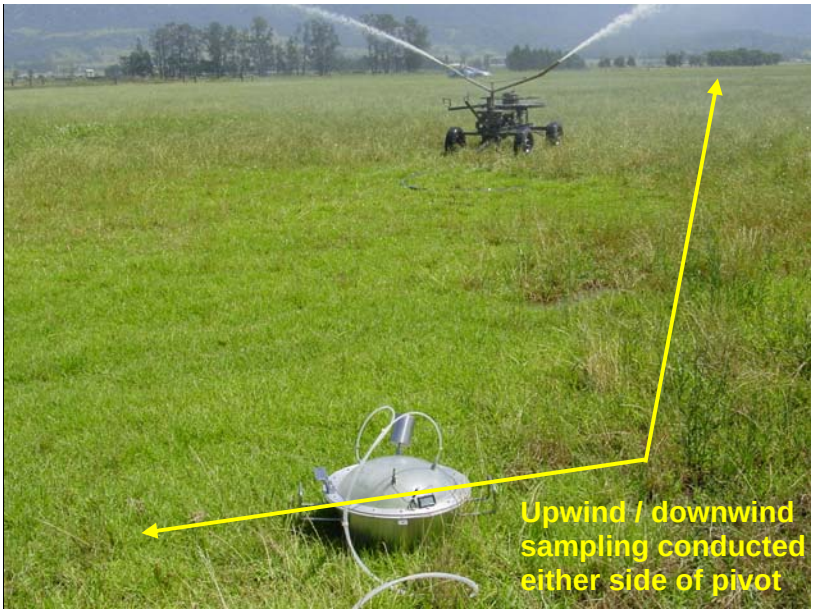
Panel n-butanol threshold	22 ppb
Odour character (hedonic tone)	Neutral – mildly pleasant
Odour character	Grass, sweet, rotten, garden waste, grass clippings

DOWNWIND

Panel n-butanol threshold	22 ppb
Odour character (hedonic tone)	Mildly pleasant – mildly unpleasant
Odour character	Bread, yeast, sweet, grass, grass clippings, rotten

F11: Traveller – upwind and downwind

30 January 2007



Flow Results			F11
Time of flow tests	1118 to 1124	hrs	
Stack dimensions at sampling plane	4000 x 20000	mm	
Velocity at sampling plane	2.0	m/s	
Average temperature	26	°C	
Flow rate at discharge conditions	9,600	m³/min	
Flow rate at wet NTP conditions	8,700	m³/min	

Odour Results	Sample ID	Sampling Times	Concentration		Mass rate	
Odour (Downwind)	2	1118-1124	230	ou	2,000,000	ouv/min
Odour (Upwind)	60	1118-1124	47	ou	410,000	ouv/min

Notes: Downwind results not corrected for upwind contribution.
Flow measurements conducted by GHD personnel.

UPWIND

Panel n-butanol threshold	22 ppb
Odour character (hedonic tone)	Mildly pleasant – mildly unpleasant
Odour character	No discernable odour, cow manure, grass clippings

DOWNWIND

Panel n-butanol threshold	22 ppb
Odour character (hedonic tone)	Mildly pleasant – mildly unpleasant
Odour character	Bread, yeast, alcohol, sweet, grass clippings

F12: Pivot (sopper) – wet grass

30 January 2007

Location F12	Sopper wet grass
GPS co-ordinates	150.66871°E, 34.82552°S
Date tested	30/01/2007
Equilibration time, hrs	0944 - 1008
Sample ID	184
Dilution ratio	1in 2
Sampling time, hrs	1008 - 1013
Odour concentration, ou	**320**
Odour flux rate, ou/m²/min	**11**
Surface temperature (°C)	21.5
Chamber temperature (°C)	42.8
Ambient temperature (°C)	26.8

Panel n-butanol threshold	22 ppb
Odour character (hedonic tone)	Mildly pleasant – mildly unpleasant
Odour character	Stale, beer, grass, rotten, grass clippings

F13: Traveller – wet grass

30 January 2007

Location F13	Traveller wet grass
GPS co-ordinates	150.63438°E, 34.84113°S
Date tested	30/01/2007
Equilibration time, hrs	1057 - 1125
Sample ID	63
Dilution ratio	1 in 2
Sampling time, hrs	1125 - 1129
Odour concentration, ou	**780**
Odour flux rate, ou/m²/min	**27**
Surface temperature (°C)	29.5
Chamber temperature (°C)	44.6
Ambient temperature (°C)	27.3

Panel n-butanol threshold	22 ppb
Odour character (hedonic tone)	Mildly pleasant - mildly unpleasant
Odour character	Sweet, alcohol, fermentation, grass, rotten, garden waste

F14: Pivot 2 (mist nozzle) – wet grass

30 January 2007

Location	Pivot 2 (mist nozzles) wet grass
GPS co-ordinates	150.63671°E, 34.83779°S
Date tested	30/01/2007
Equilibration time, hrs	0838 - 902
Sample ID	13
Dilution ratio	1 in 2
Sampling time, hrs	0902 - 0907
Odour concentration, ou	**280**
Odour flux rate, ou/m²/min	**9.9**
Surface temperature (°C)	21.8
Chamber temperature (°C)	36.7
Ambient temperature (°C)	26.4

Panel n-butanol threshold	22 ppb
Odour character (hedonic tone)	Mildly pleasant - mildly unpleasant
Odour character	Sour, yeast, alcohol, sweet, grass, rotten

F15: Pivot 2 (mist nozzles) – dry grass

30 January 2007

Location F15	Pivot 2 (mist nozzles) Dry grass
GPS co-ordinates	150.63673°E, 34.3742°S
Date tested	30/01/2007
Equilibration time, hrs	0827 - 853
Sample ID	9
Dilution ratio	1 in 2
Sampling time, hrs	0853 - 0857
Odour concentration, ou	**320**
Odour flux rate, ou/m²/min	**11**
Surface temperature (°C)	21.6
Chamber temperature (°C)	34.7
Ambient temperature (°C)	25.6

Panel n-butanol threshold	22 ppb
Odour character (hedonic tone)	Neutral – mildly pleasant
Odour character	Sweet, grass, rotten, grass clippings

F16: Non irrigated land

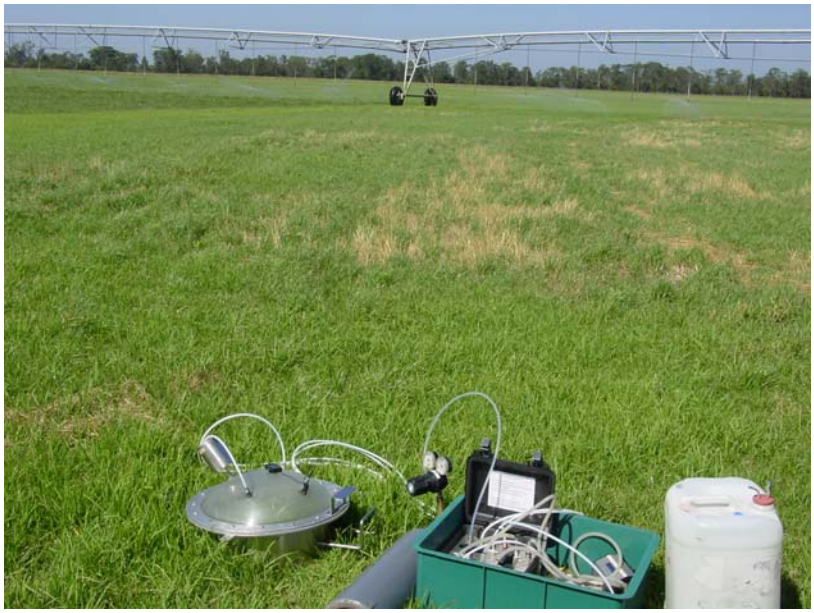
30 January 2007

Location F16	Non irrigated land
GPS co-ordinates	150.62754°E, 34.8493°S
Date tested	30/01/2007
Equilibration time, hrs	0710 - 0746
Sample ID	155
Dilution ratio	Nil
Sampling time, hrs	0746 - 0752
Odour concentration, ou	**230**
Odour flux rate, ou/m²/min	**8.1**
Surface temperature (°C)	21.5
Chamber temperature (°C)	21.0
Ambient temperature (°C)	20.2

Panel n-butanol threshold	22 ppb
Odour character (hedonic tone)	Neutral – mildly pleasant
Odour character	Earth, sweet, grass, rotten, grass clippings

F17: Pivot (sopper) – dry grass

30 January 2007

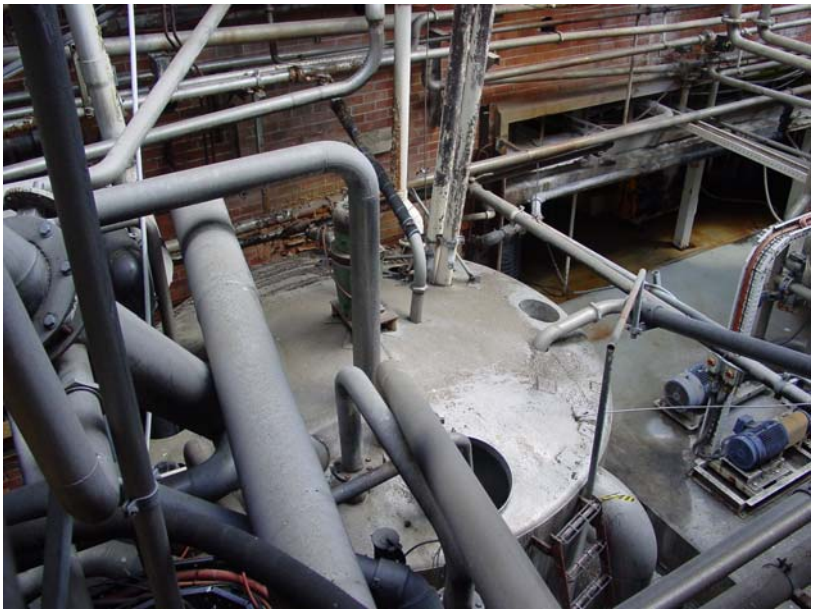


Location F17	Sopper dry grass
GPS co-ordinates	150.66957°E, 34.82517°S
Date tested	30/01/2007
Equilibration time, hrs	0954 - 1021
Sample ID	153
Dilution ratio	1 in 2
Sampling time, hrs	1021 - 1026
Odour concentration, ou	**300**
Odour flux rate, ou/m²/min	**11**
Surface temperature (°C)	21.4
Chamber temperature (°C)	40.9
Ambient temperature (°C)	27.4

Panel n-butanol threshold	22 ppb
Odour character (hedonic tone)	Mildly pleasant
Odour character	Grass, sweet, rotten

F18: Drains

2 February 2007



Flow Results			F18
Time of flow tests	1155	hrs	
Stack dimensions at sampling plane	330	mm	
Velocity at sampling plane	3.3	m/s	
Average temperature	28	°C	
Flow rate at discharge conditions	17	m^3/min	
Flow rate at wet NTP conditions	15	m^3/min	

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	135	1157-1158	30,000 ou	460,000 ouv/min

Note: The tank had multiple outlets. All outlets except 1 were sealed and air extracted using a fan and temporary ducting. Sampling was conducted on the outlet of the temporary ducting. The diameter stated refers to the diameter of the temporary ducting.

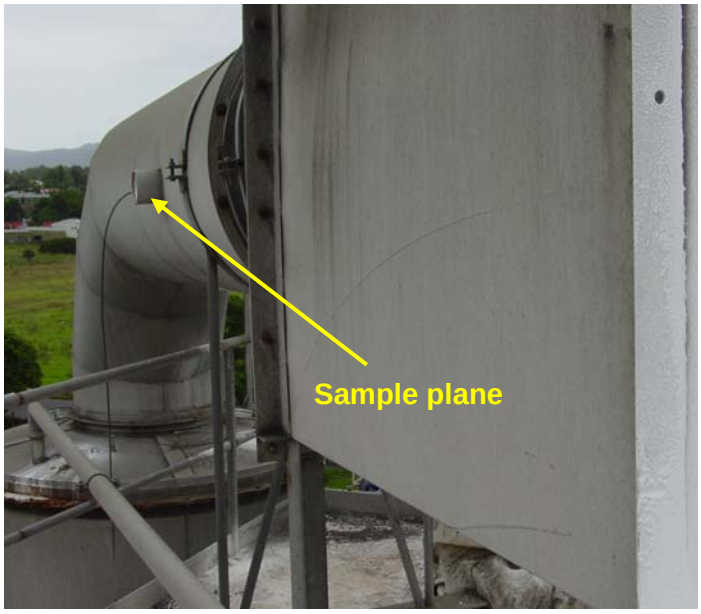
Panel n-butanol threshold 30 ppb

Odour character (hedonic tone) Mildly unpleasant

Odour character Bread, fermentation, beer, sour, stale, grains

S1: No. 1 starch dryer

1 February 2007



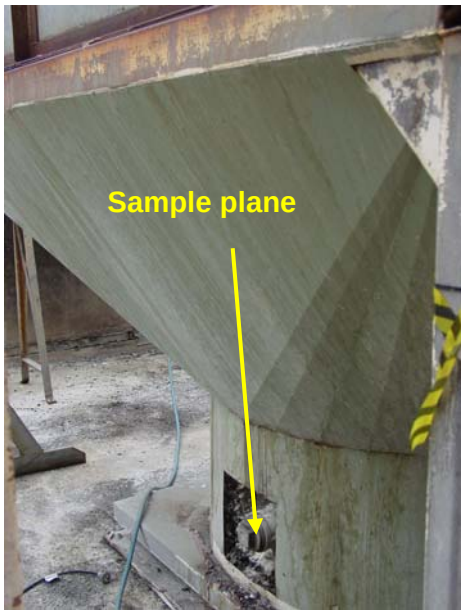
Flow Results		S1
Time of flow tests	1023	hrs
Stack dimensions at sampling plane	880	mm
Velocity at sampling plane	16	m/s
Average temperature	45	°C
Flow rate at discharge conditions	600	m³/min
Flow rate at wet NTP conditions	520	m³/min

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	134	1027-1028	380 ou	190,000 ouv/min

Panel n-butanol threshold	26 ppb
Odour character (hedonic tone)	Neutral
Odour character	Bread

S2: No. 1 gluten dryer baghouse

31 January 2007



Flow Results		S2
Time of flow tests	0940	hrs
Stack dimensions at sampling plane	1340	mm
Velocity at sampling plane	14	m/s
Average temperature	74	°C
Flow rate at discharge conditions	1,200	m³/min
Flow rate at wet NTP conditions	940	m³/min

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	17	0944-0945	1,500 ou	1,400,000 ouv/min
	52	0946-0947	3,300 ou	3,100,000 ouv/min
Average Results			**2,400 ou**	**2,300,000 ouv/min**

Panel n-butanol threshold	25 ppb
Odour character (hedonic tone)	Neutral - mildly unpleasant
Odour character	Grain, flour, dough, fertiliser, blood and bone

S3: No. 3 gluten dryer baghouse

31 January 2007

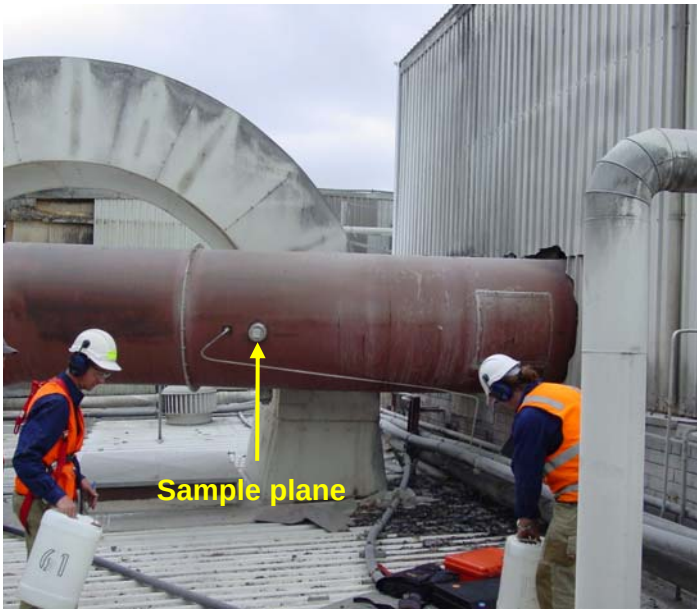
Flow Results	S3	
Time of flow tests	0809	hrs
Stack dimensions at sampling plane	2100 x 2400	mm
Velocity at sampling plane	7.2	m/s
Average temperature	67	°C
Flow rate at discharge conditions	2,200	m³/min
Flow rate at wet NTP conditions	1,700	m³/min

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	171	748-749	2,500 ou	4,400,000 ouv/min

Panel n-butanol threshold	25 ppb
Odour character (hedonic tone)	Mildly pleasant - mildly unpleasant
Odour character	Stale, flour

S4: No. 2 gluten dryer baghouse

31 January 2007



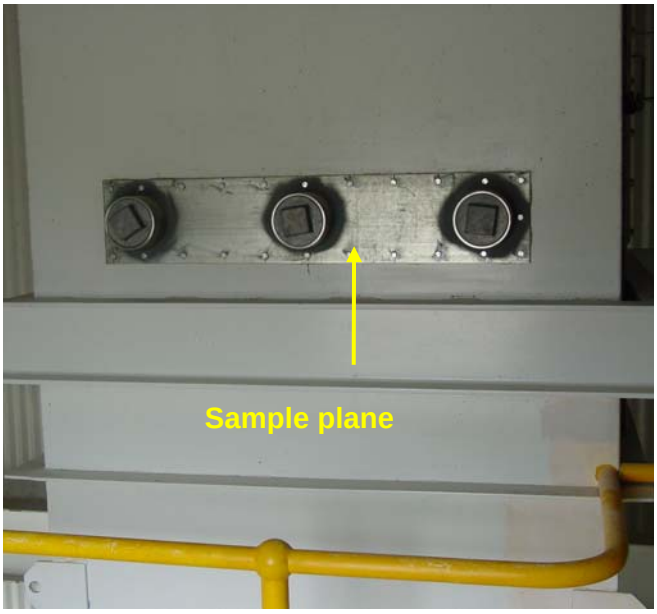
Flow Results			S4
Time of flow tests	1025	hrs	
Stack dimensions at sampling plane	1200	mm	
Velocity at sampling plane	14	m/s	
Average temperature	55	°C	
Flow rate at discharge conditions	960	m³/min	
Flow rate at wet NTP conditions	740	m³/min	

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	61	1015-1017	1,400 ou	1,100,000 ouv/min

Panel n-butanol threshold	25 ppb
Odour character (hedonic tone)	Neutral - mildly unpleasant
Odour character	Flour, dough, fertiliser, blood and bone

S5: No. 4 gluten dryer baghouse

31 January 2007



Flow Results			S5
Time of flow tests	1042	hrs	
Stack dimensions at sampling plane	1690 x 1390	mm	
Velocity at sampling plane	17	m/s	
Average temperature	77	°C	
Flow rate at discharge conditions	2,300	m³/min	
Flow rate at dry NTP conditions	1,800	m³/min	

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	121	1054-1055	5,000 ou	9,000,000 ouv/min

Panel n-butanol threshold	25 ppb
Odour character (hedonic tone)	Neutral - mildly unpleasant
Odour character	Grain, livestock feed, dough, salty, play-dough, fertiliser, blood and bone

S6: Flour bin motor drive

31 January 2007

Flow Results		
Time of flow tests	0728	hrs
Stack dimensions at sampling plane	285 x 200	mm
Velocity at sampling plane	18	m/s
Average temperature	34	°C
Flow rate at discharge conditions	60	m³/min
Flow rate at wet NTP conditions	54	m³/min

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	151	0733-0734	320 ou	17,000 ouv/min

Panel n-butanol threshold	25 ppb
Odour character (hedonic tone)	Neutral
Odour character	No discernable odour, gas

S7: Dry gluten roof bin

31 January 2007

Flow Results		S7
Time of flow tests	0826	hrs
Stack dimensions at sampling plane	470 x 710	mm
Velocity at sampling plane	15	m/s
Average temperature	55	°C
Flow rate at discharge conditions	300	m³/min
Flow rate at wet NTP conditions	250	m³/min

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	144	0833-0834	1,100 ou	270,000 ouv/min

Panel n-butanol threshold	25 ppb
Odour character (hedonic tone)	Neutral - very unpleasant
Odour character	Garden waste, flour, rotten, compost

S8: High protein dust collector

31 January 2007

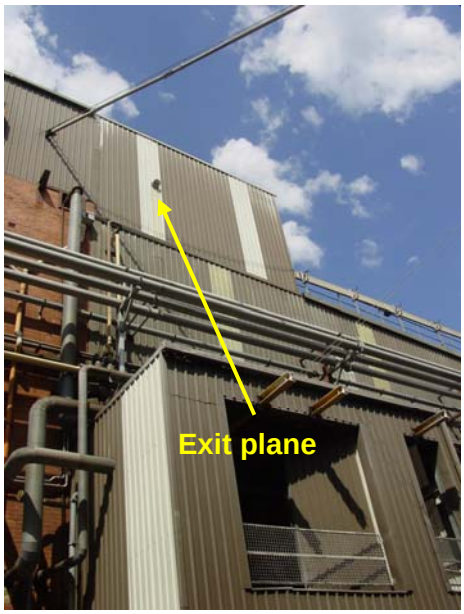
Flow Results			S8
Time of flow tests	0714	hrs	
Stack dimensions at sampling plane	520 x 225	mm	
Velocity at sampling plane	12	m/s	
Average temperature	43	°C	
Flow rate at discharge conditions	85	m^3/min	
Flow rate at wet NTP conditions	73	m^3/min	

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	62	0717-0718	490 ou	36,000 ouv/min

Panel n-butanol threshold	25 ppb
Odour character (hedonic tone)	Neutral
Odour character	Stale

S9: Pre-separator

2 February 2007



Flow Results			S9
Time of flow tests	0715	hrs	
Stack dimensions at sampling plane	250	mm	
Velocity at sampling plane	16	m/s	
Average temperature	43	°C	
Flow rate at discharge conditions	46	m³/min	
Flow rate at wet NTP conditions	40	m³/min	

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	30	0722-0723	150 ou	5,800 ouv/min

Panel n-butanol threshold	30 ppb
Odour character (hedonic tone)	Neutral – pleasant
Odour character	Chicken feed, flour, sweet, boiled sweets

S10: Flour bin

1 February 2007

Flow Results			S10
Time of flow tests	1039	hrs	
Stack dimensions at sampling plane	170 x 350	mm	
Velocity at sampling plane	25	m/s	
Average temperature	34	°C	
Flow rate at discharge conditions	90	m³/min	
Flow rate at wet NTP conditions	81	m³/min	

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	57	1040-1046	100 ou	8,200 ouv/min

Panel n-butanol threshold	26 ppb
Odour character (hedonic tone)	Neutral – mildly pleasant
Odour character	Dry grass, bread, flour, nutty

S11: Coarse bin

31 January 2007

Flow Results			S11
Time of flow tests	1150	hrs	
Stack dimensions at sampling plane	150 x 150	mm	
Velocity at sampling plane	10	m/s	
Average temperature	37	°C	
Flow rate at discharge conditions	14	m^3/min	
Flow rate at wet NTP conditions	12	m^3/min	

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	115	1146-1147	< 200 ou	< 2,000 ouv/min

Panel n-butanol threshold	30 ppb
Odour character (hedonic tone)	Neutral – mildly unpleasant
Odour character	Rubber, stale, grain

S12: Pellet silo

31 January 2007

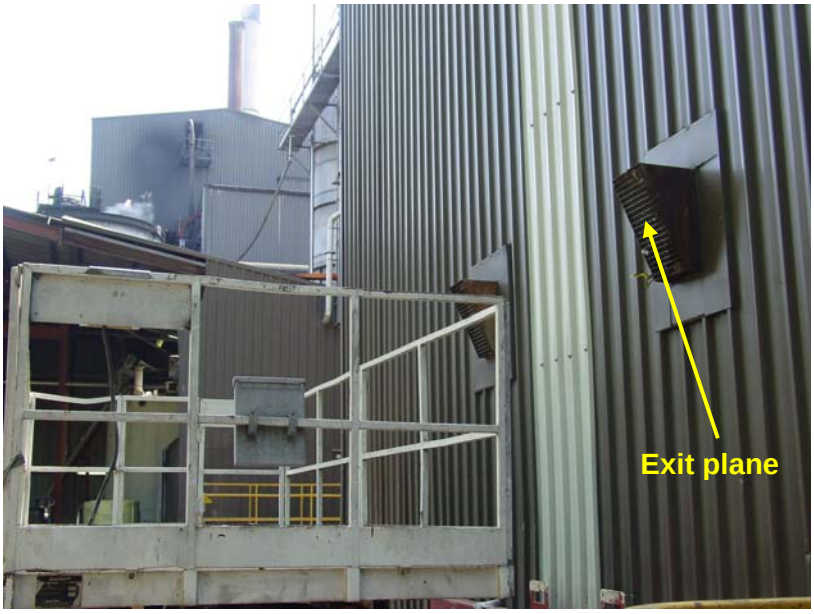
Flow Results			S12
Time of flow tests	1122	hrs	
Stack dimensions at sampling plane	360 x 225	mm	
Velocity at sampling plane	25	m/s	
Average temperature	31	°C	
Flow rate at discharge conditions	120	m³/min	
Flow rate at wet NTP conditions	110	m³/min	

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	76	1111-1117	190 ou	21,000 ouv/min

Panel n-butanol threshold	30 ppb
Odour character (hedonic tone)	Neutral – mildly unpleasant
Odour character	Stale, earthy, cattle, meat

S13: Flour bin aspirator

30 January 2007



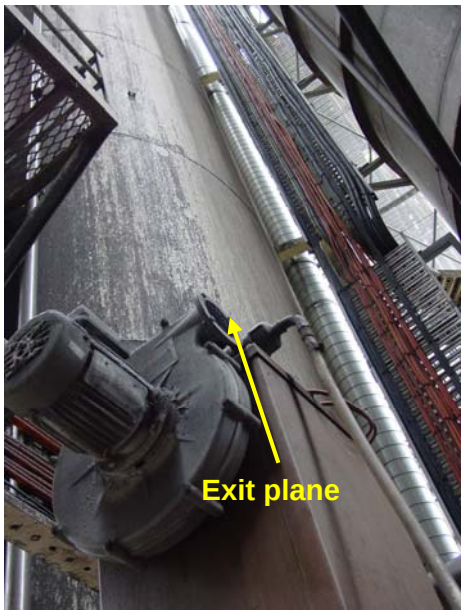
Flow Results			S13
Time of flow tests	1406	hrs	
Stack dimensions at sampling plane	260 x 505	mm	
Velocity at sampling plane	22	m/s	
Average temperature	33	°C	
Flow rate at discharge conditions	180	m³/min	
Flow rate at wet NTP conditions	160	m³/min	

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	37	1409-1410	190 ou	30,000 ouv/min

Panel n-butanol threshold	25 ppb
Odour character (hedonic tone)	Neutral – mildly unpleasant
Odour character	Yeast, earthy, bread, dough

S14: Day bin transfer baghouse

31 January 2007



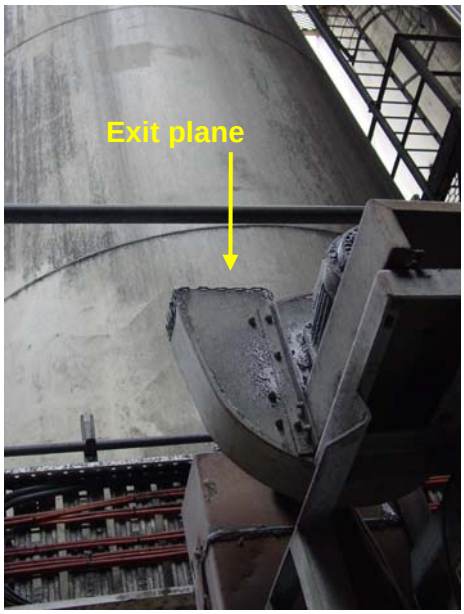
Flow Results			S14
Time of flow tests	1222	hrs	
Stack dimensions at sampling plane	90	mm	
Velocity at sampling plane	9.6	m/s	
Average temperature	29	°C	
Flow rate at discharge conditions	3.7	m³/min	
Flow rate at wet NTP conditions	3.3	m³/min	

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	55	1224-1230	66 ou	220 ouv/min

Panel n-butanol threshold	30 ppb
Odour character (hedonic tone)	Neutral
Odour character	Dough, flour

S15: Coarse gluten transfer baghouse

2 February 2007



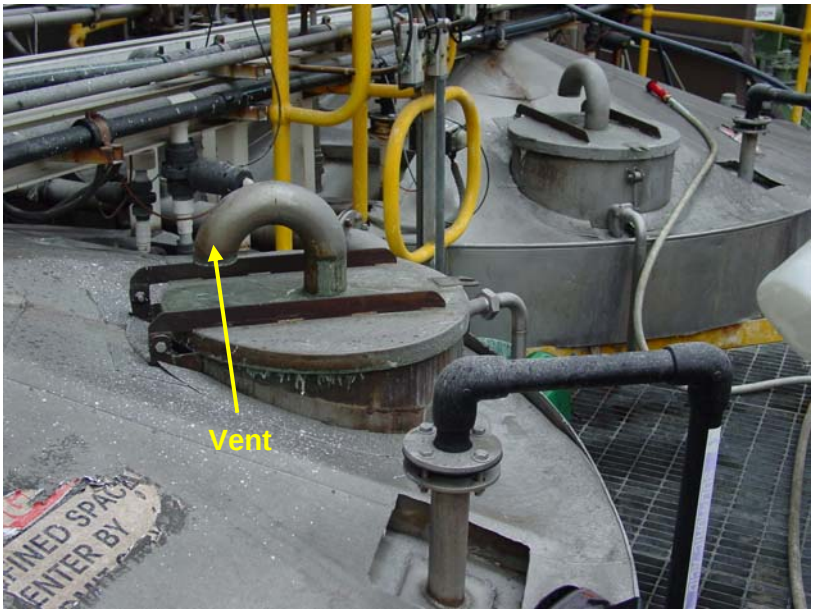
Flow Results			S15
Time of flow tests	1216	hrs	
Stack dimensions at sampling plane	170 x 100	mm	
Velocity at sampling plane	2.4	m/s	
Average temperature	35	°C	
Flow rate at discharge conditions	2.5	m³/min	
Flow rate at wet NTP conditions	2.2	m³/min	

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	166	1217-1225	520 ou	1,100 ouv/min

Panel n-butanol threshold	30 ppb
Odour character (hedonic tone)	Pleasant – mildly unpleasant
Odour character	Chicken feed, biscuits

S17: Starch reaction tank

31 January 2007



Flow Results			S17
Time of flow tests		1352	hrs
Stack dimensions at sampling plane		95	mm
Velocity at sampling plane	<	0.4	m/s
Average temperature		24	°C
Flow rate at discharge conditions	<	0.2	m³/min
Flow rate at wet NTP conditions	<	0.2	m³/min

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	142	1410-1416	38 ou	< 6 ouv/min

Panel n-butanol threshold	30 ppb
Odour character (hedonic tone)	Neutral – mildly unpleasant
Odour character	No discernable odour, cattle, meat

S18: No. 3 starch dryer

31 January 2007

Flow Results			S18
Time of flow tests	1315	hrs	
Stack dimensions at sampling plane	1100 x 1100	mm	
Velocity at sampling plane	23	m/s	
Average temperature	45	°C	
Flow rate at discharge conditions	1,600	m³/min	
Flow rate at wet NTP conditions	1,400	m³/min	

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	27	1329-1332	230 ou	330,000 ouv/min

Panel n-butanol threshold	30 ppb
Odour character (hedonic tone)	Neutral
Odour character	Rubber, cattle, bread, flour

S19: No. 4 starch dryer (Test 1)

31 January 2007

Flow Results			S19
Time of flow tests	1319	hrs	
Stack dimensions at sampling plane	1100 x 1100	mm	
Velocity at sampling plane	23	m/s	
Average temperature	44	°C	
Flow rate at discharge conditions	1,700	m³/min	
Flow rate at wet NTP conditions	1,400	m³/min	

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	32	1336-1338	130 ou	190,000 ouv/min

Panel n-butanol threshold	30 ppb
Odour character (hedonic tone)	Neutral – mildly unpleasant
Odour character	Meat, fermentation, grass

S19: No. 4 starch dryer (Test 2)

2 February 2007

Flow Results			S19
Time of flow tests	0955	hrs	
Stack dimensions at sampling plane	1100 x 1100	mm	
Velocity at sampling plane	21	m/s	
Average temperature	46	°C	
Flow rate at discharge conditions	1,500	m³/min	
Flow rate at wet NTP conditions	1,300	m³/min	

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	100	0950-0952	470 ou	610,000 ouv/min

Panel n-butanol threshold	30 ppb
Odour character (hedonic tone)	Neutral – mildly unpleasant
Odour character	Sour, stale, rotten, sweet, fermentation

S20: Spray dryer

31 January 2007

Flow Results			S20
Time of flow tests	1352	hrs	
Stack dimensions at sampling plane	1200 x 1200	mm	
Velocity at sampling plane	6.8	m/s	
Average temperature	62	°C	
Flow rate at discharge conditions	590	m³/min	
Flow rate at wet NTP conditions	480	m³/min	

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	45	1342-1348	120 ou	59,000 ouv/min

Panel n-butanol threshold	30 ppb
Odour character (hedonic tone)	Neutral
Odour character	No discernable odour

C1: Flash vessel for jet cooker

31 January 2007

Flow Results			C1
Average temperature	77	°C	
Flow rate at discharge conditions	0.20	m³/min	
Flow rate at wet NTP conditions	0.16	m³/min	

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	182	0900-0902	7,300 ou	1,100 ouv/min

Note: Flow rate calculated based upon a vessel fill rate of 12,000 litres per hour.

Panel n-butanol threshold 25 ppb

Odour character (hedonic tone) Neutral – mildly unpleasant

Odour character Sawdust, dough, salty, play-dough, plasticine

C2: Sach tank

1 February 2007

Flow Results			C2
Time of flow tests	0911	hrs	
Stack dimensions at sampling plane	95	mm	
Velocity at sampling plane	0.30	m/s	
Average temperature	20	°C	
Flow rate at discharge conditions	0.13	m³/min	
Flow rate at wet NTP conditions	0.12	m³/min	

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	40	0914-0920	2,200 ou	260 ouv/min

Panel n-butanol threshold	26 ppb
Odour character (hedonic tone)	Neutral – mildly pleasant
Odour character	Cattle, stock-feed, walnuts, nutty

C4: Drum vacuum receiver

31 January 2007

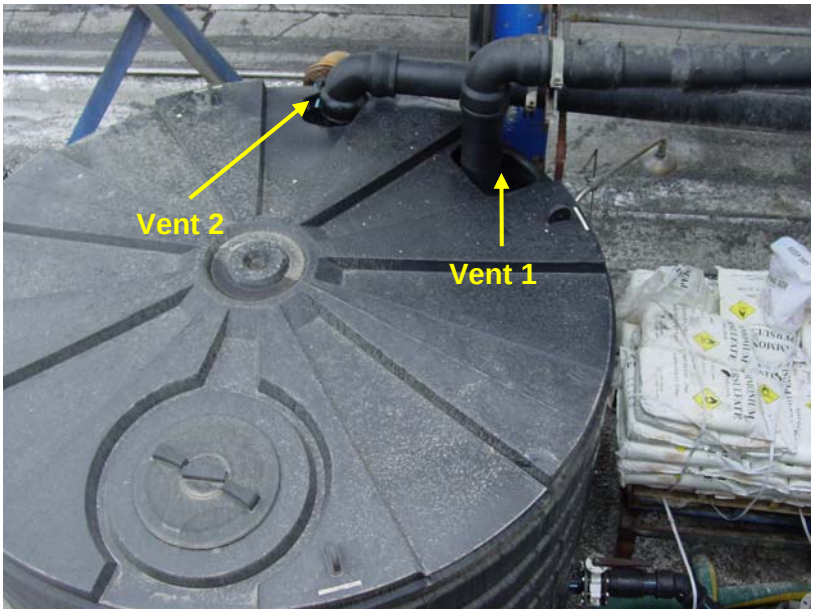
Flow Results			C4
Time of flow tests	0850	hrs	
Stack dimensions at sampling plane	200	mm	
Velocity at sampling plane	20	m/s	
Average temperature	41	°C	
Flow rate at discharge conditions	38	m³/min	
Flow rate at wet NTP conditions	33	m³/min	

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	131	0848-0849	6,500 ou	210,000 ouv/min

Panel n-butanol threshold	25 ppb
Odour character (hedonic tone)	Neutral – mildly unpleasant
Odour character	Sawdust, dough, salty, play-dough, grain, livestock feed

C18: Ion exchange effluent tank

1 February 2007



Flow Results			C18
Time of flow tests	0742	hrs	
Stack dimensions at sampling plane (vent 1)	380 x 240*	mm	
Velocity at sampling plane (vent 1)	0.30	m/s	
Stack dimensions at sampling plane (vent 2)	280 x 280*	mm	
Velocity at sampling plane (vent 2)	0.30	m/s	
Average temperature	34	°C	
Flow rate at discharge conditions	2.3	m^3/min	
Flow rate at wet NTP conditions	2.1	m^3/min	

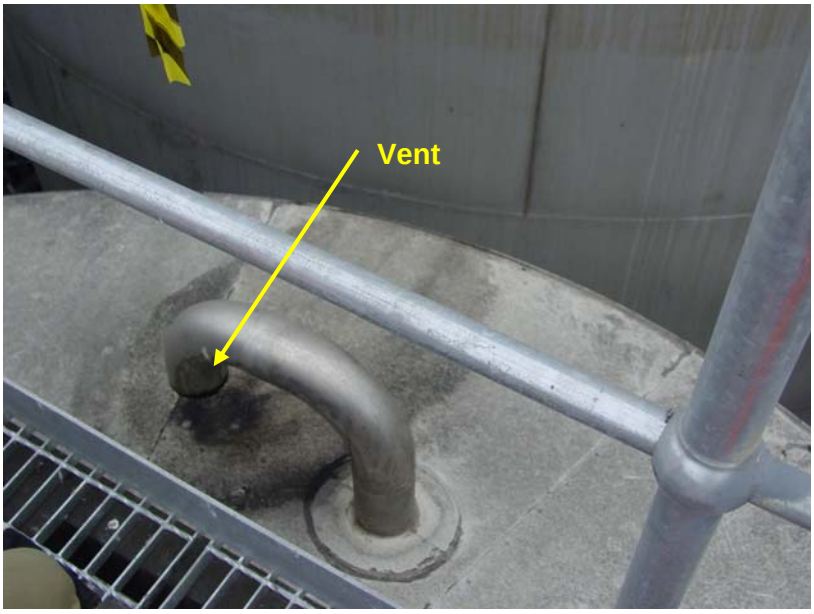
Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	49	0744-0745	7,200 ou	15,000 ouv/min

* The tank was exhausting though two approximately rectangular vents; vent 1 was 380 mm x 240 mm and vent 2 was 280 mm x 280 mm. Both vents had a 160 mm pipe entering the tank. The cross sectional area of the pipe was subtracted from the cross sectional area of each vent in order to calculate the flow rate.

Panel n-butanol threshold	26 ppb
Odour character (hedonic tone)	Mildly unpleasant
Odour character	Stale, sewage, yeast, fermentation

C19: Condensate water collection tank

1 February 2007



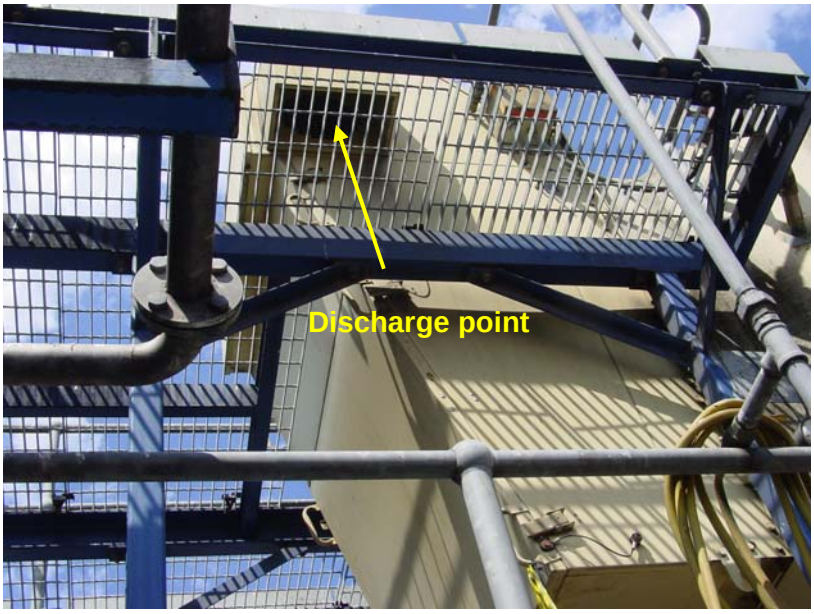
Flow Results			C19
Time of flow tests	0831	hrs	
Stack dimensions at sampling plane	95	mm	
Velocity at sampling plane	0.30	m/s	
Average temperature	31	°C	
Flow rate at discharge conditions	0.13	m³/min	
Flow rate at wet NTP conditions	0.12	m³/min	

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	5	0834-0836	6,500 ou	750 ouv/min

Panel n-butanol threshold	26 ppb
Odour character (hedonic tone)	Neutral
Odour character	Cattle, bread, earthy

E1: Grain silo baghouse

2 February 2007



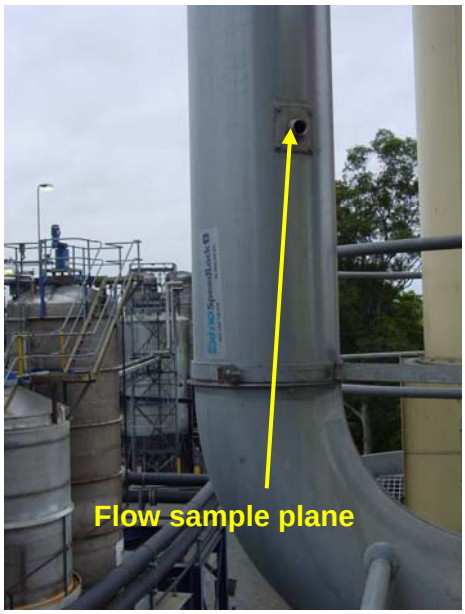
Flow Results		
Time of flow tests	1102	hrs
Stack dimensions at sampling plane	420 x 250	mm
Velocity at sampling plane	6.5	m/s
Average temperature	31	°C
Flow rate at discharge conditions	41	m^3/min
Flow rate at wet NTP conditions	37	m^3/min

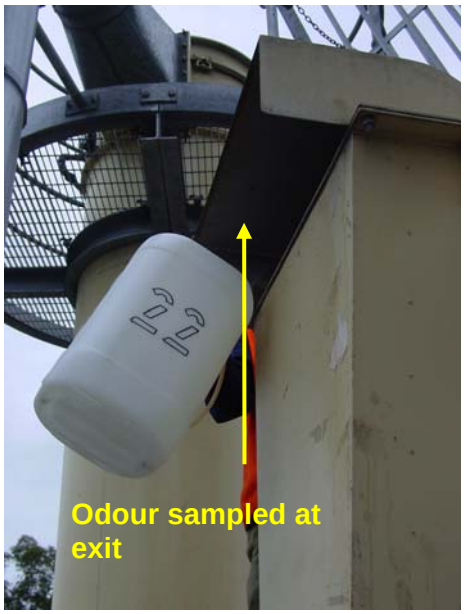
Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	10	1056-1057	310 ou	11,000 ouv/min

Panel n-butanol threshold	30 ppb
Odour character (hedonic tone)	Neutral – mildly pleasant
Odour character	Sweet, grain, flour, grass

E4: Hammer mill Buhler baghouse

1 February 2007





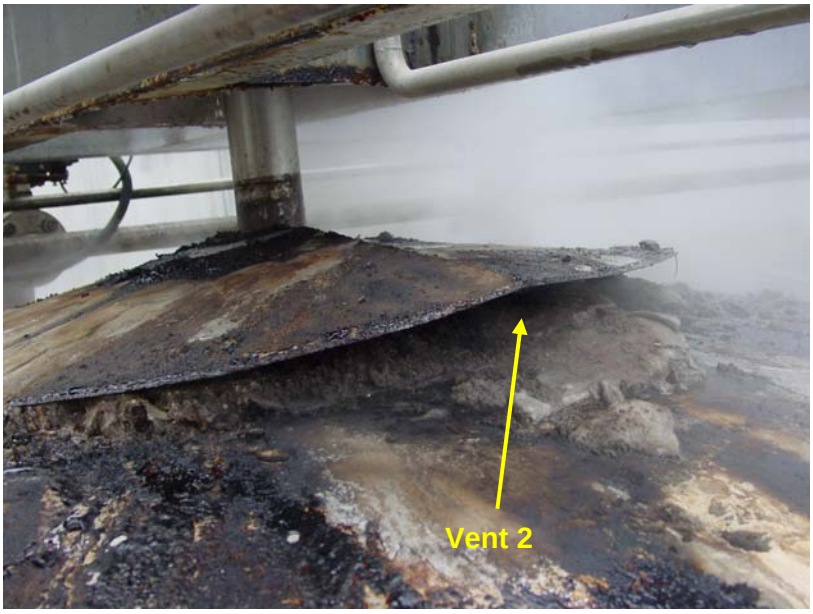
Flow Results		
Time of flow tests	0759	hrs
Stack dimensions at sampling plane	350	mm
Velocity at sampling plane	13	m/s
Average temperature	39	°C
Flow rate at discharge conditions	75	m³/min
Flow rate at wet NTP conditions	66	m³/min

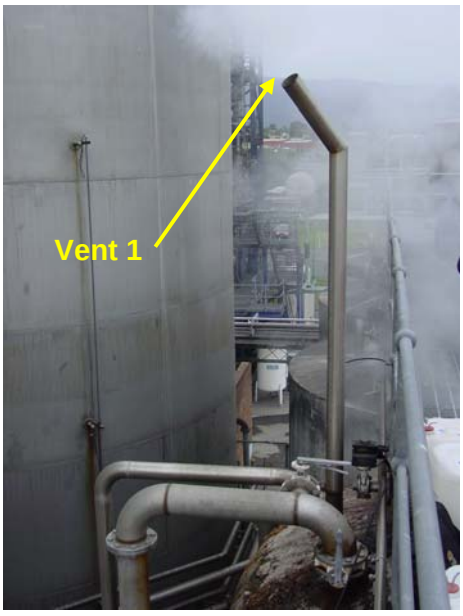
Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	22	0807-0813	84 ou	5,500 ouv/min

Panel n-butanol threshold	26 ppb
Odour character (hedonic tone)	Neutral – mildly pleasant
Odour character	Dry grass, bread, flour

E7: Jet cooker 2 and 4 – grain retention

1 February 2007





Flow Results		
Time of flow tests	0849	hrs
Stack dimensions at sampling plane (vent 1)	95	mm
Velocity at sampling plane (vent 1)	3.1	m/s
Stack dimensions at sampling plane (vent 2)	-*	mm
Velocity at sampling plane (vent 2)	3.1	m/s
Average temperature	100	°C
Flow rate at discharge conditions	5.2	m^3/min
Flow rate at wet NTP conditions	3.8	m^3/min

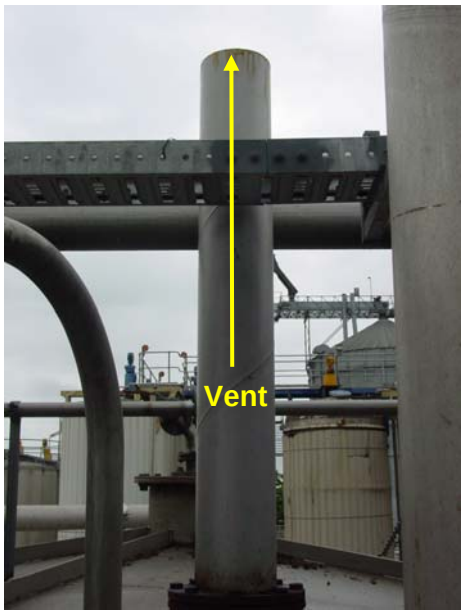
Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	47	0852-0853	15,000 ou	57,000 ouv/min
	159	0854-0855	21,000 ou	79,000 ouv/min
Average Results			**18,000 ou**	**68,000 ouv/min**

* Vent 2 is a half circle (850mm in diameter) with a cladding at an angle raised up 50mm at the centre.

Panel n-butanol threshold	26 ppb
Odour character (hedonic tone)	Mildly – very unpleasant
Odour character	Rotten, decomposition, yeast, fermentation, sewage, stale

E8: Grain retention – tank 2 (fermenter no. 7)

2 February 2007



Flow Results		
Time of flow tests	1004	hrs
Stack dimensions at sampling plane	200	mm
Velocity at sampling plane	18	m/s
Average temperature	87	°C
Flow rate at discharge conditions	33	m³/min
Flow rate at wet NTP conditions	25	m³/min

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	72	0956-0957	9,400 ou	240,000 ouv/min
	176	0958-0959	22,000 ou	550,000 ouv/min
Average Results			**16,000 ou**	**390,000 ouv/min**

Panel n-butanol threshold	30 ppb
Odour character (hedonic tone)	Mildly pleasant – mildly unpleasant
Odour character	Sweet, grain, bread, fermentation, oats, flour, yeast

E9: Hammer mill baghouse

1 February 2007

Flow Results		
Time of flow tests	0704	hrs
Stack dimensions at sampling plane	250 x 150	mm
Velocity at sampling plane	24	m/s
Average temperature	38	°C
Flow rate at discharge conditions	54	m³/min
Flow rate at wet NTP conditions	48	m³/min

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	124	0706-0712	36 ou	1,700 ouv/min

Panel n-butanol threshold	26 ppb
Odour character (hedonic tone)	Neutral – mildly pleasant
Odour character	No discernable odour, dry grass, bread

E10: Starch factory rejects collection tank

1 February 2007

Flow Results			E10
Time of flow tests	1238	hrs	
Stack dimensions at sampling plane	95	mm	
Velocity at sampling plane	1.3	m/s	
Average temperature	35	°C	
Flow rate at discharge conditions	0.55	m³/min	
Flow rate at wet NTP conditions	0.49	m³/min	

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	24	1241-1242	23,000 ou	11,000 ouv/min

Panel n-butanol threshold	25 ppb
Odour character (hedonic tone)	Neutral – mildly unpleasant
Odour character	Bread, flour, earthy, fertiliser, compost

E11: Buffer tank

1 February 2007

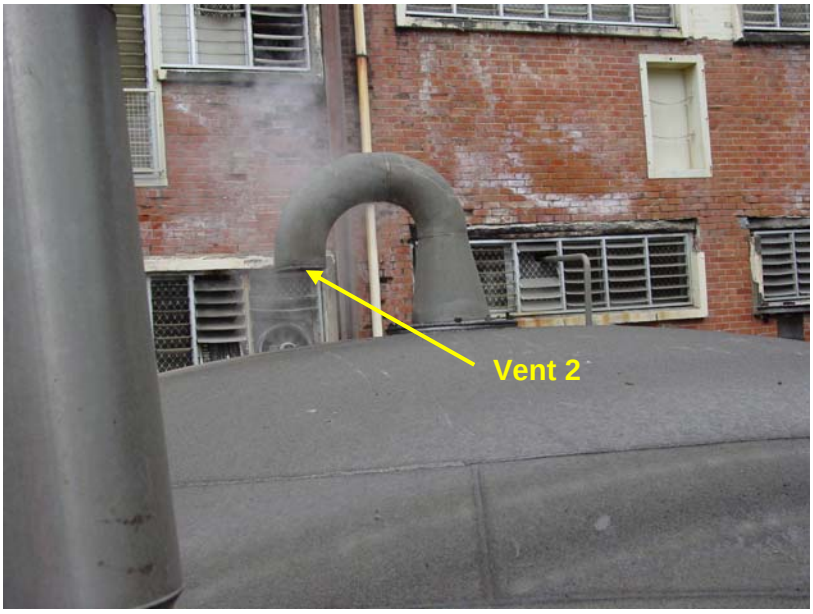
Flow Results			E11
Time of flow tests	0932	hrs	
Stack dimensions at sampling plane	95	mm	
Velocity at sampling plane	0.30	m/s	
Average temperature	38	°C	
Flow rate at discharge conditions	0.13	m³/min	
Flow rate at wet NTP conditions	0.11	m³/min	

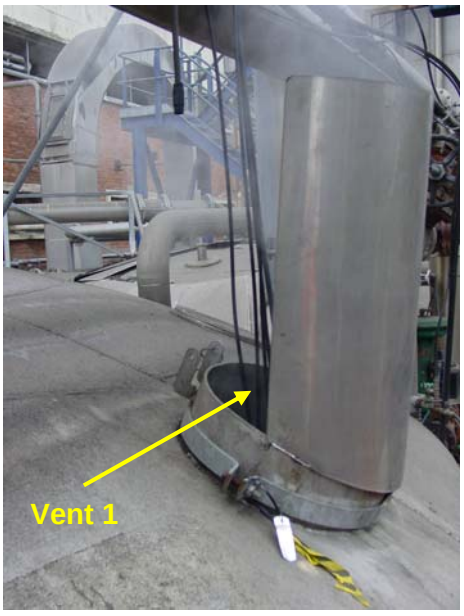
Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	50	0935-0937	11,000 ou	1,200 ouv/min

Panel n-butanol threshold	26 ppb
Odour character (hedonic tone)	Mildly unpleasant
Odour character	Plastic, yeast

E13: Jet cooker 1 retention tank

1 February 2007





Flow Results		
Time of flow tests	1301	hrs
Stack dimensions at sampling plane (vent 1)	390	mm
Velocity at sampling plane (vent 1)	0.51	m/s
Stack dimensions at sampling plane (vent 2)*	150	mm
Velocity at sampling plane (vent 2)	1.1	m/s
Average temperature	89	°C
Flow rate at discharge conditions	4.8	m^3/min
Flow rate at wet NTP conditions	3.7	m^3/min

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	48	1304-1305	17,000 ou	64,000 ouv/min

1 Estimated diameter.

Panel n-butanol threshold 25 ppb

Odour character (hedonic tone) Neutral – mildly unpleasant

Odour character Bread, flour, yeast, plasticine

E14: Yeast propagator

2 February 2007

Flow Results			E14
Time of flow tests	0838	hrs	
Stack dimensions at sampling plane*	460 x 350	mm	
Velocity at sampling plane	0.80	m/s	
Average temperature	33	°C	
Flow rate at discharge conditions	6.1	m³/min	
Flow rate at wet NTP conditions	5.5	m³/min	

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	175	0844-0845	21,000 ou	110,000 ouv/min

* Exit hatch is elliptical with a length of 460 mm and a width of 350 mm.

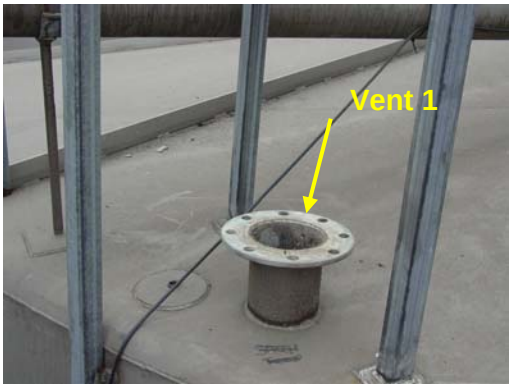
Panel n-butanol threshold 30 ppb

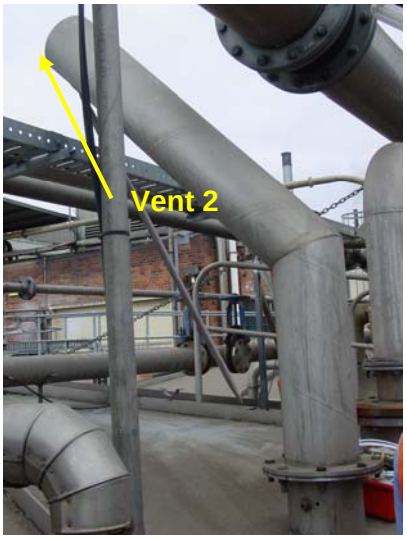
Odour character (hedonic tone) Mildly – very unpleasant

Odour character Sour, apple, fermentation, citrus, acrid, alcohol

E15: Yeast propagator

1 February 2007





Flow Results		
Time of flow tests	1343	hrs
Stack dimensions at sampling plane (vent 1)	150	mm
Velocity at sampling plane (vent 1)	2.2	m/s
Stack dimensions at sampling plane (vent 2)	420	mm
Velocity at sampling plane (vent 2)	3.2	m/s
Stack dimensions at sampling plane (vent 3)	250	mm
Velocity at sampling plane (vent 3)	2.0	m/s
Average temperature	29	°C
Flow rate at discharge conditions	35	m^3/min
Flow rate at wet NTP conditions	32	m^3/min

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	41	1350-1351	16,000 ou	490,000 ouv/min
	53	1352-1353	38,000 ou	1,200,000 ouv/min
Average Results			**27,000 ou**	**850,000 ouv/min**

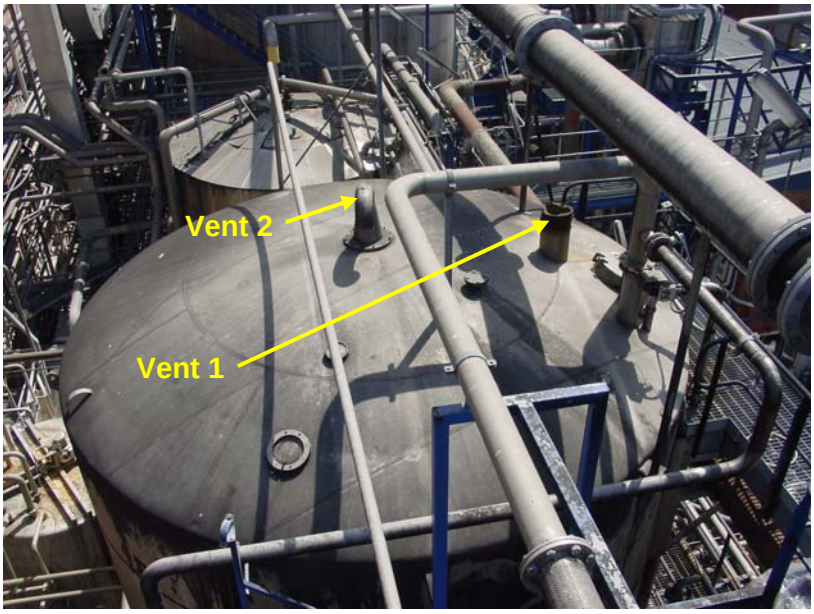
Panel n-butanol threshold 25 ppb

Odour character (hedonic tone) Mildly pleasant – mildly unpleasant

Odour character Beer, fermentation, yeast, sweet, musk, alcohol

E22: Feed transfer to distillery

2 February 2007



Flow Results		
Time of flow tests	0918	hrs
Stack dimensions at sampling plane (vent 1)	290	mm
Velocity at sampling plane (vent 1)	0.37	m/s
Stack dimensions at sampling plane (vent 2)	150	mm
Velocity at sampling plane (vent 2)	0.37	m/s
Average temperature	27	°C
Flow rate at discharge conditions	1.9	m^3/min
Flow rate at wet NTP conditions	1.7	m^3/min

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	59	0929-0930	6,100 ou	10,000 ouv/min

Panel n-butanol threshold	30 ppb
Odour character (hedonic tone)	Mildly unpleasant – very unpleasant
Odour character	Sweet, fermentation, alcohol, sour, solvent, acrid

E23: Cooling tower

1 February 2007

Flow Results			E23
Time of flow tests	1320	hrs	
Stack dimensions at sampling plane	3400	mm	
Velocity at sampling plane	7.5	m/s	
Average temperature	28	°C	
Flow rate at discharge conditions	4,100	m³/min	
Flow rate at wet NTP conditions	3,700	m³/min	

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	87	1328-1329	12,000 ou	44,000,000 ouv/min

Panel n-butanol threshold	25 ppb
Odour character (hedonic tone)	Neutral – mildly pleasant
Odour character	Bread, alcohol

E24: Hammer mill baghouse

1 February 2007

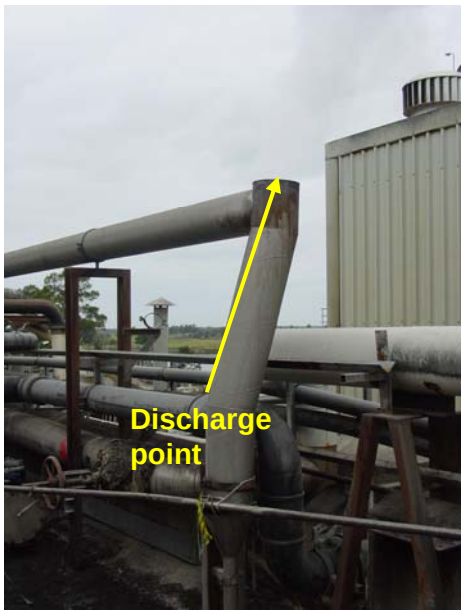
Flow Results			E24
Time of flow tests	0722	hrs	
Stack dimensions at sampling plane	360 x 555	mm	
Velocity at sampling plane	15	m/s	
Average temperature	21	°C	
Flow rate at discharge conditions	180	m^3/min	
Flow rate at wet NTP conditions	160	m^3/min	

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	147	0724-0730	< 30 ou	< 6,000 ouv/min

Panel n-butanol threshold	26 ppb
Odour character (hedonic tone)	Neutral
Odour character	No discernable odour

B3: Cooker A and B flash tanks

1 February 2007



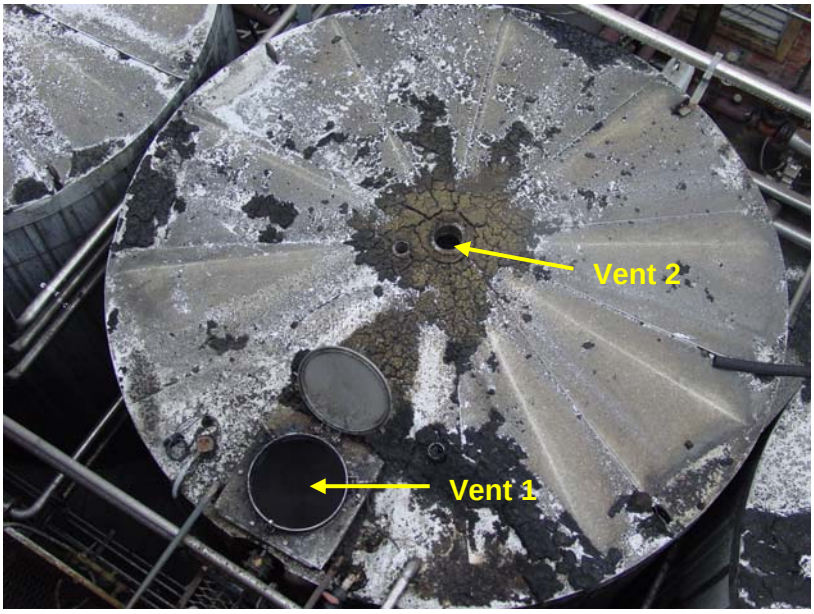
Flow Results			B3
Time of flow tests	0951	hrs	
Stack dimensions at sampling plane	250	mm	
Velocity at sampling plane	2.8	m/s	
Average temperature	100	°C	
Flow rate at discharge conditions	8.3	m³/min	
Flow rate at wet NTP conditions	6.1	m³/min	

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	74	0954-0956	9,400 ou	57,000 ouv/min

Panel n-butanol threshold	26 ppb
Odour character (hedonic tone)	Neutral – very unpleasant
Odour character	Plastic, bread, flour, chemical

B7: Enzyme tank

1 February 2007



Flow Results		
Time of flow tests	1400	hrs
Stack dimensions at sampling plane (vent 1)	460	mm
Velocity at sampling plane (vent 1)	0.30	m/s
Stack dimensions at sampling plane (vent 2)	150	mm
Velocity at sampling plane plane (vent 2)	0.30	m/s
Average temperature	54	°C
Flow rate at discharge conditions	3.3	m^3/min
Flow rate at wet NTP conditions	2.8	m^3/min

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	36	1405-1406	12,000 ou	35,000 ouv/min

Panel n-butanol threshold	25 ppb
Odour character (hedonic tone)	Mildly pleasant – mildly unpleasant
Odour character	Walnuts, stale, plasticine

APPENDIX: Weather conditions

Nowra, New South Wales
January 2007 Daily Weather Observations

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9:00 AM						3:00 PM					
		Min	Max				Dir	Spd	Time	Temp	RH	Cld	Dir	Spd	MSLP	Temp	RH	Cld	Dir	Spd	MSLP
		°C	°C	mm	mm	hours		km/h	local	°C	%	8th		km/h	hPa	°C	%	8th		km/h	hPa
1	Mo	16.5	22.3	2.2			NE	35	11:35	17.1	95		N	9	1021.1	21.1	60		E	22	1020
2	Tu	16.3	22	2.6			NE	39	13:24	17.2	95		E	13	1022.5	20.5	72		NNE	17	1021.5
3	We	14.5	24.4	6.2			ENE	39	13:00	19.5	78		ESE	6	1025.4	22.4	58		E	24	1023.9
4	Th	13.2	25.2	0.6			NE	50	13:14	19.5	74		N	4	1023.9	23.1	60		E	28	1020.6
5	Fr	12.8	28.9	0			ENE	43	15:13	22.1	55		N	2	1019.9	27.8	37		ENE	28	1015.9
6	Sa	14.2	32	0			E	37	13:23	23.4	59		N	7	1014.1	31.4	35		E	22	1009.8
7	Su	18	33.6	0			WNW	50	14:36	23.5	70		ESE	2	1005.8	33	30		NNW	22	1000.8
8	Mo	17.5	23.6	0.6			SE	43	13:42	18.2	79		SSE	17	1009.4	22.4	40		SSE	31	1010.4
9	Tu	14.4	23.4	0.4			SE	30	13:34	17.9	64		SSE	17	1015.5	22.4	45		ESE	19	1012.3
10	We	13.4	26.1	0			E	39	14:35	19.9	60		NNW	11	1013.4	25.6	53		ENE	24	1009.9
11	Th	13.6	31.5	0			ESE	28	11:02	23.1	62		ENE	6	1010.3	30.9	50		E	20	1006.1
12	Fr	17	31	0			S	56	17:59	25.5	66		ENE	9	1007	29.8	55		ESE	17	1004
13	Sa	18.8	25.1	0.2			SE	46	10:30	21.4	49		S	19	1012.2	23	51		SSE	28	1013.3
14	Su	12.1	25.7	0			ENE	41	13:01	19.5	57		WSW	7	1016.2	23.7	46		ENE	22	1014.3
15	Mo	13.9	26	0			E	43	14:18	21.1	63		N	15	1018.4	24.8	49		ENE	26	1015.9
16	Tu	13.7	29.1	0			ENE	48	14:41	23	60		NNE	15	1018.4	29.1	48		ENE	28	1015.4
17	We	16.4	32.7	0			E	31	10:58	25.1	56		NNE	9	1016.7	29.9	51		ESE	24	1012.8
18	Th	17.9	30.1	0			E	44	13:55	24.6	70		NE	7	1019.6	28.1	53		ENE	30	1016.6
19	Fr	18.9	29.9	0			ENE	39	12:33	24.5	55		N	19	1018	29.7	47		ENE	24	1013.3
20	Sa	16.6	33.1	0			ENE	39	14:31	24.4	65		N	9	1011.7	31.9	40		ENE	28	1006.6
21	Su	17	40.2	0			WNW	61	14:03	32.3	25		NNW	24	1002.7	37.8	17		WNW	37	999.6
22	Mo	17.6	27.6	0			WNW	48	0:53	25.3	42		W	11	1011.4	26	52		ESE	19	1013.2
23	Tu	16.7	28.4	0			E	41	12:42	23	64		ENE	11	1015.1	27.2	56		E	30	1010.6
24	We	19.7	22.7	0			S	43	7:44	20	87		S	31	1013.4	20.6	77		S	22	1014.1
25	Th	16.3	20.6	0.8			SSE	28	14:26	17.4	91		SSW	9	1015.3	20.2	75		SSE	17	1012.9
26	Fr	17.2	29.1	0			ENE	43	15:45	20.1	77		NE	2	1012.6	26.9	61		E	26	1005.7
27	Sa	15.7	23.7	0			S	56	12:17	23.6	60		SSE	37	999.2	18.2	58		SSE	31	1004.1
28	Su	12.2	28.7	0			ESE	41	13:40	18.1	41		NW	17	1007.7	25	36		E	33	1002.9
29	Mo	13.5	25.9	0			ENE	43	14:00	21.8	58		SE	11	1011.8	25.4	49		ENE	28	1010.8
30	Tu	16.7	33.3	0			S	46	22:18	23.4	61		N	11	1012.2	32.2	39		E	20	1006.8
31	We	20.1	23.1	0			S	44	0:55	20.6	76		S	15	1016.3	19.5	76		SSE	24	1017.4
Statistics for January 2007																					
	Mean	15.9	27.7							21.8	64			12	1014.1	26.1	50			24	1011.7
	Lowest	12.1	20.6	0						17.1	25		#	2	999.2	18.2	17		#	17	999.6
	Highest	20.1	40.2	6.2			WNW	61		32.3	95		SSE	37	1025.4	37.8	77		WNW	37	1023.9
	Total			13.6																	

IDCJDW2101.200701 Prepared at 13:07 GMT on Wednesday 14 February 2007

Source of data

Observations were drawn from Nowra RAN Air Station AWS {station 068072}.

Nowra, New South Wales
February 2007 Daily Weather Observations

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9:00 AM						3:00 PM					
		Min	Max				Dir	Spd	Time	Temp	RH	Cld	Dir	Spd	MSLP	Temp	RH	Cld	Dir	Spd	MSLP
		°C	°C	mm	mm	hours		km/h	local	°C	%	8th		km/h	hPa	°C	%	8th		km/h	hPa
1	Th	15.6	21.8	5.8			E	24	17:28	17.3	74		S	11	1024.1	20.1	71		E	11	1022.8
2	Fr	17.3	28.6	0			ENE	37	15:25	21.5	71		N	7	1022.3	27	58		NE	24	1018.4
3	Sa	16.2	29.9	0			ESE	43	14:13	23.8	67		NNW	13	1017.6	27.5	55		E	22	1017.1
4	Su	16.5	27.3	0			SE	33	12:30	22.2	77		SSE	13	1021.9	24.7	63		SE	19	1019.9
5	Mo	18.3	27.6	0			ENE	41	14:03	22.5	63		NE	17	1016.9	26.4	53		E	31	1010.7
6	Tu	17.5	26.3	0			ENE	35	14:24	23.7	65		NW	6	1010.7	25.7	64		ENE	20	1009.7
7	We	15.8	27.7	0			NE	54	14:32	21	76		ESE	11	1010.1	23.1	69		ENE	30	1005.7
8	Th	16.8	24.3	0.2			S	52	16:37	20.9	82		SSW	24	1008.8	23.2	62		S	28	1009.7
9	Fr	17.7	25.5	9.2			SE	39	11:47	20.1	74		SSW	13	1013.9	24.8	56		SE	20	1011.4
10	Sa	16.3	28	0			ENE	43	16:36	21.2	83		NW	7	1011.7	26	61		ENE	26	1008.5
11	Su	18	22.4	53.6			ESE	52	9:54	19.5	96		SW	11	1013.7	18.4	94		W	22	1014.7
12	Mo	17.6		125.2						18.9	83		SSE	19	1019.4	17.3	95		S	24	1020.6
13	Tu		22.8				ENE	30	11:19	17.9	86		SE	11	1021.7	20.7	77		SSE	13	1020.5
14	We	14.4	26.1	2.8			ENE	35	17:56	19.2	81		NW	11	1021	25.8	54		ENE	19	1018.9
15	Th	16	27.3	0			E	33	13:16	20.2	77		NW	15	1020.4	25.6	56		ENE	19	1018.2
16	Fr	16	28.2	0			E	39	14:05	22.2	75		WNW	11	1021.1	27	61		ENE	28	1018.5
17	Sa	16.6	29	0			ENE	39	15:38	22.4	73		NW	15	1023.6	28.6	53		E	24	1021.6
18	Su	15.2	27.9	0			ENE	48	15:22	22.3	64		NW	9	1023.6	27.1	52		NE	31	1020.5
19	Mo	16.1	28.7	0			ESE	31	14:48	22.2	75		N	9	1021.1	28	57		E	17	1020
20	Tu	17.6		0						22.1	70		N	7	1023.8						
Statistics for the first 20 days of February 2007																					
	Mean	16.6	26.6							21.1	75			12	1018.4	24.6	63			22	1016.2
	Lowest	14.4	21.8	0						17.3	63		NW	6	1008.8	17.3	52		E	11	1005.7
	Highest	18.3	29.9	125.2			NE	54		23.8	96		SSW	24	1024.1	28.6	95		#	31	1022.8
	Total			196.8																	

IDCJDW2101.200702 Prepared at 23:41 GMT on Monday 19 February 2007

Source of data

Observations were drawn from Nowra RAN Air Station AWS {station 068072}.
The closest station with cloud observations is at Wollongong, about 58 km to the north.

EMISSION TESTING CONSULTANTS

Odour Survey

Manildra Group

Prepared for:

GHD Services

April 2007

Report No. **070113r**

Report prepared by-

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INTRODUCTION

Tests were performed on 18 and 19 April 2007 to determine odour emissions to air from various locations within the Bomaderry Plant of the Manildra Group.

DEFINITIONS

The following symbols and abbreviations are used in this test report:

Odour unit	One odour unit (ou) is that concentration of odorant(s) at standard concentrations that elicits a physiological response from a panel (detection threshold) equivalent to that elicited by one Reference Odour Mass (ROM), evaporated in one cubic metre of neutral gas at standard conditions.
Nm^3/min	Flow rate (m^3/min) at NTP conditions
VOC	Any chemical compound based on carbon in the boiling range 36 to 126°C, with a vapour pressure of at least 0.010kPa at 25°C (or having a corresponding volatility under the particular conditions of use) that adsorb onto activated charcoal and desorb into CS_2, or that can be collected in a tedlar bag and be quantitatively recovered, and that are detected by GCMS. These compounds may contain oxygen, nitrogen and other elements, but specifically excluded are CO, CO_2, carbonic acid, metallic carbides and carbonate salts.
NTP	Normal temperature and pressure. Gas volumes and concentrations are expressed on a dry basis at 0°C, at discharge oxygen concentration and an absolute pressure of 101.325 kPa, unless otherwise specified.
<	Less than the minimum limit of detection using the specified method.
NA	Not applicable

SUMMARY OF SAMPLING LOCATIONS

Odour sampling was conducted from the following locations:

DDG section

DDG20:	Feed dump:	Odour and VOC's
DDG23:	Condensate:	Odour and VOC's
DDG24:	Vent condenser:	Odour and VOC's
DDG26:	Finish feed:)	Odour and VOC's
DDG30:	Dryer feed tank:	Odour and VOC's
DDG31:	Syrup holding tank:	Odour
DDG39:	Dryer building:	Odour
DDG:	Dryer building cooling tower:	Odour
DDG:	Evaporation cooling tower 3A:	Odour

Farm

F3:	Pond 2:	Odour
F4:	Pond 3:	Odour
F5:	Pond 4:	Odour
F7:	Pond 5:	Odour

Ethanol plant

E23:	Cooling tower:	Odour
E23-2:	Cooling tower:	Odour

SAMPLING DESCRIPTIONS AND OBSERVATIONS

DDG Section

DDG 20: Feed dump

Two exhaust vents were present on the tank.

A single odour sample (grab sample) and VOC sample (sorbent tube and drop out) was taken from vent 1.

Flow measurements were conducted at both vent exits using an anemometer.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** and condition ***(b)*** of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** was not met.

(b) The gas velocity at all sampling points is greater than 3 m/sec.

Refer to deviations from test methods (low flow vents and ducts) on page 10.

DDG 23: Condensate

Two exhaust vents were present on the tank.

A single odour sample (grab sample) and VOC sample (sorbent tube and drop out) was taken from vent 1.

Flow measurements were conducted at both vent exits using an anemometer.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** and condition ***(b)*** of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** was not met.

(b) The gas velocity at all sampling points is greater than 3 m/sec.

Refer to deviations from test methods (low flow vents and ducts) on page 10.

DDG 24: Vent condensor

A single odour sample (grab sample) and VOC sample (sorbent tube and drop out) was taken from the vent exit.

Flow measurements were conducted at the vent exit using an anemometer.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** and condition ***(b)*** of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** was not met.

(b) The gas velocity at all sampling points is greater than 3 m/sec.

Refer to deviations from test methods (low flow vents and ducts) on page 10.

DDG26: Finish feed

Three exhaust vents were present on the tank.

A single odour sample (grab sample) and VOC sample (sorbent tube and drop out) was taken from vent 1.

Flow measurements were conducted on all vent exits using an anemometer.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** and condition ***(b)*** of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** was not met.

(b) The gas velocity at all sampling points is greater than 3 m/sec.

Refer to deviations from test methods (low flow vents and ducts) on page 10.

DDG30: Dryer feed tank

A single odour sample (grab sample) and VOC sample (sorbent tube and drop out) was taken from the vent exit.

Flow measurements were conducted at the vent exit using an anemometer.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** and condition ***(b)*** of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** was not met.

(b) The gas velocity at all sampling points is greater than 3 m/sec.

Refer to deviations from test methods (low flow vents and ducts) on page 10.

DDG31: Syrup holding tank

Two exhaust vents were present on the tank.

A single odour sample (grab sample) and VOC sample (sorbent tube and drop out) was taken from vent 1.

Flow measurements were conducted on all vent exits using an anemometer.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** and condition ***(b)*** of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** was not met.

(b) The gas velocity at all sampling points is greater than 3 m/sec.

Refer to deviations from test methods (low flow vents and ducts) on page 10.

DDG39: Dryer building

Downwind sampling was conducted on the upper level of the eastern open face of building. A single odour sample (grab sample) was taken as an integrated sample across the face.

Flow rate measurements were conducted simultaneously with the odour sampling at equal grid points.

DDG: Dryer building cooling tower

A single odour sample (grab sample) was taken from the exit face and adjacent to the DDG building 1.5 m above ground level (inlet sample).

Flow measurements were conducted from across the exit face using a pitot tube and manometer.

Swirl was measured at approximately 45 degree.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** and conditions ***(b)***, ***(c)*** and ***(e)*** of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** were not met.

(b) The gas velocity at all sampling points is greater than 3 m/sec.

(c) The gas flow profile at the sampling plane shall be steady, evenly distributed and not have a cyclonic component which exceeds an angle of 15° to the duct axis, when measured near the periphery of a circular sampling plane.

(e) The ratio of the highest to lowest pitot pressure difference shall not exceed 9:1 and the ratio of the highest to lowest gas velocities shall not exceed 3:1. For isokinetic testing with the use of impingers, the gas velocity ratio across the sampling plane shall not exceed 1.6:1.

The accuracy of results may be less than stated in the method.

DDG: Evaporation cooling tower 3A

A single odour sample (grab sample) was taken from the exit face and at the base of the upwind end of the cooling tower 1.5 m above ground level (inlet sample).

Flow measurements were conducted from across the exit face using a pitot tube and manometer.

Swirl was measured at approximately 45 degree.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** and conditions ***(b)***, ***(c)*** and ***(e)*** of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** were not met.

(b) The gas velocity at all sampling points is greater than 3 m/sec.

(c) The gas flow profile at the sampling plane shall be steady, evenly distributed and not have a cyclonic component which exceeds an angle of 15° to the duct axis, when measured near the periphery of a circular sampling plane.

(e) The ratio of the highest to lowest pitot pressure difference shall not exceed 9:1 and the ratio of the highest to lowest gas velocities shall not exceed 3:1. For isokinetic testing with the use of impingers, the gas velocity ratio across the sampling plane shall not exceed 1.6:1.

The accuracy of results may be less than stated in the method.

Farm

F3: Pond 2

The pond capacity was 11 ML and was filled with 7 ML. The material in the pond was 6 months old.

A single odour sample (isolation flux) was collected from the south eastern corner of the pond. Sampling was conducted approximately 3m from the bank

F4: Pond 3

The pond capacity was 33 ML and was filled with 30 ML. The material in the pond was 3 – 4 months old.

A single odour sample (isolation flux) was collected from the jetty located on the western bank. Sampling was conducted approximately 10m from the bank

F5: Pond 4

The pond capacity was 125 ML and was filled with 72 ML. The material in the pond was wash down water.

A single odour sample (isolation flux) was collected from the uncovered corner of the pond (north western corner) approximately 2m from the bank.

F7: Pond 5

The pond capacity was 205 ML and was filled with 190 ML. The pond was in the process of filling.

A single odour sample (isolation flux) was collected from the concrete ramp in the centre of the western bank. Sampling was conducted approximately 3m from the bank

Ethanol plant

E23: Cooling tower

A single odour sample (grab sample) was taken from the exit face and the northern end of the western face of the cooling tower structure approximately 3m above ground level.

Flow measurements were conducted from across the exit face using a pitot tube and manometer.

Swirl was measured at approximately 45 degree.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** and conditions ***(b)***, ***(c)*** and ***(e)*** of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** were not met.

(b) The gas velocity at all sampling points is greater than 3 m/sec.

(c) The gas flow profile at the sampling plane shall be steady, evenly distributed and not have a cyclonic component which exceeds an angle of 15° to the duct axis, when measured near the periphery of a circular sampling plane.

(e) The ratio of the highest to lowest pitot pressure difference shall not exceed 9:1 and the ratio of the highest to lowest gas velocities shall not exceed 3:1. For isokinetic testing with the use of impingers, the gas velocity ratio across the sampling plane shall not exceed 1.6:1.

The accuracy of results may be less than stated in the method.

E23-2: Cooling tower

A single odour sample (grab sample) was taken from the exit face and the northern end of the western face of the cooling tower structure approximately 3m above ground level.

Flow measurements were conducted from across the exit face using a pitot tube and manometer.

Swirl was measured at approximately 45 degree.

The sampling plane was not in accordance with ***Table 1*** of **AS4323.1** and conditions ***(b)***, ***(c)*** and ***(e)*** of checklist ***(a)*** to ***(f)*** of ***AS 4323.1*** were not met.

(b) The gas velocity at all sampling points is greater than 3 m/sec.

(c) The gas flow profile at the sampling plane shall be steady, evenly distributed and not have a cyclonic component which exceeds an angle of 15° to the duct axis, when measured near the periphery of a circular sampling plane.

(e) The ratio of the highest to lowest pitot pressure difference shall not exceed 9:1 and the ratio of the highest to lowest gas velocities shall not exceed 3:1. For isokinetic testing with the use of impingers, the gas velocity ratio across the sampling plane shall not exceed 1.6:1.

The accuracy of results may be less than stated in the method.

SAMPLING METHODOLOGY

On site sampling guidelines: according to ETC method 1.

Sampling plane criteria: according to AS 4323.1-1995. Selection of sampling positions. **(TM-1)**

Flow rate and velocity: according to USEPA Method 2, using a pitot tube and differential manometer. Temperature determined using a calibrated thermocouple and digital pyrometer. **(TM-2)**

Odour isolation flux (quiescent surfaces): according to ETC method 130 using an equilibrium flux chamber.

* *Given the recent development of the draft Australian Standard for area source measurement (AS4323.4), quality control protocols outlined in the draft standard were adopted if not otherwise stated in ETC method 130. Isolation flux chambers which are compliant with the draft standard and the* specifications of USEPA user guide (1986 EPA/600/8) *were used.*

Where static pre-dilution was conducted odour-free air was used.

Odour grab samples (stacks, ducts, fugitive and ambient samples): sample collection according to AS4323.3, by collection into Nalophan sample bags using the 'lung' principle.

Where static pre-dilution was conducted odour-free air (zero grade) was used.

Volatile organic compounds (VOC): sampled onsite according to Vic EPA method 4230 onto a chilled drop out impinger and sorbent tube.

ANALYSIS METHODOLOGY

Odour: according to AS4323.3, by dynamic olfactometry (forced-choice technique). Panel n-butanol threshold determination by analysis against a NATA certified n-butanol gas standard.

All odour analysis was conducted with 6 member odour panels.

All samples were analysed within 30 hours of collection.

Volatile organic compounds (VOC): by solvent desorption and GCMS. Analysis performed under subcontract by SGS (NATA accreditation number 2562); report number M070579R1 dated 1 May 2007.

DEVIATIONS FROM TEST METHODS

Low flow vents and ducts

Stacks and ducts with a velocity of less than 3 m/s cannot be measured accurately using a pitot tube and manometer as stipulated in USEPA method 2 (TM-2). In these cases velocity was measured using a digital impellor anemometer. This method of velocity measurement is more accurate for low velocity measurement. The number of sampling points was determined in accordance with AS4323.1 in the usual manner.

Temperature determined using a calibrated thermocouple and digital pyrometer.

Where applicable this deviation is indicated in the 'sampling descriptions and observations' section of this report.

High odour sources

Odour sources with a very high odour concentration required a pre-dilution greater than specified in AS4323.3. Where applicable this is indicated in the 'results' section of this report.

WEATHER OBSERVATIONS

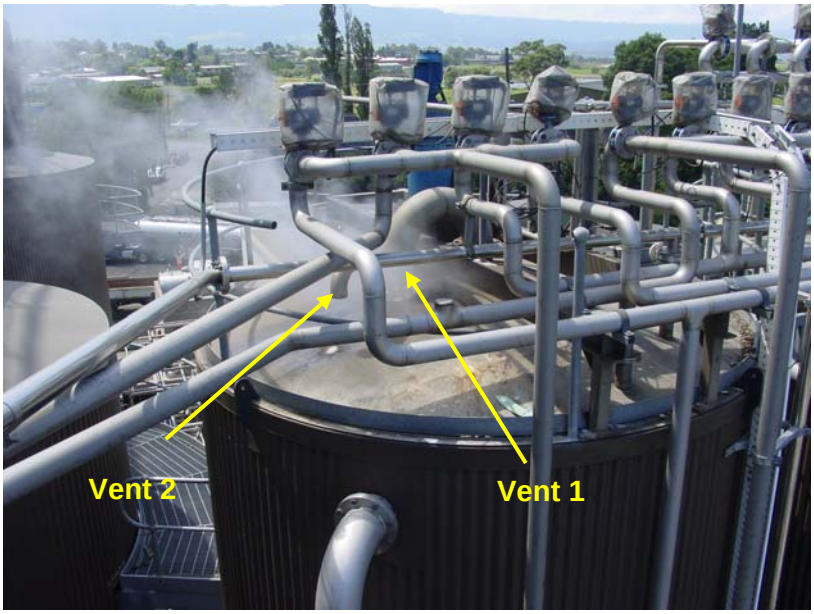
Weather conditions at the time of sampling are recorded in the results section of this report. Readings were obtained from the Bureau of Meteorology weather station at Nowra RAN Air station AWS (station 068072).

Refer to appendix for details.

RESULTS

DDG20: Feed dump

18 April 2007



Flow Results			DDG20
Time of flow tests	1114 and 1141	hrs	
Stack dimensions at sampling plane (vent 1)	210	mm	
Velocity at sampling plane (vent 1), m/s	2.0	m/s	
Stack dimensions at sampling plane (vent 2)	95	mm	
Velocity at sampling plane (vent 2), m/s	1.1	m/s	
Average temperature	91	°C	
Moisture content	69	%v/v	
Flow rate at discharge conditions	4.5	m³/min	
Flow rate at wet NTP conditions	3.4	m³/min	
Flow rate at dry NTP conditions	1.0	m³/min	

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	73	1117-1118	100,000 ou	350,000 ouv/min

Note: A further 1 in 121 dilution was required to bring within the scale of the olfactometer. This ratio is greater than recommended by AS4323.3.

Panel n-butanol threshold 48 ppb

Odour character (hedonic tone) Neutral - mildly unpleasant

Odour character Molasses, sour, fermentation, bread, yeast, vegemite

DDG20: Feed dump (continued)

18 April 2007

Volatile Organic Compound (VOC) Results DDG20	Sampling Times	Concentration at NTP		Mass rate	
Benzene	1115-1135	0.075	mg/Nm³	0.000078	g/min
1,2,4,Trimethyl benzene	1115-1135	< 0.01	mg/Nm³	< 0.00001	g/min
Chloroform	1115-1135	0.064	mg/Nm³	0.000067	g/min
Ethyl benzene	1115-1135	0.011	mg/Nm³	0.000011	g/min
Styrene	1115-1135	< 0.01	mg/Nm³	< 0.00001	g/min
Toluene	1115-1135	0.30	mg/Nm³	0.00031	g/min
m&p-Xylenes	1115-1135	0.021	mg/Nm³	0.000022	g/min
o-Xylene	1115-1135	< 0.01	mg/Nm³	< 0.00001	g/min
2-Butanone (MEK)	1115-1135	1.6	mg/Nm³	0.0017	g/min
Dimethyl sulphide	1115-1135	0.20	mg/Nm³	0.00021	g/min
Dimethyl trisulphide*	1115-1135	< 0.01	mg/Nm³	< 0.00001	g/min
Dodecane	1115-1135	0.47	mg/Nm³	0.00049	g/min
Decane	1115-1135	< 0.01	mg/Nm³	< 0.00001	g/min
Octane	1115-1135	0.053	mg/Nm³	0.000056	g/min
Tridecane	1115-1135	0.41	mg/Nm³	0.00043	g/min
Ethyl decanoate*	1115-1135	0.33	mg/Nm³	0.00035	g/min
Ethyl furan*	1115-1135	0.16	mg/Nm³	0.00017	g/min
Ethyl octonoate*	1115-1135	0.38	mg/Nm³	0.00040	g/min
Undecane*	1115-1135	0.28	mg/Nm³	0.00029	g/min
Furfural*	1115-1135	0.50	mg/Nm³	0.00053	g/min
Hexanal*	1115-1135	0.54	mg/Nm³	0.00057	g/min
Methyl butanal*	1115-1135	2.3	mg/Nm³	0.0024	g/min
Methyl butanol*	1115-1135	< 0.01	mg/Nm³	< 0.00001	g/min
Methyl furan*	1115-1135	2.2	mg/Nm³	0.0024	g/min
Methyl propanol*	1115-1135	0.12	mg/Nm³	0.00012	g/min
Pentanal*	1115-1135	< 0.01	mg/Nm³	< 0.00001	g/min
Pentyl furan*	1115-1135	0.39	mg/Nm³	0.00041	g/min
Trimethyl dioxolane*	1115-1135	0.34	mg/Nm³	0.00036	g/min
Acetone*	1115-1135	0.16	mg/Nm³	0.00017	g/min
Butanal*	1115-1135	0.13	mg/Nm³	0.00013	g/min
Ethanol*	1115-1135	2.9	mg/Nm³	0.0030	g/min

* Compound is tentatively identified based upon computer library search of mass spectra. Results are semi-quantitative based upon generic response factor for this class of analyte.

DDG23: Condensate

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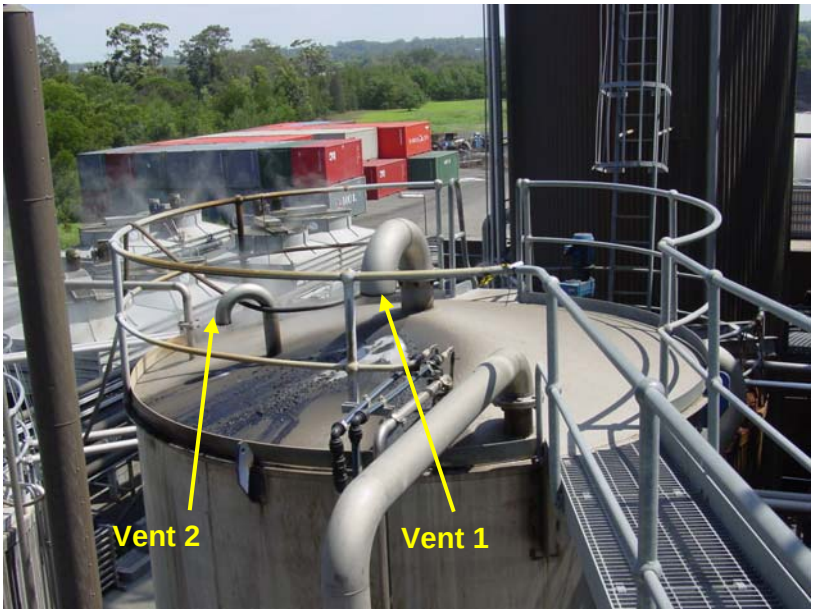


Flow Results			DDG23
Time of flow tests	0842 and 0928	hrs	
Stack dimensions at sampling plane (vent 1)	230	mm	
Velocity at sampling plane (vent 1)	2.2	m/s	
Stack dimensions at sampling plane (vent 2)	100	mm	
Velocity at sampling plane, (vent 2)	1.3	m/s	
Average temperature	91	°C	
Moisture content	71	%v/v	
Flow rate at discharge conditions	8.5	m³/min	
Flow rate at wet NTP conditions	6.4	m³/min	
Flow rate at dry NTP conditions	2.0	m³/min	

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	24	0857-0858	530,000 ou	3,400,000 ouv/min

Note: A further 1 in 121 dilution was required to bring within the scale of the olfactometer. This ratio is greater than recommended by AS4323.3.

Panel n-butanol threshold 48 ppb

Odour character (hedonic tone) Mildly unpleasant – very unpleasant.

Odour character Cattle, fermentation, meat, acrid.

DDG23: Condensate (continued)

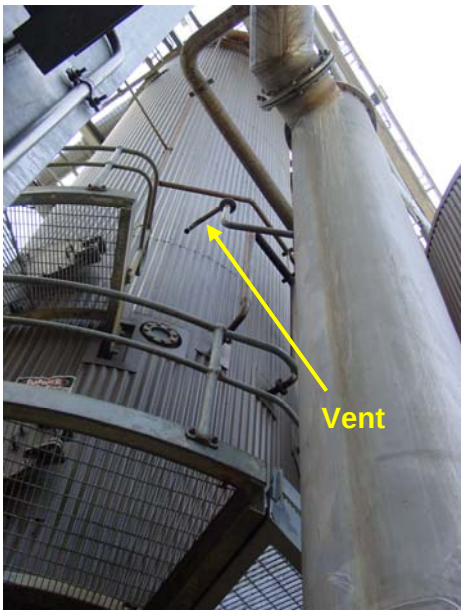
18 April 2007

Volatile Organic Compound (VOC) Results DDG23	Sampling Times	Concentration at NTP		Mass rate	
Benzene	0843-0903	0.064	mg/Nm³	0.00013	g/min
1,2,4,Trimethyl benzene	0843-0903	< 0.01	mg/Nm³	< 0.00002	g/min
Chloroform	0843-0903	< 0.01	mg/Nm³	< 0.00002	g/min
Ethyl benzene	0843-0903	0.043	mg/Nm³	0.000086	g/min
Styrene	0843-0903	0.021	mg/Nm³	0.000043	g/min
Toluene	0843-0903	0.36	mg/Nm³	0.00074	g/min
m&p-Xylenes	0843-0903	0.15	mg/Nm³	0.00030	g/min
o-Xylene	0843-0903	0.021	mg/Nm³	0.000043	g/min
2-Butanone (MEK)	0843-0903	12	mg/Nm³	0.024	g/min
Dimethyl sulphide	0843-0903	2.2	mg/Nm³	0.0045	g/min
Dimethyl trisulphide*	0843-0903	< 0.01	mg/Nm³	< 0.00002	g/min
Dodecane	0843-0903	3.0	mg/Nm³	0.0061	g/min
Decane	0843-0903	0.25	mg/Nm³	0.00050	g/min
Octane	0843-0903	1.3	mg/Nm³	0.0026	g/min
Tridecane	0843-0903	3.1	mg/Nm³	0.0063	g/min
Ethyl decanoate*	0843-0903	2.0	mg/Nm³	0.0041	g/min
Ethyl furan*	0843-0903	0.73	mg/Nm³	0.0015	g/min
Ethyl octonoate*	0843-0903	10	mg/Nm³	0.021	g/min
Undecane*	0843-0903	1.6	mg/Nm³	0.0032	g/min
Furfural*	0843-0903	120	mg/Nm³	0.25	g/min
Hexanal*	0843-0903	13	mg/Nm³	0.026	g/min
Methyl butanal*	0843-0903	51	mg/Nm³	0.10	g/min
Methyl butanol*	0843-0903	1.3	mg/Nm³	0.0026	g/min
Methyl furan*	0843-0903	2.4	mg/Nm³	0.0048	g/min
Methyl propanol*	0843-0903	1.6	mg/Nm³	0.0032	g/min
Pentanal*	0843-0903	0.73	mg/Nm³	0.0015	g/min
Pentyl furan*	0843-0903	4.1	mg/Nm³	0.0082	g/min
Trimethyl dioxolane*	0843-0903	2.5	mg/Nm³	0.0050	g/min
Acetone*	0843-0903	< 0.08	mg/Nm³	< 0.0002	g/min
Butanal*	0843-0903	5.8	mg/Nm³	0.012	g/min
Ethanol*	0843-0903	7.5	mg/Nm³	0.015	g/min

* Compound is tentatively identified based upon computer library search of mass spectra. Results are semi-quantitative based upon generic response factor for this class of analyte.

DDG24: Vent condenser

18 April 2007



Flow Results			DDG24
Time of flow tests	1225	hrs	
Stack dimensions at sampling plane	95	mm	
Velocity at sampling plane	1.9	m/s	
Average temperature	29	°C	
Moisture content	2.3	%v/v	
Flow rate at discharge conditions	0.80	m³/min	
Flow rate at wet NTP conditions	0.73	m³/min	
Flow rate at dry NTP conditions	0.71	m³/min	

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	4	1230-1231	3,500,000 ou	2,600,000 ouv/min

Note: A further 1 in 121 dilution was required to bring within the scale of the olfactometer. This ratio is greater than recommended by AS4323.3.

Panel n-butanol threshold 60 ppb

Odour character (hedonic tone) Very unpleasant

Odour character Sulphur, foul, fermentation, meat, burnt, acrid.

DDG24: Vent condenser (continued)

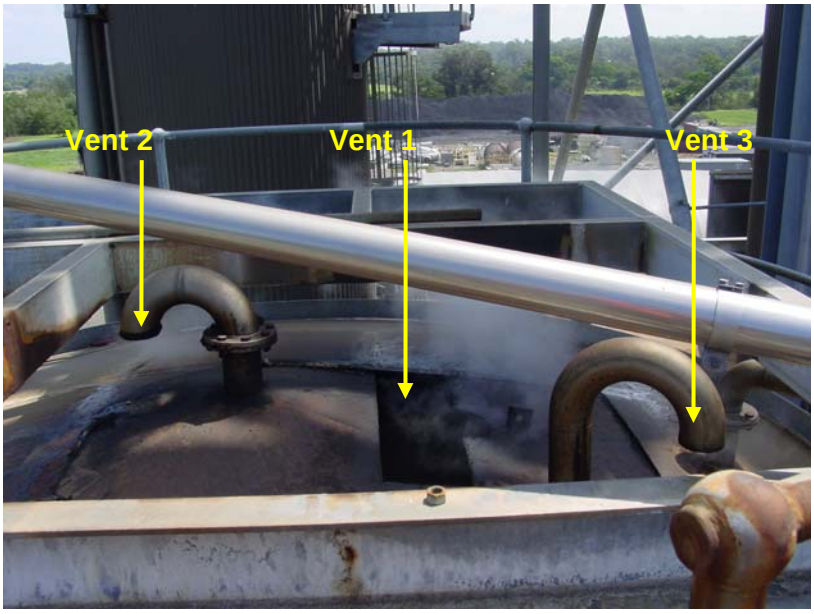
18 April 2007

Volatile Organic Compound (VOC) Results DDG24	Sampling Times	Concentration at NTP		Mass rate	
Benzene	1215-1235	3.3	mg/Nm³	0.0024	g/min
1,2,4,Trimethyl benzene	1215-1235	0.95	mg/Nm³	0.00068	g/min
Chloroform	1215-1235	7.5	mg/Nm³	0.0054	g/min
Ethyl benzene	1215-1235	1.3	mg/Nm³	0.00092	g/min
Styrene	1215-1235	0.53	mg/Nm³	0.00038	g/min
Toluene	1215-1235	4.9	mg/Nm³	0.0035	g/min
m&p-Xylenes	1215-1235	5.8	mg/Nm³	0.0041	g/min
o-Xylene	1215-1235	0.47	mg/Nm³	0.00033	g/min
2-Butanone (MEK)	1215-1235	55	mg/Nm³	0.040	g/min
Dimethyl sulphide	1215-1235	160	mg/Nm³	0.12	g/min
Dimethyl trisulphide*	1215-1235	40	mg/Nm³	0.029	g/min
Dodecane	1215-1235	9.3	mg/Nm³	0.0067	g/min
Decane	1215-1235	5.3	mg/Nm³	0.0038	g/min
Octane	1215-1235	6.9	mg/Nm³	0.0049	g/min
Tridecane	1215-1235	4.9	mg/Nm³	0.0035	g/min
Ethyl decanoate*	1215-1235	3.3	mg/Nm³	0.0024	g/min
Ethyl furan*	1215-1235	89	mg/Nm³	0.063	g/min
Ethyl octonoate*	1215-1235	6.6	mg/Nm³	0.0048	g/min
Undecane*	1215-1235	13	mg/Nm³	0.0095	g/min
Furfural*	1215-1235	21	mg/Nm³	0.015	g/min
Hexanal*	1215-1235	22	mg/Nm³	0.016	g/min
Methyl butanal*	1215-1235	270	mg/Nm³	0.19	g/min
Methyl butanol*	1215-1235	< 0.02	mg/Nm³	< 0.00002	g/min
Methyl furan*	1215-1235	1,200	mg/Nm³	0.86	g/min
Methyl propanol*	1215-1235	14	mg/Nm³	0.010	g/min
Pentanal*	1215-1235	33	mg/Nm³	0.024	g/min
Pentyl furan*	1215-1235	44	mg/Nm³	0.032	g/min
Trimethyl dioxolane*	1215-1235	14	mg/Nm³	0.0098	g/min

* Compound is tentatively identified based upon computer library search of mass spectra. Results are semi-quantitative based upon generic response factor for this class of analyte.

DDG26: Finish feed

18 April 2007



Flow Results			DDG26
Time of flow tests	0945 and 1045	hrs	
Stack dimensions at sampling plane (vent 1)	790 x 260	mm	
Velocity at sampling plane (vent 1)	0.82	m/s	
Stack dimensions at sampling plane (vent 2)	95	mm	
Velocity at sampling plane (vent 2)	0.71	m/s	
Stack dimensions at sampling plane (vent 3)	105	mm	
Velocity at sampling plane (vent 3)	1.5	m/s	
Average temperature	94	°C	
Moisture content	73	%v/v	
Flow rate at discharge conditions	11	m³/min	
Flow rate at wet NTP conditions	8.3	m³/min	
Flow rate at dry NTP conditions	2.3	m³/min	

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	96	1025-1026	180,000 ou	1,500,000 ouv/min

Note: A further 1 in 121 dilution was required to bring within the scale of the olfactometer. This ratio is greater than recommended by AS4323.3.

Panel n-butanol threshold	48 ppb
Odour character (hedonic tone)	Neutral - midly unpleasant
Odour character	Vegemite, molasses, fermentation, bread, yeast

DDG26: Finish feed (continued)

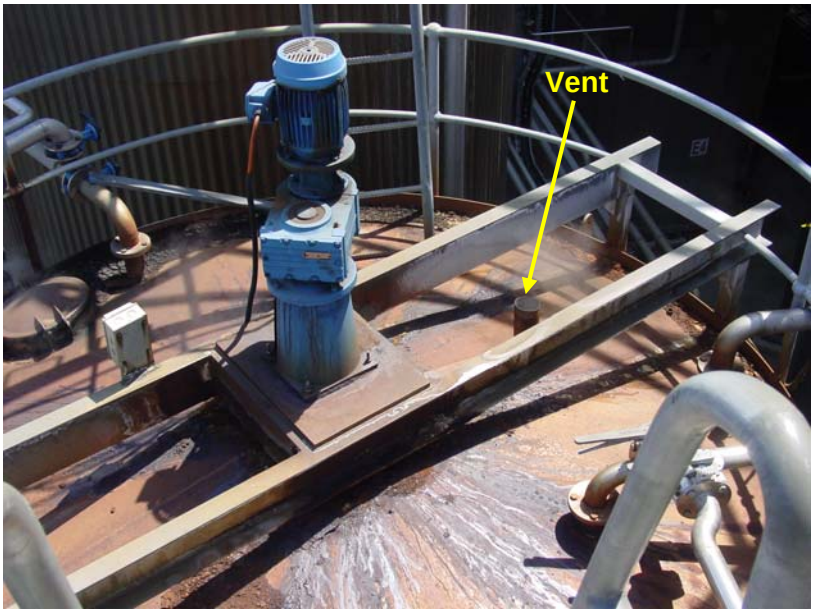
18 April 2007

Volatile Organic Compound (VOC) Results DDG26	Sampling Times	Concentration at NTP		Mass rate	
Benzene	1021-1041	0.021	mg/Nm³	0.000049	g/min
1,2,4,Trimethyl benzene	1021-1041	< 0.01	mg/Nm³	< 0.00002	g/min
Chloroform	1021-1041	< 0.01	mg/Nm³	< 0.00002	g/min
Ethyl benzene	1021-1041	< 0.01	mg/Nm³	< 0.00002	g/min
Styrene	1021-1041	< 0.01	mg/Nm³	< 0.00002	g/min
Toluene	1021-1041	0.21	mg/Nm³	0.00049	g/min
m&p-Xylenes	1021-1041	0.011	mg/Nm³	0.000024	g/min
o-Xylene	1021-1041	< 0.01	mg/Nm³	< 0.00002	g/min
2-Butanone (MEK)	1021-1041	3.5	mg/Nm³	0.0079	g/min
Dimethyl sulphide	1021-1041	0.53	mg/Nm³	0.0012	g/min
Dimethyl trisulphide*	1021-1041	< 0.01	mg/Nm³	< 0.00002	g/min
Dodecane	1021-1041	< 0.01	mg/Nm³	< 0.00002	g/min
Decane	1021-1041	< 0.01	mg/Nm³	< 0.00002	g/min
Octane	1021-1041	< 0.01	mg/Nm³	< 0.00002	g/min
Tridecane	1021-1041	< 0.01	mg/Nm³	< 0.00002	g/min
Ethyl decanoate*	1021-1041	< 0.01	mg/Nm³	< 0.00002	g/min
Ethyl furan*	1021-1041	0.25	mg/Nm³	0.00056	g/min
Ethyl octonoate*	1021-1041	< 0.01	mg/Nm³	< 0.00002	g/min
Undecane*	1021-1041	< 0.01	mg/Nm³	< 0.00002	g/min
Furfural*	1021-1041	20	mg/Nm³	0.045	g/min
Hexanal*	1021-1041	0.42	mg/Nm³	0.00095	g/min
Methyl butanal*	1021-1041	2.5	mg/Nm³	0.0056	g/min
Methyl butanol*	1021-1041	0.096	mg/Nm³	0.00022	g/min
Methyl furan*	1021-1041	0.94	mg/Nm³	0.0021	g/min
Methyl propanol*	1021-1041	0.87	mg/Nm³	0.0020	g/min
Pentanal*	1021-1041	< 0.01	mg/Nm³	< 0.00002	g/min
Pentyl furan*	1021-1041	< 0.01	mg/Nm³	< 0.00002	g/min
Trimethyl dioxolane*	1021-1041	1.4	mg/Nm³	0.0032	g/min
Acetone*	1021-1041	< 0.1	mg/Nm³	< 0.0003	g/min
Butanal*	1021-1041	2.2	mg/Nm³	0.0050	g/min
Ethanol*	1021-1041	2.2	mg/Nm³	0.0050	g/min

* Compound is tentatively identified based upon computer library search of mass spectra. Results are semi-quantitative based upon generic response factor for this class of analyte.

DDG30: Dryer feed tank

18 April 2007



Flow Results			DDG30
Time of flow tests	0931 and 0950	hrs	
Stack dimensions at sampling plane	95	mm	
Velocity at sampling plane	2.0	m/s	
Average temperature	93	°C	
Moisture content	71	%v/v	
Flow rate at discharge conditions	0.84	m^3/min	
Flow rate at wet NTP conditions	0.63	m^3/min	
Flow rate at dry NTP conditions	0.18	m^3/min	

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	151	0934-0935	200,000 ou	120,000 ouv/min

Note: A further 1 in 121 dilution was required to bring within the scale of the olfactometer. This ratio is greater than recommended by AS4323.3.

Panel n-butanol threshold 48 ppb

Odour character (hedonic tone) Mildly unpleasant

Odour character Vegemite, bread, fermentation, yeast, acrid.

DDG30: Dryer feed tank (continued)

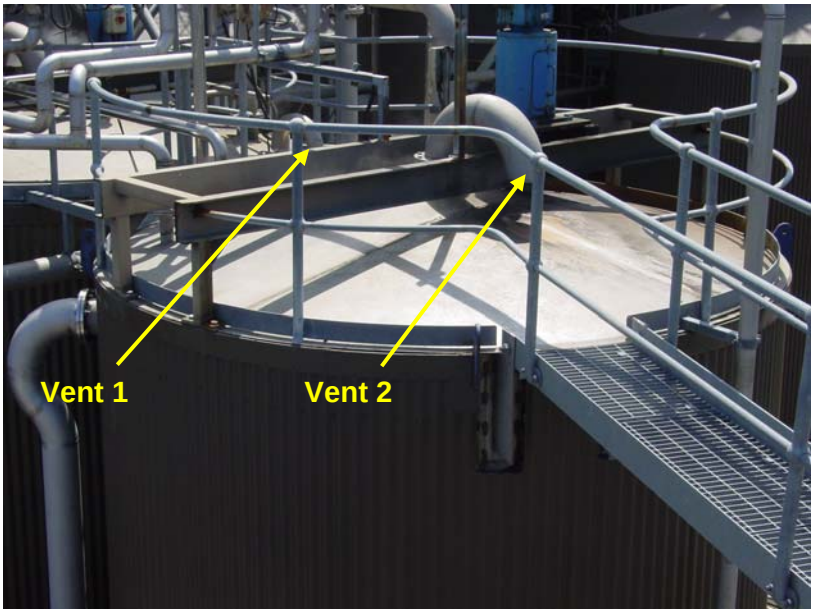
18 April 2007

Volatile Organic Compound (VOC) Results DDG30	Sampling Times	Concentration at NTP		Mass rate	
Benzene	0925-0945	0.022	mg/Nm³	0.0000040	g/min
1,2,4,Trimethyl benzene	0925-0945	< 0.01	mg/Nm³	< 0.000002	g/min
Chloroform	0925-0945	< 0.01	mg/Nm³	< 0.000002	g/min
Ethyl benzene	0925-0945	0.011	mg/Nm³	0.0000020	g/min
Styrene	0925-0945	< 0.01	mg/Nm³	< 0.000002	g/min
Toluene	0925-0945	0.48	mg/Nm³	0.000086	g/min
m&p-Xylenes	0925-0945	0.022	mg/Nm³	0.0000040	g/min
o-Xylene	0925-0945	0.011	mg/Nm³	0.0000020	g/min
2-Butanone (MEK)	0925-0945	9.1	mg/Nm³	0.0016	g/min
Dimethyl sulphide	0925-0945	0.85	mg/Nm³	0.00015	g/min
Dimethyl trisulphide*	0925-0945	< 0.01	mg/Nm³	< 0.000002	g/min
Dodecane	0925-0945	< 0.01	mg/Nm³	< 0.000002	g/min
Decane	0925-0945	< 0.01	mg/Nm³	< 0.000002	g/min
Octane	0925-0945	< 0.01	mg/Nm³	< 0.000002	g/min
Tridecane	0925-0945	< 0.01	mg/Nm³	< 0.000002	g/min
Ethyl decanoate*	0925-0945	< 0.01	mg/Nm³	< 0.000002	g/min
Ethyl furan*	0925-0945	0.18	mg/Nm³	0.000032	g/min
Ethyl octonoate*	0925-0945	< 0.01	mg/Nm³	< 0.000002	g/min
Undecane*	0925-0945	< 0.01	mg/Nm³	< 0.000002	g/min
Furfural*	0925-0945	240	mg/Nm³	0.042	g/min
Hexanal*	0925-0945	0.59	mg/Nm³	0.00011	g/min
Methyl butanal*	0925-0945	12	mg/Nm³	0.0022	g/min
Methyl butanol*	0925-0945	0.60	mg/Nm³	0.00011	g/min
Methyl furan*	0925-0945	5.9	mg/Nm³	0.0011	g/min
Methyl propanol*	0925-0945	5.6	mg/Nm³	0.0010	g/min
Pentanal*	0925-0945	0.20	mg/Nm³	0.000036	g/min
Pentyl furan*	0925-0945	< 0.01	mg/Nm³	< 0.000002	g/min
Trimethyl dioxolane*	0925-0945	6.6	mg/Nm³	0.0012	g/min
Acetone*	0925-0945	< 0.08	mg/Nm³	< 0.00002	g/min
Butanal*	0925-0945	2.2	mg/Nm³	0.00039	g/min
Ethanol*	0925-0945	1.5	mg/Nm³	0.00027	g/min

* Compound is tentatively identified based upon computer library search of mass spectra. Results are semi-quantitative based upon generic response factor for this class of analyte.

DDG31: Syrup holding tank

18 April 2007



Flow Results			DDG31
Time of flow tests	1135	hrs	
Stack dimensions at sampling plane (vent 1)	210	mm	
Velocity at sampling plane (vent 1)	0.80	m/s	
Stack dimensions at sampling plane (vent 2)	95	mm	
Velocity at sampling plane (vent 2)	0.56	m/s	
Average temperature	61	°C	
Flow rate at discharge conditions	1.9	m³/min	
Flow rate at wet NTP conditions	1.5	m³/min	

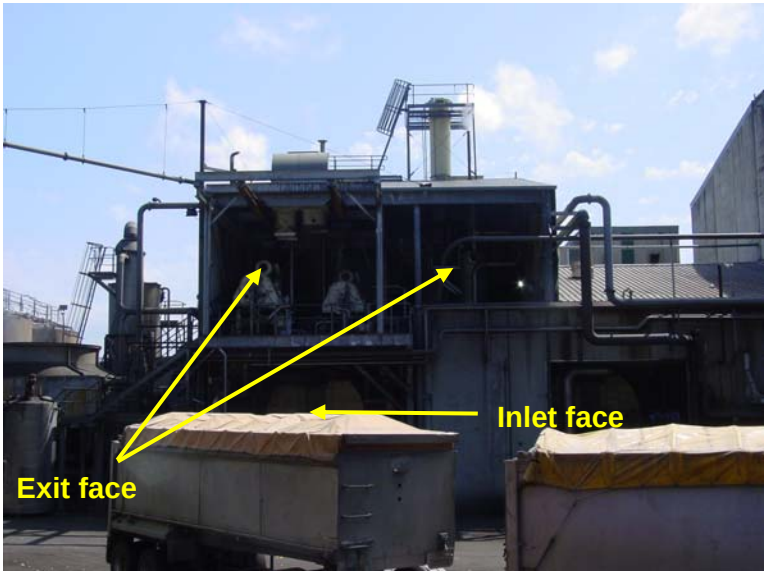
Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	134	1127-1128	190,000 ou	290,000 ouv/min

Note: A further 1 in 121 dilution was required to bring within the scale of the olfactometer. This ratio is greater than recommended by AS4323.3.

Panel n-butanol threshold	48 ppb
Odour character (hedonic tone)	Mildly unpleasant
Odour character	Vegemite, bread, fermentation, yeast, acrid.

DDG39: Dryer building

19 April 2007



Flow Results			DDG39
Time of flow tests	0723 - 0730	hrs	
Stack dimensions at sampling plane	5000 x 11000	mm	
Velocity at sampling plane	0.89	m/s	
Average temperature	25	°C	
Flow rate at discharge conditions	2,900	m³/min	
Flow rate at wet NTP conditions	2,700	m³/min	
Flow rate at dry NTP conditions	2,700	m³/min	

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	82	0723-0730	1,100 ou	3,100,000 ouv/min
Odour (Inlet)	102	0743-0749	42 ou	110,000 ouv/min

Note: Downwind results not corrected for upwind contribution.

EXIT

Panel n-butanol threshold 60 ppb

Odour character (hedonic tone) Midly pleasant – neutral

Odour character Yeast, stale, bread, molasses, fermentation

INLET

Panel n-butanol threshold 60 ppb

Odour character (hedonic tone) Neutral, midly - unpleasant

Odour character Stale, yeast

DDG dryer building cooling tower

19 April 2007

Cooling tower near DDG building (beside DDG39)

Flow Results		
Time of flow tests	0810	hrs
Stack dimensions at sampling plane	4500	mm
Velocity at sampling plane	7.4	m/s
Average temperature	29	°C
Moisture content	3.8	%v/v
Flow rate at discharge conditions	7,000	m³/min
Flow rate at wet NTP conditions	6,400	m³/min
Flow rate at dry NTP conditions	6,100	m³/min

Odour Results	Sample ID	Sampling Times	Concentration		Mass rate	
Odour (Exit)	179	0825-0830	650	ou	4,100,000	ouv/min
Odour (Inlet)	102	0743-0749	42	ou	270,000	ouv/min

Note: Downwind results not corrected for upwind contribution.

EXIT

Panel n-butanol threshold 60 ppb

Odour character (hedonic tone) Neutral – midly unpleasant

Odour character Yeast, bread, fermentation, stale

INLET

Panel n-butanol threshold 60 ppb

Odour character (hedonic tone) Neutral - midly unpleasant

Odour character Stale, yeast

DDG evaporators area cooling tower 3A

18 April 2007

Cooling tower near DDG evaporaters

Flow Results		
Time of flow tests	1317	hrs
Stack dimensions at sampling plane	2500	mm
Velocity at sampling plane	5.6	m/s
Average temperature	34	°C
Moisture content	4.9	%v/v
Flow rate at discharge conditions	1,600	m³/min
Flow rate at wet NTP conditions	1,500	m³/min
Flow rate at dry NTP conditions	1,400	m³/min

Odour Results	Sample ID	Sampling Times	Concentration	Mass rate
Odour (Exit)	16	1305-1311	< 30 ou	< 50,000 ouv/min
Odour (Inlet)	62	1334-1340	< 30 ou	< 50,000 ouv/min

EXIT

Panel n-butanol threshold	48 ppb
Odour character (hedonic tone)	Midly unpleasant
Odour character	Alcohol, fermentation

INLET

Panel n-butanol threshold	48 ppb
Odour character (hedonic tone)	Neutral
Odour character	No discernable odour

F3: Pond 2

19 April 2007

Location	Pond 2
Equilibration time, hrs	0948 - 1020
Sample ID	20
Dilution ratio	1 in 6
Sampling time, hrs	1020 - 1021
odour concentration, ou	**3900**
odour flux rate, ou/m²/min	**140**
Surface temperature (°C)	20.3
Chamber temperature (°C)	26.2
Ambient temperature (°C)	21.9

Panel n-butanol threshold	60 ppb
Odour character (hedonic tone)	Mildly pleasant - mildly unpleasant
Odour character	Yeast, bread, sweet, fermentation.

F4: Pond 3

19 April 2007

Location	Pond 3
Date tested	19/04/2007
Equilibration time, hrs	0942 - 1008
Sample ID	163
Dilution ratio	1 in 6
Sampling time, hrs	1008 - 1009
odour concentration, ou	**4900**
odour flux rate, ou/m²/min	**180**
Surface temperature (°C)	22.3
Chamber temperature (°C)	23.1
Ambient temperature (°C)	21.9

Panel n-butanol threshold	60 ppb
Odour character (hedonic tone)	Mildly pleasant – very unpleasant
Odour character	fermentation, acrid.

F5: Pond 4

19 April 2007

Location	Pond 4
Date tested	19/04/2007
Equilibration time, hrs	1037 - 1108
Sample ID	7
Dilution ratio	1 in 6
Sampling time, hrs	1108 - 1109
odour concentration, ou	**32000**
odour flux rate, ou/m²/min	**1200**
Surface temperature (°C)	26.2
Chamber temperature (°C)	25.4
Ambient temperature (°C)	22.3

Note: A further 1 in 11 dilution was required to bring within the scale of the olfactometer. This ratio is greater than recommended by AS4323.3.

Panel n-butanol threshold 60 ppb

Odour character (hedonic tone) Very unpleasant

Odour character Sour, rancid, fermentation, vomit, acrid.

F7: Pond 5

19 April 2007

Location	Pond 5
Date tested	19/04/2007
Equilibration time, hrs	1101 - 1137
Sample ID	95
Dilution ratio	1 in 6
Sampling time, hrs	1137 - 1138
odour concentration, ou	**5800**
odour flux rate, ou/m²/min	**210**
Surface temperature (°C)	25.6
Chamber temperature (°C)	25.2
Ambient temperature (°C)	23.7

Panel n-butanol threshold	60 ppb
Odour character (hedonic tone)	Mildly unpleasant
Odour character	Bread, yeast, fermentation.

E23: Cooling tower

18 April 2007

Flow Results			E23
Time of flow tests		1553	hrs
Stack dimensions at sampling plane		3400	mm
Velocity at sampling plane		12	m/s
Average temperature		31	°C
Moisture content		4.3	%v/v
Flow rate at discharge conditions		6,500	m³/min
Flow rate at wet NTP conditions		5,900	m³/min
Flow rate at dry NTP conditions		5,600	m³/min

Odour Results	Sample ID	Sampling Times	Concentration		Mass rate	
Odour (Exit)	52	1430-1435	130	ou	790,000	ouv/min
Odour (Inlet)	1	1435-1442	100	ou	590,000	ouv/min

Note: Downwind results not corrected for upwind contribution.

EXIT

Panel n-butanol threshold	48 ppb
Odour character (hedonic tone)	Neutral
Odour character	Bread, yeast, earthy, fermentation

INLET

Panel n-butanol threshold	48 ppb
Odour character (hedonic tone)	Neutral
Odour character	Bread, yeast, earthy

E23 - 2: Cooling tower

18 April 2007

Flow Results			E23-2
Time of flow tests	1610	hrs	
Stack dimensions at sampling plane	3400	mm	
Velocity at sampling plane	9.1	m/s	
Average temperature	34	°C	
Moisture content	5.2	%v/v	
Flow rate at discharge conditions	5,000	m³/min	
Flow rate at wet NTP conditions	4,400	m³/min	
Flow rate at dry NTP conditions	4,200	m³/min	

Odour Results	Sample ID	Sampling Times	Concentration		Mass rate
Odour (Exit)	83	1437-1442	130	ou	560,000 ouv/min
Odour (Inlet)	1	1435-1442	100	ou	440,000 ouv/min

Note: Downwind results not corrected for upwind contribution.

EXIT

Panel n-butanol threshold	48 ppb
Odour character (hedonic tone)	Neutral
Odour character	Bread, yeast, earthy, fermentation

INLET

Panel n-butanol threshold	48 ppb
Odour character (hedonic tone)	Neutral
Odour character	Bread, yeast, earthy

APPENDIX: Weather conditions

Nowra, New South Wales
April 2007 Daily Weather Observations

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9:00 AM						3:00 PM					
		Min	Max				Dir	Spd	Time	Temp	RH	Cld	Dir	Spd	MSLP	Temp	RH	Cld	Dir	Spd	MSLP
		°C	°C	mm	mm	hours		km/h	local	°C	%	8th		km/h	hPa	°C	%	8th		km/h	hPa
1	Su	12	22.8	0			E	22	15:42	18.3	55		SSW	13	1026.4	22.2	51		SE	11	1023.1
2	Mo	10.5	28.4	0			NNW	30	10:47	19.4	62		NW	19	1022.3	28	27		W	17	1017.2
3	Tu	11.9	22.6	0			SSE	31	12:17	20	69		SSE	9	1021.8	20.5	71		S	20	1020.6
4	We	16.5	22.6	1.2			SSW	24	5:36	18.1	80		S	17	1024.8	20.9	69		ESE	17	1021.8
5	Th	12.2	22.5	0			SSE	41	13:32	19.2	76		S	15	1020.5	19.7	66		SSE	28	1019.9
6	Fr	12.8	19.6	2.6			S	44	12:29	14	90		SSW	20	1025.9	16.6	76		S	22	1025.7
7	Sa	12.5	20.8	1.2			S	46	10:27	17	66		SSW	22	1029.8	17.5	87		S	20	1029
8	Su	13.1	21.3	2.6			SE	31	13:20	15.4	92		WNW	13	1032.7	18.3	72		SSE	7	1031.1
9	Mo	12.5	22.1	3.4			ENE	24	15:52	15.8	93		WNW	7	1033.7	21.5	54		ENE	13	1030.5
10	Tu	10.8	24.1	0.2			WNW	24	9:48	17.3	77		NW	13	1030.2	23	56		ENE	17	1026
11	We	11.8	25.7	0			SSE	39	14:28	18.4	59		NW	19	1024.4	22.2	57		SE	26	1024.3
12	Th	14.4	23.6	1.2			ENE	24	13:34	19.1	72		WNW	2	1027.9	22.1	60		NE	17	1023.7
13	Fr	11.8	22.6	0.2			ESE	24	14:54	17.9	78		NW	13	1028.5	20.2	65		ESE	19	1025.8
14	Sa	11.7	24.8	0			NW	22	9:14	17.8	75		NW	13	1026.1	24	54		E	17	1020.6
15	Su	11.7	26.2	0			SW	39	16:35	20.9	49		W	11	1019.4	22.9	56		E	17	1014.4
16	Mo	11.6	22.8	1.8			S	41	15:25	19.5	71		SSW	15	1016.8	21.2	59		S	26	1015.1
17	Tu	13.6	23.3	0			S	24	12:05	19.2	74		S	13	1018.2	20.8	66		ESE	15	1015.7
18	We	12.3	24.2	0			E	28	15:24	19.3	70		NW	7	1018.4	23	65		ENE	20	1015
19	Th	12.4	20.8	0			S	20	3:07	16.8	83		NW	11	1018.3	20.4	76		NE	9	1015.3
20	Fr	13.3	22.7	0.2			SSW	33	9:17	19.3	77		SSW	20	1018.3	20.8	66		SE	20	1016.9
21	Sa	12.1	24	0			ESE	26	15:01	16.8	76		NW	13	1019.2	22.5	54		ESE	19	1015.8
22	Su	12.3	21.7	0.2			SSE	30	16:06	17	83		WNW	7	1018.4	20.3	72		SSE	22	1017.1
23	Mo	14.3	19.9	2			S	50	13:15	16.8	72		SSW	15	1022.1	16.2	92		S	24	1021.6
24	Tu	13.7	17.1	12.6			SSW	39	3:06	14.6	92		SSW	17	1026.1	15.8	86		SSW	26	1024.1
25	We	13.8	19.8	5.6			SSE	30	12:23	17	68		SSW	20	1025.4	17.5	65		SSE	15	1022.5
26	Th	9.6	20.3	0			SSE	33	14:42	15.2	74		NW	13	1023.3	18.5	62		S	20	1019.9
27	Fr	11.4	18.1	2.2			NW	17	4:18	14	86		NW	11	1018.2	17.6	78		S	7	1013.6
28	Sa	13.9	18.9	5.2			W	19	21:10	14.6	96			Calm	1007.8	18	84		ENE	6	1003.3
29	Su	9.7	23.4	5			W	50	9:48	18.8	61		WNW	26	1003.5	22.1	42		WNW	22	1001.4
30	Mo	14.2	21.6	0.4			WNW	46	0:25	18.4	62		WNW	19	1005.7	16.1	86		W	13	1007
Statistics for April 2007																					
	Mean	12.5	22.3							17.5	74			13	1021.8	20.3	65			17	1019.3
	Lowest	9.6	17.1	0						14	49			Calm	1003.5	15.8	27		ENE	6	1001.4
	Highest	16.5	28.4	12.6			#	50		20.9	96		WNW	26	1033.7	28	92		SSE	28	1031.1
	Total			47.8																	

IDCJDW2101.200704 Prepared at 16:07 GMT on Saturday 2 June 2007

Source of data

Observations were drawn from Nowra RAN Air Station AWS {station 068072}.

Appendix F

Pre-survey Trial

Pre-Survey Trial: Odour Sample Degradation

The methodology of the trial was as follows:

» The No. 1 Starch Dryer and Palmer Cooler at the DDG plant discharge points were selected. The odour Sources were specifically selected so that, 1) significant odour sources with two different odour characters were represented, and 2) static pre-dilution of the odour sample would not be required;

» Duplicate odour samples were collected using a sample pump to evacuate the air space in a 60 litre plastic barrel, causing odorous air to be drawn via a Teflon line into a Nalaphan sample bag. The sample pump rate was set at 2 L/min and samples taken over ~ 10 minute period; ;

» Samples were collected at approximately 10 a.m. on the 20th December 2006 by GHD personnel;

» The respective odour samples were sent by road freight courier to Environodour's olfactometry laboratory in Sydney and Emission Testing Consultant's (ETC) NATA accredited laboratory in Melbourne;

» The odour samples sent to Environodour were analysed after lapsed time periods of 5, 6 and 26 hours. The odour samples sent to ETC were analysed after a 26 hour lapse time period;

» All Odour samples were analysed by dynamic olfactometry (forced-choice method) in accordance with AS 4323.3, "*Stationary Source Emissions – Determination of odour concentration by dynamic olfactometry".* All odour analysis was conducted with six member odour panels, with all members of the panel screened by n-butanol threshold determination using a certified n-butanol gas standard.

The key results of the trial are as follows:

» The measured odour concentration as a function of lapse time is presented in Figure 1. Figure 1 shows that the degradation of the sample in terms of measured odour concentration is significant – the odour concentrations measured after a 5-hour lapsed period are approximately 2 to 3 times higher than the odour concentration measured on the sample after a lapsed period of 25 hours;

» The relatively low odour concentrations determined for the samples at the ETC laboratory support the trend observed in the samples analysed by Environodour – refer to Figure 2;

» The odour concentrations reported for the Starch Dryer (EPA No. 12) after a 25-hour lapsed period are similar to the typical odour concentration reported by Stephenson's for this source as part of Shoalhaven's Annual Return (ETC = 84 OU, Environodour = 230 OU, SEMA = ~150 OU).

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MEMORANDUM

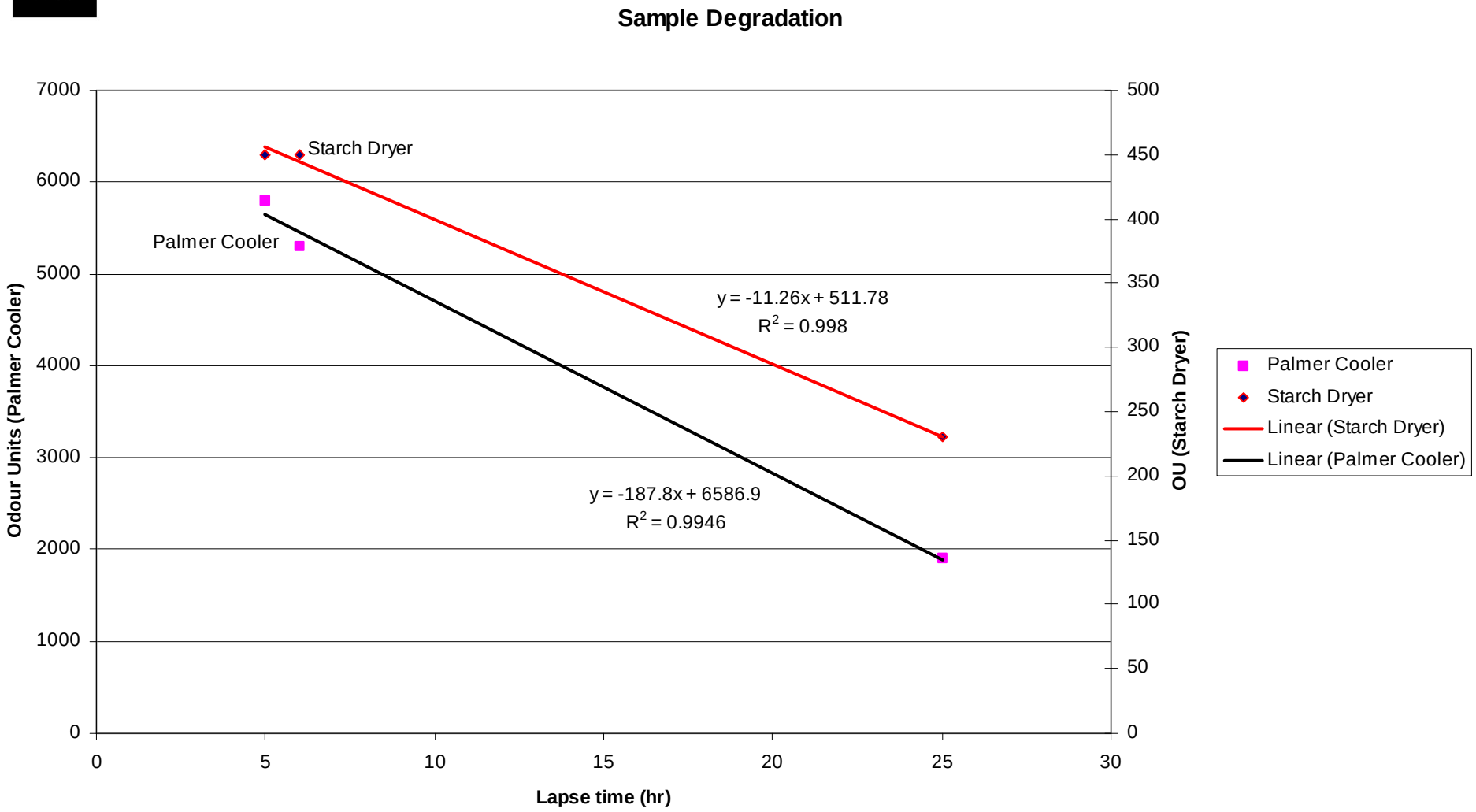

Figure 1 Odour Sample Degradation

23/11918/74860

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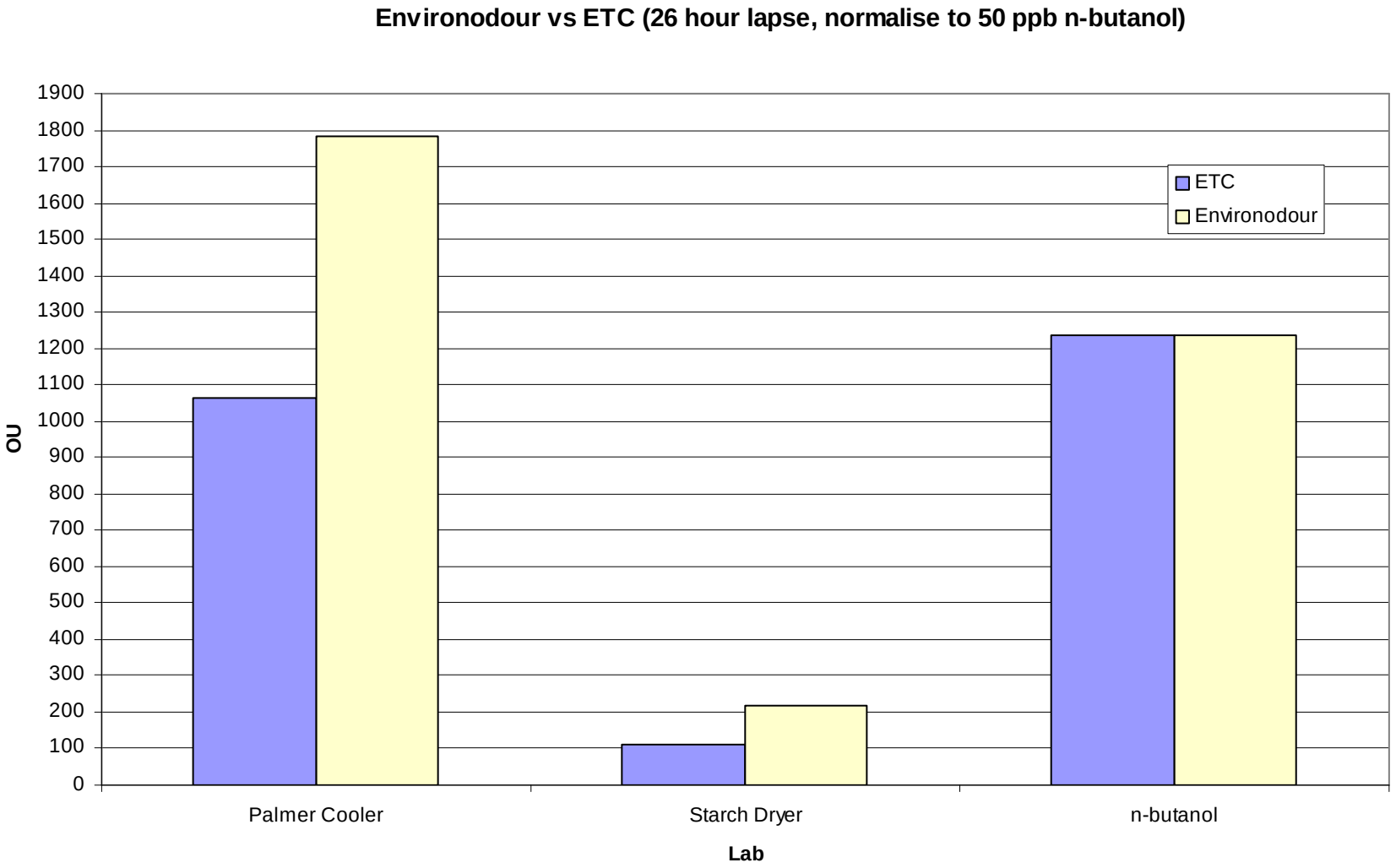

Figure 2 Inter-laboratory Comparison – 24-hour lapse time

Appendix G

Odour Emission Rate Inventory

Manildra Group
Odour Emission Rate Inventory - Existing
Notes: -1 hedonic tone = very unpleasant, 0 = neutral, 1 = mildly pleasant

Plant	Section	Unit	Audit Ref No.	OU	Unit area (m2)	SOER (m/s)	SOER m/min	OER m3/min	OER per unit (OUm3/s)	No. units	Total OER (OUm3/s)	Hedonic tone	Assumptions/Remarks
DDG	Dryer building	Cooling towers	DDG46	650				4,100,000	68,333	1	68,333	NS	
DDG	Dryer building	DDG dryer baghouse (palmer cooler)	DDG16	1,700				530,000	8,833	1	8,833	-1	
DDG	Dryer building	DDG heat exchanger	DDG45	34,000				140,000	2,333	1	2,333	1	
DDG	Dryer building	Decanters 1 & 2	DDG2	14,000				7,800	130	2	260	-1	Assume measured OER for Decanter No. 1 aplies to No. 2
DDG	Dryer building	Decanters 3 & 4	DDG5	15,000				51,000	850	2	1,700	-1	Assume measured OER for Decanter No. 4 aplies to No. 3
DDG	Dryer building	Dryer Building	DDG39	830					35,252	2	70,504	-2	Fugitve OER measured at the building opening located at the southend was assumed to be equal to fugitve emission from the north end of the building (where it was not possible to conduct measurements). Similar process equipment is located in each building section.
DDG	Dryer building	light phase recovery tank	DDG19	23,000				27,000	450	1	450	-1	
DDG	Evaporators	CIP - spent caustic	DDG33	20,000				18,000	300	1	300	-2	Disregarded - higher DDG32 OER used in emission inventory
DDG	Evaporators	CIP - fresh caustic	DDG32	32,000				25,000	417	1	417	-1	
DDG	Evaporators	Condensate	DDG23	240,000				1,200,000	20,000	1	20,000	-1	
DDG	Evaporators	Cooling towers	DDG47	ND							0		odour level below detection threshold. Refer to ETC report April 2007
DDG	Evaporators	Decanter feed tank	DDG1	31,000				13,000	217	1	217	-2	Discard test #1
DDG	Evaporators	Dryer feed tank	DDG30	110,000				86,000	1,433	1	1,433	-1	
DDG	Evaporators	Feed dump	DDG20	136,500				535,000	8,917	1	8,917	-1	avg of 2 tests on different days
DDG	Evaporators	Feed holding tank (Syrup)	DDG31	38,000				79,000	1,317	1	1,317	-2	
DDG	Evaporators	Feeds dryer #3 - baghouses	DDG18	1,100				52,000	867	1	867	-1	
DDG	Evaporators	Finish Feed	DDG26	200,000				1,100,000	18,333	1	18,333	-2	
DDG	Evaporators	Finisher pump tank	DDG28	NS				86,000	1,433	1	1,433	-1	apply DDG30
DDG	Evaporators	Vent condensor	DDG24	300,000				210,000	3,500	1	3,500	-2	
DDG	Evaporators	vent condensor drain	DDG25	120,000				190,000	3,167	1	3,167	-1	
DDG	Load-out	DDG Load-out awning	DDG35	20					54	1	54	-1	
DDG	Load-out	DDG product storage sheds	DDG34	550					6,820	1	6,820	-1	
DDG	Load-out	DDG tent storage area	DDG36	590					12,862	1	12,862	0	
DDG	Load-out	Grounds	DDG37	1,800	200	1.02	61		203	1	203	-1	

Manildra Group
Odour Emission Rate Inventory - Existing
Notes: -1 hedonic tone = very unpleasant, 0 = neutral, 1 = mildly pleasant

Plant	Section	Unit	Audit Ref No.	OU	Unit area (m2)	SOER (m/s)	SOER m/min	OER m3/min	OER per unit (OUm3/s)	No. units	Total OER (OUm3/s)	Hedonic tone	Assumptions/Remarks
Distillery	DME	DME vent	D12	190,000				6,400	107	1	107	-2	
Distillery	Stage 1	Recyled water to waste water	D11	11,000				990	17	1	17	-1	
Distillery	Stage 2	Molecular Sieve - Vacuum drum	D2	26,000				81,000	1,350	1	1,350	-1	
Distillery	Stage 3	Incondensible gases vent	D6	21,000				24,000	400	1	400	-2	
Ethanol	Fermentation	Buffer tank	E11	11,000				1,200	20	1	20	-1	
Ethanol	Fermentation	Cooling towers	E23	130				790,000	13,167	5	65,833	-1	round 2 results (refer to ETC report April 2007), inlet OU blevel was not subtracted from outlet
Ethanol	Fermentation	Feed transfer to distillery	E22	6,100				10,000	167	1	167	-2	
Ethanol	Fermentation	Grain retention - tank 2 (Fermenter #7)	E8	16,000				390,000	6,500	1	6,500	-1	mean of 2 samples
Ethanol	Fermentation	Jet cooker 1 - retention tank	E13	17,000				64,000	1,067	1	1,067	-1	
Ethanol	Fermentation	Jet cooker 2 & 4 - Grain retention	E7	18,000				68,000	1,133	1	1,133	-2	mean of 2 samples
Ethanol	Fermentation	Starch factory rejects collection tank	E10	23,000				11,000	183	1	183	0	
Ethanol	Fermentation	Yeast propagators - tanks 4 & 5	E15	27,000				850,000	14,167	2	28,333	-1	
Ethanol	Fermentation	Yeast propagators- tanks 1, 2 & 3	E14	21,000				110,000	1,833	3	5,500	-2	
Ethanol	Hammer mill	Baghouse	E24	30				6,000	100	1	100	0	
Ethanol	Hammer mill	Baghouse	E9	36				1,700	28	2	57	0	
Ethanol	Hammer mill	Buhler baghouse	E4	84				5,500	92	1	92	0	
Ethanol	Hammer mill	Grain silo - baghouse	E1	310				11,000	183	1	183	0	

Manildra Group
Odour Emission Rate Inventory - Existing
Notes: -1 hedonic tone = very unpleasant, 0 = neutral, 1 = mildly pleasant

Plant	Section	Unit	Audit Ref No.	OU	Unit area (m2)	SOER (m/s)	SOER m/min	OER m3/min	OER per unit (OUm3/s)	No. units	Total OER (OUm3/s)	Hedonic tone	Assumptions/Remarks
Farm	Factory	Farm tank	F18	30,000	8	970.46	58228	460,000	7,667	1	7,667	-1	
Farm	Irrigation	Pivot No. 103 (mist nozzel)	F9	560					1,156,968	1	1,156,968	-1	
Farm	Irrigation	Pivot No. 101	F9	NS					0	1	833,017	-1	Pivot 1 - OER derived from Pivot No. 103 OER based on irrigation rate ratio of 0.18 : 0.25 ML/hr (No. 101 : No. 103)
Farm	Irrigation	Pivot No. 102	F9	NS					0	1	833,017	-1	Pivot 1 - OER derived from Pivot No. 103 OER based on irrigation rate ratio of 0.18 : 0.25 ML/hr (No. 101 : No. 103)
Farm	Irrigation	Pivot No. 104- (non mist)	F10	180					517,076			-1	Sopers in operation (does not operate when walshes running), not included in the model or inventoryy - measured for discussion purposes
Farm	Irrigation	Irrigated land - Pivots	F15, F17, F12, F14	310	920,000	0.05	3		44,467	1	44,467	1	irrigation area = Pivot 1+ Pivot 2 = 2 x 32 Ha + walshes 28 Ha. 50% wet and 50% dry. Grass 'blank' = 8.1 ou/m2/min subtracted from SOER
Farm	Irrigation	Travellers- spray	F11	180					29,573	4	162,650	-1	Total OER = 2 large (0.7ML/hr) and 2 small (0.4ML/hr) in operation. OER measured on small traveller.
Farm	Irrigation	Irrigated land - travellers	F13	780	250,800	0.18	11		45,980	1	45,980	-1	grass area outside of pivot 1 and pivot 2 arm radius. Assume 50% wet/dry
Farm	Ponds	Mixer tank vent	F1	210,000				8,800,000	146,667	1	146,667	-2	
Farm	Ponds	Pond 1	F2	NS	3,200	2.33	140		7,467	1	7,467	-1	could not access pond. Apply pond 2 SOER
Farm	Ponds	Pond 2	F3	3,800	3,200	2.33	140		7,467	1	7,467	-1	
Farm	Ponds	Pond 3	F4	13,000	8,000	7.83	470		3,682	1	62,667	-1	
Farm	Ponds	Pond 4	F5, F6	16,000	400	9.20	550		3,680	1	3,680	-2	OER includes covered uncovered area only . Exposed area = 400m2
Farm	Ponds	Pond 5	F7	NS	35,525	2.33	140		327	1	82,892	-1	Pond empty at present. Apply pond 2 SOER
Farm	Ponds	Pond 6	F8	NS	56,000	2.33	140		327	1	130,667	-1	Pond empty at present. Apply pond 2 SOER

Manildra Group
Odour Emission Rate Inventory - Existing
Notes: -1 hedonic tone = very unpleasant, 0 = neutral, 1 = mildly pleasant

Plant	Section	Unit	Audit Ref No.	OU	Unit area (m2)	SOER (m/s)	SOER m/min	OER m3/min	OER per unit (OUm3/s)	No. units	Total OER (OUm3/s)	Hedonic tone	Assumptions/Remarks
Glucose	Brewers	Cooker A & B Flash Tanks	B3	9,400				57,000	950	1	950	-2	
Glucose	Brewers	Enzyme Tanks	B7	12,000				35,000	583	7	4,083	-1	
Glucose	Confectionary	Condensate water collection tanks	C19	6,500				750	13	1	13	0	
Glucose	Confectionary	Drum vacuum receiver	C4	6,500				210,000	3,500	1	3,500	-1	
Glucose	Confectionary	Flash vessel for Jet Cooker	C1	7,300				1,190	20	1	20	-1	
Glucose	Confectionary	Ion exchange effluent tank	C18	7,200				15,000	250	1	250	-1	
Glucose	Confectionary	Sach Tanks	C2	2,200				260	4	19	82	0	
Starch	Dryer building	Kestner dryer exhaust	DDG40	710				180,000	3,000	1	3,000	-1	
Starch	Dryers	No. 1 Gluten Dryer baghouse	S2	2,400				2,300,000	38,333	1	38,333	-1	
Starch	Dryers	No. 1 Starch Dryer	S1	380				190,000	3,167	1	3,167	0	
Starch	Dryers	No. 2 Gluten Dryer baghouse	S4	1,400				1,100,000	18,333	1	18,333	-1	
Starch	Dryers	No. 3 Gluten Dryer baghouse	S3	2,500				4,400,000	73,333	1	73,333	-1	
Starch	Dryers	No. 3 Starch Dryer	S18	230				330,000	5,500	1	5,500	0	
Starch	Dryers	No. 4 Gluten Dryer baghouse	S5	5,000				9,000,000	150,000	1	150,000	-1	
Starch	Dryers	No. 4 Starch Dryer	S19	470				610,000	10,167	1	10,167	-1	Use test 2 result only - making acetic anhydryde product
Starch	Dryers	Spray dryer	S20	120				59,000	983	1	983	0	
Starch	Grain processing p	Course bin	S11	200				2,000	33	1	33	-1	
Starch	Grain processing p	Course gluten transfer baghouse	S15	520				1,100	18	1	18	-1	
Starch	Grain processing p	Day bin transfer baghouse	S14	66				220	4	1	4	0	
Starch	Grain processing p	Flour bin aspirator	S13	190				30,000	500	2	1,000	-1	
Starch	Grain processing p	Pellet silo	S12	190				21,000	350	1	350	-1	
Starch	Starch building mis	Dry gluten roof bin	S7	1,100				270,000	4,500	1	4,500	-2	
Starch	Starch building mis	Flour bin	S10	100				8,200	137	1	137	0	
Starch	Starch building mis	Flour bin motor drive	S6	320				17,000	283	1	283	0	
Starch	Starch building mis	High protein dust collector	S8	490				36,000	600	1	600	0	
Starch	Starch building mis	Pre-separator	S9	150				5,800	97	1	97	0	
Starch	Tank farm	Starch reaction tanks	S17	38				6	0	4	0	-1	

Manildra Group
Odour emission inventory following odour control

Plant	Section	Unit	Audit reference	OU	Unit area (m2)	SOER (m/s)	OER per unit (OUm3/s)	No. units	Total OER (OUm3/s) BEFORE CONTROL	Total OER (OUm3/s) AFTER CONTROL	% reduction	Assumptions/Remarks
DDG	Dryer building	Dryer Building	DDG39	830			35,252	2	70,504	35,252	50%	improve negative pressure and duct odorous gas to boiler for destruction
DDG	Dryer building	Cooling towers	DDG46	650			68,333	1	68,333	0	100%	Prevent cooling water contamination
DDG	Evaporators	Condensate	DDG23	240,000			20,000	1	20,000	1,000	95%	Evaporator Plant bioscrubber - reduce OER by 95%
DDG	Evaporators	Finish Feed	DDG26	200,000			18,333	1	18,333	917	95%	Evaporator Plant bioscrubber - reduce OER by 95%
DDG	Dryer building	DDG dryer baghouse (palmer cooler)	DDG16	1,700			8,833	1	8,833	1,325	85%	DDG Plant bioscrubber - reduce OER by 85%
DDG	Load-out	DDG tent storage area	DDG36	590			12,862	1	12,862	1,929	85%	Pelletize DDG product, install door - reduce OER by 90% (CH confirm)
DDG	Evaporators	Feed dump	DDG20	136,500			8,917	1	8,917	446	95%	Evaporator Plant bioscrubber - reduce OER by 95%
DDG	Load-out	DDG product storage sheds	DDG34	550			6,820	1	6,820	1,023	85%	Pelletize DDG product, install door - reduce OER by 90% (CH confirm)
DDG	Evaporators	Vent condensor	DDG24	300,000			3,500	1	3,500	175	95%	Evaporator Plant bioscrubber - reduce OER by 95%
DDG	Evaporators	vent condensor drain	DDG25	120,000			3,167	1	3,167	158	95%	Evaporator Plant bioscrubber - reduce OER by 95%
DDG	Dryer building	DDG heat exchanger	DDG45	34,000			2,333	1	2,333	350	85%	DDG Plant bioscrubber - reduce OER by 85%
DDG	Dryer building	Decanters 3 & 4	DDG5	15,000			850	2	1,700	255	85%	DDG Plant bioscrubber - reduce OER by 85%
DDG	Evaporators	Dryer feed tank	DDG30	110,000			1,433	1	1,433	72	95%	Evaporator Plant bioscrubber - reduce OER by 95%
DDG	Evaporators	Finisher pump tank	DDG28	NS			1,433	1	1,433	72	95%	Evaporator Plant bioscrubber - reduce OER by 95%
DDG	Evaporators	Feed holding tank (Syrup)	DDG31	38,000			1,317	1	1,317	66	95%	Evaporator Plant bioscrubber - reduce OER by 95%
DDG	Evaporators	Feeds dryer #3 - baghouses	DDG18	1,100			867	1	867	43	95%	Evaporator Plant bioscrubber - reduce OER by 95%
DDG	Dryer building	light phase recovery tank	DDG19	23,000			450	1	450	68	85%	DDG Plant bioscrubber - reduce OER by 85%
DDG	Evaporators	CIP - fresh caustic	DDG32	32,000			417	1	417	21	95%	Evaporator Plant bioscrubber - reduce OER by 95%
DDG	Evaporators	CIP - spent caustic	DDG33	20,000			300	1	300	15	95%	Evaporator Plant bioscrubber - reduce OER by 95%
DDG	Dryer building	Decanters 1 & 2	DDG2	14,000			130	2	260	39	85%	DDG Plant bioscrubber - reduce OER by 85%
DDG	Evaporators	Decanter feed tank	DDG1	31,000			217	1	217	33	85%	DDG Plant bioscrubber - reduce OER by 85%
DDG	Load-out	Grounds	DDG37	1,800	200	1.02	203	1	203	0	100%	improve housekeeping - eliminate odour source
DDG	Load-out	DDG Load-out awning	DDG35	20			54	1	54	8	85%	Pelletize DDG product, install door - reduce OER by 90%
DDG	Evaporators	Cooling towers	DDG47	ND					0	0		odour level below detection threshold

Manildra Group
Odour emission inventory following odour control

Plant	Section	Unit	Audit reference	OU	Unit area (m2)	SOER (m/s)	OER per unit (OUm3/s)	No. units	Total OER (OUm3/s) BEFORE CONTROL	Total OER (OUm3/s) AFTER CONTROL	% reduction	Assumptions/Remarks
Distillery	Stage 2	Molecular Sieve - Vacuum drum	D2	26,000			1,350	1	1,350	203	85%	Ethanol Plant bioscrubber - reduce OER by 85%
Distillery	Stage 3	Incondensible gases vent	D6	21,000			400	1	400	60	85%	Ethanol Plant bioscrubber - reduce OER by 85%
Distillery	DME	DME vent	D12	190,000			107	1	107	107	0%	intermittent use - no control applied
Distillery	Stage 1	Recyled water to waste water	D11	11,000			17	1	17	17	0%	no control
Ethanol	Fermentation	Cooling towers	E23	130			13,167	5	65,833	0	100%	Prevent cooling water contamination
Ethanol	Fermentation	Yeast propagators - tanks 4 & 5	E15	27,000			14,167	2	28,333	4,250	85%	Ethanol Plant bioscrubber - reduce OER by 85%
Ethanol	Fermentation	Grain retention - tank 2 (Fermenter #7)	E8	16,000			6,500	1	6,500	975	85%	Ethanol Plant bioscrubber - reduce OER by 85%
Ethanol	Fermentation	Yeast propagators- tanks 1, 2 & 3	E14	21,000			1,833	3	5,500	825	85%	Ethanol Plant bioscrubber - reduce OER by 85%
Ethanol	Fermentation	Jet cooker 2 & 4 - Grain retention	E7	18,000			1,133	1	1,133	170	85%	Ethanol Plant bioscrubber - reduce OER by 85%
Ethanol	Fermentation	Jet cooker 1 - retention tank	E13	17,000			1,067	1	1,067	160	85%	Ethanol Plant bioscrubber - reduce OER by 85%
Ethanol	Fermentation	Starch factory rejects collection tank	E10	23,000			183	1	183	28	85%	Ethanol Plant bioscrubber - reduce OER by 85%
Ethanol	Hammer mill	Grain silo - baghouse	E1	310			183	1	183	28	85%	Ethanol Plant bioscrubber - reduce OER by 85%
Ethanol	Fermentation	Feed transfer to distillery	E22	6,100			167	1	167	25	85%	Ethanol Plant bioscrubber - reduce OER by 85%
Ethanol	Hammer mill	Baghouse	E24	30			100	1	100	100	0%	no control
Ethanol	Hammer mill	Buhler baghouse	E4	84			92	1	92	92	0%	no control
Ethanol	Hammer mill	Baghouse	E9	36			28	2	57	57	0%	no control
Ethanol	Fermentation	Buffer tank	E11	11,000			20	1	20	20	0%	no control

Manildra Group
Odour emission inventory following odour control

Plant	Section	Unit	Audit reference	OU	Unit area (m2)	SOER (m/s)	OER per unit (OUm3/s)	No. units	Total OER (OUm3/s) BEFORE CONTROL	Total OER (OUm3/s) AFTER CONTROL	% reduction	Assumptions/Remarks
Farm	Irrigation	Pivot No. 130 (spray)	F9	560			1,156,968	1	1,156,968	22,387	98%	pro rata OER based on new : old pond SOER = 0.1 : 2.3 = 0.043 + adjust for non-mist : mist nozzel OER = 0.45
Farm	Irrigation	Pivot No. 120 (spray)	F9	NS			0	1	833,017	16,119	98%	pro rata OER based on new : old pond SOER = 0.1 : 2.3 = 0.043 + adjust for non-mist : mist nozzel OER = 0.45
Farm	Irrigation	Pivot No. 110 (spray)	F9	NS			0	1	833,017	16,119	98%	pro rata OER based on new : old pond SOER = 0.1 : 2.3 = 0.043 + adjust for non-mist : mist nozzel OER = 0.45
Farm	Irrigation	Travellers (spray)	F11	180			29,573	4	162,650	3,147	98%	pro rata OER based on new : old pond SOER = 0.1 : 2.3 = 0.043
Farm	Ponds	Mixer tank vent	F1	210,000			146,667	1	146,667	0	100%	no longer needed - decommission
Farm	Ponds	Pond 6	F8	NS	56,000	0.10	14	1	130,667	5,600	96%	Treated effluent storage ponds for new WWTP - assume SOER = 0.1
Farm	Ponds	Pond 5	F7	NS	35,525	0.10	14	1	82,892	3,553	96%	Treated effluent storage ponds for new WWTP - assume SOER = 0.1
Farm	Ponds	Pond 3	F4	13,000	8,000	0.10	47	1	62,667	800	99%	Treated effluent storage ponds for new WWTP - assume SOER = 0.1
Farm	Irrigation	Irrigated land - Travellers	F13	780	250,800	0.18	45,980	1	45,980	890	98%	pro rata OER based on new : old pond SOER = 0.1 : 2.3 = 0.043
Farm	Irrigation	Irrigated land - Pivots	F15, F17, F12, F14	310	460,000	0.05	22,233	1	44,467	860	98%	pro rata OER based on new : old pond SOER = 0.1 : 2.3 = 0.043. Assume 50% wet and 50% dry
Farm	Factory	Farm tank	F18	30,000	8	970.46	7,667	1	7,667	1,150	85%	Ethanol Plant bioscrubber - reduce OER by 85% (confirm with CH)
Farm	Ponds	Pond 1	F2	NS	3,200	0.20	640	1	7,467	640	91%	Aerobic ponds for new WWTP - assume SOER = 0.2 (similar odour profile as activated sludge plant)
Farm	Ponds	Pond 2	F3	3,800	3,200	0.20	640	1	7,467	640	91%	Aerobic ponds for new WWTP - assume SOER = 0.2 (similar odour profile as activated sludge plant)
Farm	Ponds	Pond 4	F5, F6	16,000	400	9.20	3,680	1	3,680	184	95%	Inlet pond for new WWTP. Cover installed on pond - assume reduce OER by 95%

Manildra Group
Odour emission inventory following odour control

Plant	Section	Unit	Audit reference	OU	Unit area (m2)	SOER (m/s)	OER per unit (OUm3/s)	No. units	Total OER (OUm3/s) BEFORE CONTROL	Total OER (OUm3/s) AFTER CONTROL	% reduction	Assumptions/Remarks
Glucose	Brewers	Enzyme Tanks	B7	12,000			583	7	4,083	613	85%	Ethanol Plant bioscrubber - reduce OER by 85%
Glucose	Confectionary	Drum vacuum receiver	C4	6,500			3,500	1	3,500	525	85%	Ethanol Plant bioscrubber - reduce OER by 85%
Glucose	Brewers	Cooker A & B Flash Tanks	B3	9,400			950	1	950	143	85%	Ethanol Plant bioscrubber - reduce OER by 85%
Glucose	Confectionary	Ion exchange effluent tank	C18	7,200			250	1	250	250	0%	no control
Glucose	Confectionary	Sach Tanks	C2	2,200			4	19	82	82	0%	no control
Glucose	Confectionary	Flash vessel for Jet Cooker	C1	7,300			20	1	20	20	0%	no control
Glucose	Confectionary	Condensate water collection tanks	C19	6,500			13	1	13	13	0%	no control
Starch	Dryers	No. 4 Gluten Dryer baghouse	S5	5,000			150,000	1	150,000	150,000	0%	improve dispersion
Starch	Dryers	No. 3 Gluten Dryer baghouse	S3	2,500			73,333	1	73,333	73,333	0%	improve dispersion
Starch	Dryers	No. 1 Gluten Dryer baghouse	S2	2,400			38,333	1	38,333	38,333	0%	improve dispersion
Starch	Dryers	No. 2 Gluten Dryer baghouse	S4	1,400			18,333	1	18,333	18,333	0%	improve dispersion
Starch	Dryers	No. 4 Starch Dryer	S19	470			10,167	1	10,167	10,167	0%	improve dispersion
Starch	Dryers	No. 3 Starch Dryer	S18	230			5,500	1	5,500	5,500	0%	improve dispersion
Starch	Starch building misc	Dry gluten roof bin	S7	1,100			4,500	1	4,500	4,500	0%	improve dispersion
Starch	Dryers	No. 1 Starch Dryer	S1	380			3,167	1	3,167	3,167	0%	improve dispersion
Starch	Dryer building	Kestner dryer exhaust	DDG40	710			3,000	1	3,000	3,000	0%	improve dispersion
Starch	Grain processing pla	Flour bin aspirator	S13	190			500	2	1,000	1,000	0%	no control
Starch	Dryers	Spray dryer	S20	120			983	1	983	983	0%	no control
Starch	Starch building misc	High protein dust collector	S8	490			600	1	600	600	0%	no control
Starch	Grain processing pla	Pellet silo	S12	190			350	1	350	350	0%	no control
Starch	Starch building misc	Flour bin motor drive	S6	320			283	1	283	283	0%	no control
Starch	Starch building misc	Flour bin	S10	100			137	1	137	137	0%	no control
Starch	Starch building misc	Pre-separator	S9	150			97	1	97	97	0%	no control
Starch	Grain processing pla	Course bin	S11	200			33	1	33	33	0%	no control
Starch	Grain processing pla	Course gluten transfer baghouse	S15	520			18	1	18	18	0%	no control
Starch	Grain processing pla	Day bin transfer baghouse	S14	66			4	1	4	4	0%	no control
Starch	Tank farm	Starch reaction tanks	S17	38			0	4	0	0	0%	no control

Appendix H

Dispersion Model Output

Manildra Group
Base Scenario Model Input - Waked Affected Point Sources
P/M60 factor of 2.3 applied to all OERs; Nominal exhaust velocity of 0.1m/s applied to discharges with horizontal or downward release; Continuous emission rates applied

Plant	Section	Process Unit	Audit No.	OER (OUm3/s)	Peak OER (OUm3/s)	Stack height (m)	Temp. (deg K)	Exhaust velocity (m/s)	Model input velocity (m/s)	Stack diameter or effective diameter (m)	Assumptions/Remarks
DDG	Evaporators	Feeds dryer baghouses	DDG18	867	1,993	19.0	320	19.0	0.1	0.3	
DDG	Evaporators	Vent condensor	DDG24	3,500	8,050	8.0	290	1.8	0.1	0.1	
DDG	Evaporators	Condensate	DDG23	20,000	46,000	8.5	358	2.4	0.1	0.2	
DDG	Evaporators	Feed dump	DDG20	8,917	20,508	12.0	361	2.4	0.1	0.2	
DDG	Evaporators	Dryer feed tank	DDG30	1,433	3,297	6.0	369	2.5	2.5	0.1	
DDG	Evaporators	Finish Feed	DDG26	18,333	42,167	12.0	364	1.1	0.1	0.5	
DDG	Evaporators	Finisher pump tank	DDG28	1,433	3,297	6.0	369	2.5	2.5	0.1	Not measured. Applied OER from DDG30
DDG	Evaporators	CIP - fresh caustic	DDG32	417	958	6.0	346	1.9	0.1	0.1	
DDG	Evaporators	Feed holding tank (Syrup)	DDG31	1,317	3,028	11.5	329	1.0	0.1	0.2	
DDG	Dryer building	Decanters 1 & 2	DDG2	130	299	14.0	329	0.4	0.4	0.2	Two point sources - DDG2a & DDG2b
DDG	Dryer building	Decanters 3 & 4	DDG5	850	1,955	20.0	347	2.1	2.1	0.2	Two point sources - DDG5a & DDG5b
DDG	Dryer building	DDG dryer baghouse (palmer cooler)	DDG16	8,833	20,317	16.5	335	16.0	0.1	0.7	Rain cowl
DDG	Evaporators	Decanter feed tank	DDG1	217	498	12.0	330	1.2	0.1	0.1	
DDG	Dryer building	light phase recovery tank	DDG19	450	1,035	11.0	362	3.3	3.3	0.1	
DDG	Evaporators	vent condensor drain	DDG25	3,167	7,283	0.0	300	0.3	0.1	0.3	
Starch	Dryer building	Kestner dryer exhaust	DDG40	3,000	6,900	13.0	329	7.5	0.1	0.9	
DDG	Dryer building	DDG heat exchanger	DDG45	2,333	5,367	10.0	309	4.1	4.1	0.2	
DDG	Dryer building	Cooling tower	DDG46	68,333	157,166	10.0	302	7.4	7.4	4.5	
DDG	Evaporators	Cooling tower near evap	DDG47								Negligible OER - not modelled

Manildra Group
Base Scenario Model Input - Waked Affected Point Sources
P/M60 factor of 2.3 applied to all OERs; Nominal exhaust velocity of 0.1m/s applied to discharges with horizontal or downward release; Continuous emission rates applied

Plant	Section	Process Unit	Audit No.	OER (OUm3/s)	Peak OER (OUm3/s)	Stack height (m)	Temp. (deg K)	Exhaust velocity (m/s)	Model input velocity (m/s)	Stack diameter or effective diameter (m)	Assumptions/Remarks
Distillery	Stage 2	Molecular Sieve - Vacuum drum	D2	1,350	3,105	10.0	337	13.0	13.0	0.1	
Distillery	Stage 3	Incondensible gases vent	D6	400	920	13.0	309	0.9	0.6	0.2	
Distillery	Stage 1	Recyled water to waste water	D11	17	38	12.0	373	1.6	1.6	0.1	
Distillery	DME	DME vent	D12	107	245	36.0	250		1.6	0.1	
Starch	Dryers	No. 1 Gluten Dryer baghouse	S2	38,333	88,167	25.5	347	2.5	0.1	3.2	
Starch	Dryers	No. 2 Gluten Dryer baghouse	S4	18,333	42,167	27.0	328	2.1	0.1	3.2	
Starch	Dryers	No. 3 Gluten Dryer baghouse	S3	73,333	168,667	21.0	340	7.2	0.1	2.5	
Starch	Dryers	No. 4 Gluten Dryer baghouse	S5	150,000	345,000	30.0	350	6.7	0.1	2.7	
Starch	Dryers	No. 1 Starch Dryer	S1	3,167	7,283	26.0	318	7.1	0.1	1.3	
Starch	Dryers	No. 3 Starch Dryer	S18	5,500	12,650	20.0	318	23.0	23.0	1.2	
Starch	Dryers	No. 4 Starch Dryer	S19	10,167	23,383	20.0	319	21.0	21.0	1.2	
Starch	Dryers	Spray dryer	S20	983	2,262	19.0	335	6.8	0.1	1.4	
Starch	Starch building misc	Flour bin motor drive	S6	283	652	24.0	307	18.0	0.1	0.3	
Starch	Starch building misc	Dry gluten roof bin	S7	4,500	10,350	25.0	328	15.0	0.1	0.7	
Starch	Starch building misc	High protein dust collector	S8	600	1,380	24.5	316	12.0	0.1	0.4	
Starch	Starch building misc	Pre-separator	S9	97	222	23.0	316	16.0	0.1	0.3	
Starch	Starch building misc	Flour bin	S10	137	314	23.5	307	25.0	0.1	0.3	
Starch	Grain processing plant	Course bin	S11	33	77	30.0	310	10.0	0.1	0.2	
Starch	Grain processing plant	Pellet silo	S12	350	805	2.0	304	25.0	0.1	0.3	

Manildra Group
Base Scenario Model Input - Waked Affected Point Sources
P/M60 factor of 2.3 applied to all OERs; Nominal exhaust velocity of 0.1m/s applied to discharges with horizontal or downward release; Continuous emission rates applied

Plant	Section	Process Unit	Audit No.	OER (OUm3/s)	Peak OER (OUm3/s)	Stack height (m)	Temp. (deg K)	Exhaust velocity (m/s)	Model input velocity (m/s)	Stack diameter or effective diameter (m)	Assumptions/Remarks
Starch	Grain processing plant	Flour bin aspirator	S13	500	1,150	2.5	306	22.0	0.1	0.4	Two point sources - S13a & S13b
Starch	Grain processing plant	Day bin transfer baghouse	S14	4	8	2.8	302	9.6	0.1	0.1	
Starch	Grain processing plant	Course gluten transfer baghouse	S15	18	42	2.8	308	2.4	2.4	0.2	
Starch	Tank farm	Starch reaction tanks	S17	0	0.2	10.0	297	0.4	0.4	0.1	Modelled as single point source with OER equivalent to 4 process units
Glucose	Confectionary	Flash vessel for Jet Cooker	C1	20	46	21.0	350	0.1	0.1	0.1	
Glucose	Confectionary	Drum vacuum receiver	C4	3,500	8,050	21.0	314	20.0	20.0	0.2	
Glucose	Confectionary	Sach Tanks	C2	4	10	8.0	293	0.3	0.1	0.1	Modelled as single point source
Glucose	Confectionary	Ion exchange effluent tank	C18	250	575	2.5	307	0.2	0.1	0.3	
Glucose	Confectionary	Condensate water collection tanks	C19	13	29	8.0	304	0.3	0.1	0.1	
Glucose	Brewers	Cooker A & B Flash Tanks	B3	950	2,185	24.0	373	2.8	2.8	0.3	
Glucose	Brewers	Enzyme Tanks	B7	4,083	9,391	6.0	327	0.3	0.3	0.5	Modelled as single point source with OER equivalent to 7 process units
Ethanol	Hammer mill	Grain silo - baghouse	E1	183	422	23.0	304	6.5	0.1	0.4	
Ethanol	Hammer mill	Buhler baghouse	E4	92	211	15.0	312	13.0	0.1	0.4	
Ethanol	Fermentation	Jet cooker 2 & 4 - Grain retention	E7	1,133	2,607	9.0	373	3.1	2.2	0.1	source release 45 degree angle to vertical
Ethanol	Fermentation	Grain retention - tank 2 (Fermenter #7)	E8	6,500	14,950	17.0	360	18.0	18.0	0.2	
Ethanol	Hammer mill	Baghouse	E9	57	131	8.0	311	24.0	0.1	0.2	Modelled as single point source with OER equivalent to 2 process units
Ethanol	Fermentation	Starch factory rejects collection tank	E10	183	422	8.0	308	1.3	0.1	0.1	
Ethanol	Fermentation	Buffer tank	E11	20	46	5.0	311	0.3	0.1	0.1	
Ethanol	Fermentation	Jet cooker 1 - retention tank	E13	1,067	2,453	10.0	362	1.1	0.1	0.2	

Manildra Group
Base Scenario Model Input - Waked Affected Point Sources
P/M60 factor of 2.3 applied to all OERs; Nominal exhaust velocity of 0.1m/s applied to discharges with horizontal or downward release; Continuous emission rates applied

Plant	Section	Process Unit	Audit No.	OER (OUm3/s)	Peak OER (OUm3/s)	Stack height (m)	Temp. (deg K)	Exhaust velocity (m/s)	Model input velocity (m/s)	Stack diameter or effective diameter (m)	Assumptions/Remarks
Ethanol	Fermentation	Yeast propagators-tanks 1, 2 & 3	E14	1,833	4,217	17.0	306	0.8	0.8	0.5	Three point sources - E14a, b & c
Ethanol	Fermentation	Yeast propagators - tanks 4 & 5	E15	14,167	32,583	17.0	302	3.2	3.2	0.4	Three point sources - E15a & b
Ethanol	Fermentation	Feed transfer to distillery	E22	167	383	15.0	300	0.4	0.1	0.3	
Ethanol	Fermentation	Cooling towers	E23	11,250	25,875	10.0	306	10.6	10.6	3.4	Five point sources - E23a, b, c, d & e. Inlet OU not subtracted from outlet OER
Ethanol	Hammer mill	Baghouse	E24	100	230	4.0	294	15.0	0.1	0.5	

Manildra group
Base Scenario - Volume Sources
Notes: P/M60 factor of 2.3 applied to all emission rates, continuous emission rates applied

Plant	Section	Unit	Audit reference	OER (OUm3/s)	Peak OER (OUm3/s)	sub-vol OER	Assumptions/Remarks
Farm	Ponds	Mixer tank vent	F1	146,667	337,333		
Farm	Irrigation	Pivot No. 103 (walshes)	F9	1,156,968	2,664,027	532,805	5 sub volumes . Represented by sources F9a - e.
Farm	Irrigation	Pivot No. 101	F9	833,017	1,915,939	638,646	3 sub volumes. Represented by sources f,g,h.
Farm	Irrigation	Pivot No. 102	F9	833,017	1,915,939	638,646	3 sub volumes represented by sources I,j,k
Farm	Irrigation	Travellers (small)	F11	29,573	68,017		Assume 2 small travellers operating. 2 volume sources specifed as F11a and b
Farm	Irrigation	Travellers (large x 2)	F11	51,752	119,031		Assume 2 large travellers operating. 2 volume sources specifed as F11c and d
Farm	Factory	Farm tank	F18	7,667	17,633		Farm tank located within the factory near the ethanol plant
DDG	Load-out	DDG Load-out awning	DDG35	54	124		
DDG	Load-out	DDG product storage sheds	DDG34	6,820	15,686		
DDG	Load-out	DDG tent storage area	DDG36	12,862	29,583		
DDG	Dryer building	Dryer Building	DDG39	70,504	162,159		

Manildra Group
Base Scenario - Area Sources
Notes: P/M60 factor of 2.3 and 1.9 applied to stability classes A -D and E - F, respectively

Plant	Section	Unit	Audit reference	Unit area (m2)	SOER (m/s)	Assumptions/Remarks
Farm	Ponds	Pond 1	F2	3,200	2.33	
Farm	Ponds	Pond 2	F3	3,200	2.33	
Farm	Ponds	Pond 3	F4	8,000	7.83	
Farm	Ponds	Pond 4	F5	400	9.23	
Farm	Ponds	Pond 5	F7	35,525	2.33	
Farm	Ponds	Pond 6	F8	56,000	2.33	
Farm	Irrigation	Pivot No. 103 paddock	F12 a		0.050	assume paddock = 50% wet 50% dry grass
Farm	Irrigation	Pivot Nos. 101 and 102 paddock and Traveller area	F12 b		0.087	assume pivot 1 and pivot 2 and travelers = 50% wet 50% dry, SOER weighted by Pivot (640,000m2) and traveller (250,800m2) areas
DDG	Load-out	House Keeping	DDG37	200	1.02	

Plant	Section	Unit	Audit reference	OU	Unit area (m2)	SOER AFTER Control (m/s)	Source group	Total OER (OUm3/s) AFTER CONTROL	Peak (P/M60) OER (OUm3/s) AFTER CONTROL	Assumptions/Remarks
DDG	Dryer building	Dryer Building	DDG39	830			C	35,252	81,079	24 hrs per day, volume source
DDG	Evaporators	Condensate	DDG23	240,000			E			diverted to Evaporator Plant bioscrubber - reduce OER by 95%
DDG	Evaporators	Finish Feed	DDG26	200,000			E			diverted to Evaporator Plant bioscrubber - reduce OER by 95%
DDG	Evaporators	Feed dump	DDG20	136,500			E			diverted to Evaporator Plant bioscrubber - reduce OER by 95%
DDG	Evaporators	Vent condensor	DDG24	300,000			E			diverted to Evaporator Plant bioscrubber - reduce OER by 95%
DDG	Evaporators	vent condensor drain	DDG25	120,000			E			diverted to Evaporator Plant bioscrubber - reduce OER by 95%
DDG	Evaporators	Dryer feed tank	DDG30	110,000			E			diverted to Evaporator Plant bioscrubber - reduce OER by 95%
DDG	Evaporators	Finisher pump tank	DDG28	NS			E			diverted to Evaporator Plant bioscrubber - reduce OER by 95%
DDG	Evaporators	Feed holding tank (Syrup)	DDG31	38,000			E			diverted to Evaporator Plant bioscrubber - reduce OER by 95%
DDG	Evaporators	Feeds dryer #3 - baghouses	DDG18	1,100			E			diverted to Evaporator Plant bioscrubber - reduce OER by 95%
DDG	Evaporators	CIP - fresh caustic	DDG32	32,000			E			diverted to Evaporator Plant bioscrubber - reduce OER by 95%
DDG	Evaporators	CIP - spent caustic	DDG33	20,000			E			diverted to Evaporator Plant bioscrubber - reduce OER by 95%
DDG	Dryer building	DDG dryer baghouse (palmer cooler)	DDG16	1,700			F			diverted to DDG Plant bioscrubber - reduce OER by 85%
DDG	Dryer building	DDG heat exchanger	DDG45	34,000			F			diverted to DDG Plant bioscrubber - reduce OER by 85%
DDG	Dryer building	Decanters 3 & 4	DDG5	15,000			F			diverted to DDG Plant bioscrubber - reduce OER by 85%
DDG	Dryer building	light phase recovery tank	DDG19	23,000			F			diverted to DDG Plant bioscrubber - reduce OER by 85%
DDG	Dryer building	Decanters 1 & 2	DDG2	14,000			F			diverted to DDG Plant bioscrubber - reduce OER by 85%
DDG	Evaporators	Decanter feed tank	DDG1	31,000			F			diverted to DDG Plant bioscrubber - reduce OER by 85%

Plant	Section	Unit	Audit reference	OU	Unit area (m2)	SOER AFTER Control (m/s)	Source group	Total OER (OUm3/s) AFTER CONTROL	Peak (P/M60) OER (OUm3/s) AFTER CONTROL	Assumptions/Remarks
DDG	Load-out	DDG tent storage area	DDG36	590			H	1,929		volume source, 8am to 4pm, P/M60 factor applied in var emission file
DDG	Load-out	DDG product storage sheds	DDG34	550			H	1,023		volume source, 8am to 4pm, P/M60 factor applied in var emission file
DDG	Load-out	DDG Load-out awning	DDG35	20			H	8		volume source, 8am to 4pm, P/M60 factor applied in var emission file
DDG	Evaporators	Cooling towers	DDG47	ND			I	0	0	odour level below detection threshold
DDG	Dryer building	Cooling towers	DDG46	650			OFF	0		source turned off
DDG	Load-out	Grounds	DDG37	1,800	200	1.02	OFF			improve housekeeping - eliminate odour source
Distillery	Stage 2	Molecular Sieve - Vacuum drum	D2	26,000			D			diverted to Ethanol Plant bioscrubber - reduce OER by 85%
Distillery	Stage 3	Incondensible gases vent	D6	21,000			D			diverted to Ethanol Plant bioscrubber - reduce OER by 85%
Distillery	DME	DME vent	D12	190,000			I	107	245	intermittent use - no control applied
Distillery	Stage 1	Recyled water to waste water	D11	11,000			I	17	38	no control
Ethanol	Fermentation	Yeast propagators - tanks 4 & 5	E15	27,000			D			diverted to Ethanol Plant bioscrubber - reduce OER by 85%
Ethanol	Fermentation	Grain retention - tank 2 (Fermenter #7)	E8	16,000			D			diverted to Ethanol Plant bioscrubber - reduce OER by 85%
Ethanol	Fermentation	Yeast propagators- tanks 1, 2 & 3	E14	21,000			D			diverted to Ethanol Plant bioscrubber - reduce OER by 85%
Ethanol	Fermentation	Jet cooker 2 & 4 - Grain retention	E7	18,000			D			diverted to Ethanol Plant bioscrubber - reduce OER by 85%
Ethanol	Fermentation	Jet cooker 1 - retention tank	E13	17,000			D			diverted to Ethanol Plant bioscrubber - reduce OER by 85%
Ethanol	Fermentation	Starch factory rejects collection tank	E10	23,000			D			diverted to Ethanol Plant bioscrubber - reduce OER by 85%
Ethanol	Fermentation	Feed transfer to distillery	E22	6,100			D			diverted to Ethanol Plant bioscrubber - reduce OER by 85%
Ethanol	Hammer mill	Grain silo - baghouse	E1	310			D			diverted to Ethanol Plant bioscrubber - reduce OER by 85%
Ethanol	Fermentation	Buffer tank	E11	11,000			I	20	46	no control
Ethanol	Hammer mill	Baghouse	E24	30			I	100	230	no control

Plant	Section	Unit	Audit reference	OU	Unit area (m2)	SOER AFTER Control (m/s)	Source group	Total OER (OUm3/s) AFTER CONTROL	Peak (P/M60) OER (OUm3/s) AFTER CONTROL	Assumptions/Remarks
Ethanol	Hammer mill	Buhler baghouse	E4	84			I	92	211	no control
Ethanol	Hammer mill	Baghouse	E9	36			I	57	130	no control
Ethanol	Fermentation	Cooling towers	E23	130			OFF	0		source turned off
Farm	Irrigation	Pivot #103 (low mist nozzel)	F9	560			A	22,387		model 5xsub-vol source @ 4477 ou/s each, 5am to 5pm, every day, P/M60 factor applied in var emission factor. Assume only one pivot is in operation at any given time
Farm	Irrigation	Travellers- mist	F11	180			A	3,147		2 x small traveller @ 1272 ou/s + 2 x large traveller @ 2218 ou/s, 5AM to 5PM, every day, P/M60 factor applied in var emission factor
Farm	Irrigation	Irrigated land - travellers	F13	780	250,800	0.0037	A			Labeled as F12B, area source, P/M60 applied in var emission file by stability category
Farm	Irrigation	Irrigated land - Pivot	F12, F15, F17	310	460,000	0.0022	A			Labeled as F12A, area source, P/M60 applied in var emission file by stability category. Assume 50% wet and 50% dry grass
Farm	Ponds	Pond 6	F8	NS	56,000	0.10	B			area source
Farm	Ponds	Pond 5	F7	NS	35,525	0.10	B			area source
Farm	Ponds	Pond 3	F4	13,000	8,000	0.10	B			area source, P/M60 applied in var emission file by stability category
Farm	Ponds	Pond 1	F2	NS	3,200	0.20	B			area source, P/M60 applied in var emission file by stability category
Farm	Ponds	Pond 2	F3	3,800	3,200	0.20	B			area source, P/M60 applied in var emission file by stability category
Farm	Ponds	Pond 4	F5, F6	16,000		0.46	B			area source, P/M60 applied in var emission file by stability category
Farm	Factory	Farm tank	F18	30,000			D			diverted to Ethanol Plant bioscrubber - reduce OER by 85%
Farm	Irrigation	Pivot - mist	F9	NS			OFF	0		assume only Pivot # 130 in use (worst-case relative to any other single pivot in-use)
Farm	Irrigation	Pivot - mist	F9	NS			OFF	0		assume only Pivot # 130 in use (worst-case relative to any other single pivot in-use)
Farm	Ponds	Mixer tank vent	F1	210,000			OFF	0		no longer needed - decommission
Glucose	Brewers	Enzyme Tanks	B7	12,000			D			diverted to Ethanol Plant bioscrubber - reduce OER by 85%
Glucose	Brewers	Cooker A & B Flash Tanks	B3	9,400			D			diverted to Ethanol Plant bioscrubber - reduce OER by 85%
Glucose	Confectionary	Drum vacuum receiver	C4	6,500			D			diverted to Ethanol Plant bioscrubber - reduce OER by 85%

Plant	Section	Unit	Audit reference	OU	Unit area (m2)	SOER AFTER Control (m/s)	Source group	Total OER (OUm3/s) AFTER CONTROL	Peak (P/M60) OER (OUm3/s) AFTER CONTROL	Assumptions/Remarks
Glucose	Confectionary	Ion exchange effluent tank	C18	7,200			I	250	575	no control
Glucose	Confectionary	Sach Tanks	C2	2,200			I	82	189	no control
Glucose	Confectionary	Flash vessel for Jet Cooker	C1	7,300			I	20	46	no control
Glucose	Confectionary	Condensate water collection tanks	C19	6,500			I	13	29	no control
Starch	Dryer building	Kestner dryer exhaust	DDG40	710			G	3,000	6,900	modelled in stage 3 only, assume measured exhasut velocity is directed vertically at same vent location
Starch	Dryers	No. 4 Gluten Dryer baghouse	S5	5,000			G	150,000	345,000	assume measured exhaust velocity is directed vertically at same vent location
Starch	Dryers	No. 3 Gluten Dryer baghouse	S3	2,500			G	73,333	168,667	modelled in stage 3 only, assume measured exhasut velocity is directed vertically at same vent location
Starch	Dryers	No. 1 Gluten Dryer baghouse	S2	2,400			G	38,333	88,167	modelled in stage 3 only, assume measured exhasut velocity is directed vertically at same vent location
Starch	Dryers	No. 2 Gluten Dryer baghouse	S4	1,400			G	18,333	42,167	modelled in stage 3 only, assume measured exhasut velocity is directed vertically at same vent location
Starch	Dryers	No. 4 Starch Dryer	S19	470			G	10,167	23,383	modelled in stage 3 only, assume measured exhaust velocity is directed vertically at same vent location
Starch	Dryers	No. 3 Starch Dryer	S18	230			G	5,500	12,650	modelled in stage 3 only, assume measured exhasut velocity is directed vertically at same vent location
Starch	Dryers	No. 1 Starch Dryer	S1	380			G	3,167	7,283	modelled in stage 3 only, assume measured exhasut velocity is directed vertically at same vent location
Starch	Starch building misc	Dry gluten roof bin	S7	1,100			G	4,500	10,350	modelled in stage 3 only, assume measured exhasut velocity is directed vertically at same vent location
Starch	Dryers	Spray dryer	S20	120			I	983	2,262	no control
Starch	Grain processing plant	Flour bin aspirator	S13	190			I	1,000	2,300	no control
Starch	Grain processing plant	Pellet silo	S12	190			I	350	805	no control
Starch	Grain processing plant	Course bin	S11	200			I	33	77	no control
Starch	Grain processing plant	Course gluten transfer baghouse	S15	520			I	18	42	no control
Starch	Grain processing plant	Day bin transfer baghouse	S14	66			I	4	8	no control
Starch	Starch building misc	High protein dust collector	S8	490			I	600	1,380	no control

Plant	Section	Unit	Audit reference	OU	Unit area (m2)	SOER AFTER Control (m/s)	Source group	Total OER (OUm3/s) AFTER CONTROL	Peak (P/M60) OER (OUm3/s) AFTER CONTROL	Assumptions/Remarks
Starch	Starch building misc	Flour bin motor drive	S6	320			I	283	652	no control
Starch	Starch building misc	Flour bin	S10	100			I	137	314	no control
Starch	Starch building misc	Pre-separator	S9	150			I	97	222	no control

Manildra Group
Model input after odour control
Notes: Waked affected point sources - P/M60 factor of 2.3 applied to OER

Ethanol plant bioscrubber 1		2D
location	281940	6140390
tank diameter (m)	5	
tank height (m)	10	
air flow (m3/s)	3	
stack height (m)	20	
velocity (m/s)	15	
stack dia. (m)	0.50	
stack area (m2)	0.2	
temperature (K)	293	
OER OU m3/s	9,153	
Peak OER	**21051**	

Includes:
E15,F18,E8,E14,D2,E7,E13,D6,E10,E1,E22, B7,C4,B3

DDG plant (liquids line) bioscrubber 2		2E
location	281763	6140197
tank diameter (m)	5	
tank height (m)	10	
air flow (m3/s)	1.4	
stack height (m)	20	
velocity (m/s)	15	
stack dia. (m)	0.34	
stack area (m2)	0.1	
temperature (K)	293	
OER OU m3/s	2,984	
Peak OER	**6864**	

Includes:
DDG23,26,20,24,25,30,28,31,18,32,33

DDG Plant (solids line) bioscrubber 3		2F
location	281820	6140283
tank diameter (m)	5	
tank height (m)	10	
air flow (m3/s)	5.7	
stack height (m)	20	
velocity (m/s)	15	
stack dia. (m)	0.70	
stack area (m2)	0.4	
temperature (K)	293	
OER OU m3/s	2,069	
Peak OER	**4759**	

Includes:
DDG16,17,45,5,19,2,1

Appendix I

Odour Model Input Control Files

```
Shoalhaven Starches run01
Farm AWS data assimilated into TAPM guess field for CALMET files
All Sources

---------------- Run title (3 lines) ------------------------------------------

                    CALPUFF MODEL CONTROL FILE
                    --------------------------

--------------------------------------------------------------------------------

INPUT GROUP: 0 -- Input and Output File Names

--------------
Default Name  Type          File Name
------------  ----          ---------
CALMET.DAT    input    * METDAT = *
    or
ISCMET.DAT    input    * ISCDAT = *
    or
PLMMET.DAT    input    * PLMDAT = *
    or
PROFILE.DAT   input    * PRFDAT = *
SURFACE.DAT   input    * SFCDAT = *
RESTARTB.DAT  input    * RSTARTB = *
--------------------------------------------------------------------------------
CALPUFF.LST   output   ! PUFLST = CALPUFF.LST !
CONC.DAT      output   ! CONDAT = CONC.DAT !
DFLX.DAT      output   ! DFDAT = DFLX.DAT !
WFLX.DAT      output   ! WFDAT = WFLX.DAT !

VISB.DAT      output   ! VISDAT = VISB.DAT !
RESTARTE.DAT  output   * RSTARTE = *
--------------------------------------------------------------------------------
Emission Files
--------------
PTEMARB.DAT   input    * PTDAT = *
VOLEMARB.DAT  input    * VOLDAT = *
BAEMARB.DAT   input    * ARDAT = *
LNEMARB.DAT   input    * LNDAT = *
--------------------------------------------------------------------------------
Other Files
-----------
OZONE.DAT     input    * OZDAT = *
VD.DAT        input    * VDDAT = *
CHEM.DAT      input    * CHEMDAT = *
H2O2.DAT      input    * H2O2DAT = *
HILL.DAT      input    * HILDAT = *
HILLRCT.DAT   input    * RCTDAT = *
COASTLN.DAT   input    * CSTDAT = *
FLUXBDY.DAT   input    * BDYDAT = *
BCON.DAT      input    * BCNDAT = *
DEBUG.DAT     output   * DEBUG = *
MASSFLX.DAT   output   * FLXDAT = *
MASSBAL.DAT   output   * BALDAT = *
FOG.DAT       output   * FOGDAT = *
--------------------------------------------------------------------------------
All file names will be converted to lower case if LCFILES = T
Otherwise, if LCFILES = F, file names will be converted to UPPER CASE
         T = lower case      ! LCFILES = F !
         F = UPPER CASE
NOTE: (1) file/path names can be up to 70 characters in length


Provision for multiple input files
----------------------------------

     Number of CALMET.DAT files for run (NMETDAT)
                                   Default: 1       ! NMETDAT = 12 !

     Number of PTEMARB.DAT files for run (NPTDAT)
                                   Default: 0       ! NPTDAT =  0  !

     Number of BAEMARB.DAT files for run (NARDAT)
                                   Default: 0       ! NARDAT =  0  !

     Number of VOLEMARB.DAT files for run (NVOLDAT)
                                   Default: 0       ! NVOLDAT =  0  !

!END!

-------------
Subgroup (0a)
-------------

  The following CALMET.DAT filenames are processed in sequence if NMETDAT>1

Default Name  Type          File Name
------------  ----          ---------
 none         input    ! METDAT=C:\tapm\Shoalhaven\CALMET\shoalmet\CALMET01.DAT     !  !END!
 none         input    ! METDAT=C:\tapm\Shoalhaven\CALMET\shoalmet\CALMET02.DAT     !  !END!
 none         input    ! METDAT=C:\tapm\Shoalhaven\CALMET\shoalmet\CALMET03.DAT     !  !END!
 none         input    ! METDAT=C:\tapm\Shoalhaven\CALMET\shoalmet\CALMET04.DAT     !  !END!
 none         input    ! METDAT=C:\tapm\Shoalhaven\CALMET\shoalmet\CALMET05.DAT     !  !END!
 none         input    ! METDAT=C:\tapm\Shoalhaven\CALMET\shoalmet\CALMET06.DAT     !  !END!
 none         input    ! METDAT=C:\tapm\Shoalhaven\CALMET\shoalmet\CALMET07.DAT     !  !END!
 none         input    ! METDAT=C:\tapm\Shoalhaven\CALMET\shoalmet\CALMET08.DAT     !  !END!
```

```
 none         input    ! METDAT=C:\tapm\Shoalhaven\CALMET\shoalmet\CALMET09.DAT     !  !END!
 none         input    ! METDAT=C:\tapm\Shoalhaven\CALMET\shoalmet\CALMET10.DAT     !  !END!
 none         input    ! METDAT=C:\tapm\Shoalhaven\CALMET\shoalmet\CALMET11.DAT     !  !END!
 none         input    ! METDAT=C:\tapm\Shoalhaven\CALMET\shoalmet\CALMET12.DAT     !  !END!



--------------------------------------------------------------------------------

INPUT GROUP: 1 -- General run control parameters
--------------

    Option to run all periods found
    in the met. file     (METRUN)   Default: 0       ! METRUN = 0 !

         METRUN = 0 - Run period explicitly defined below
         METRUN = 1 - Run all periods in met. file

     Starting date:   Year (IBYR) -- No default       ! IBYR = 2004 !
     (used only if   Month (IBMO) -- No default       ! IBMO = 1 !
      METRUN = 0)      Day (IBDY) -- No default       ! IBDY = 2 !
                      Hour (IBHR) -- No default       ! IBHR = 1 !

     Base time zone        (XBTZ) -- No default       ! XBTZ = -10 !
        PST = 8., MST = 7.
        CST = 6., EST = 5.

     Length of run (hours) (IRLG) -- No default       ! IRLG = 8760 !

     Number of chemical species (NSPEC)
                                    Default: 5       ! NSPEC = 1 !

     Number of chemical species
     to be emitted  (NSE)           Default: 3       ! NSE = 1 !

     Flag to stop run after
     SETUP phase (ITEST)            Default: 2       ! ITEST = 2 !
     (Used to allow checking
     of the model inputs, files, etc.)
           ITEST = 1 - STOPS program after SETUP phase
           ITEST = 2 - Continues with execution of program
                       after SETUP

     Restart Configuration:

        Control flag (MRESTART)     Default: 0       ! MRESTART = 0 !

           0 = Do not read or write a restart file
           1 = Read a restart file at the beginning of
               the run
           2 = Write a restart file during run
           3 = Read a restart file at beginning of run
               and write a restart file during run

        Number of periods in Restart
        output cycle (NRESPD)       Default: 0       ! NRESPD = 0 !

           0 = File written only at last period
          >0 = File updated every NRESPD periods

     Meteorological Data Format (METFM)
                                    Default: 1       ! METFM = 1 !

           METFM = 1 - CALMET binary file (CALMET.MET)
           METFM = 2 - ISC ASCII file (ISCMET.MET)
           METFM = 3 - AUSPLUME ASCII file (PLMMET.MET)
           METFM = 4 - CTDM plus tower file (PROFILE.DAT) and
                       surface parameters file (SURFACE.DAT)

     PG sigma-y is adjusted by the factor (AVET/PGTIME)**0.2
     Averaging Time (minutes) (AVET)
                                    Default: 60.0    ! AVET = 60 !
     PG Averaging Time (minutes) (PGTIME)
                                    Default: 60.0    ! PGTIME = 3 !


!END!


--------------------------------------------------------------------------------

INPUT GROUP: 2 -- Technical options
--------------


     Vertical distribution used in the
     near field (MGAUSS)                   Default: 1     ! MGAUSS = 1 !
        0 = uniform
        1 = Gaussian

     Terrain adjustment method
     (MCTADJ)                              Default: 3     ! MCTADJ = 3 !
        0 = no adjustment
        1 = ISC-type of terrain adjustment
        2 = simple, CALPUFF-type of terrain
            adjustment
        3 = partial plume path adjustment
```

```
Subgrid-scale complex terrain
flag (MCTSG)                          Default: 0     ! MCTSG = 0 !
   0 = not modeled
   1 = modeled

Near-field puffs modeled as
elongated 0 (MSLUG)                   Default: 0     ! MSLUG = 0 !
   0 = no
   1 = yes (slug model used)

Transitional plume rise modeled ?
(MTRANS)                              Default: 1     ! MTRANS = 1 !
   0 = no  (i.e., final rise only)
   1 = yes (i.e., transitional rise computed)

Stack tip downwash? (MTIP)            Default: 1     ! MTIP = 1 !
   0 = no  (i.e., no stack tip downwash)
   1 = yes (i.e., use stack tip downwash)

Method used to simulate building
downwash? (MBDW)                      Default: 1     ! MBDW = 1 !
   1 = ISC method
   2 = PRIME method

Vertical wind shear modeled above
stack top? (MSHEAR)                   Default: 0     ! MSHEAR = 0 !
   0 = no  (i.e., vertical wind shear not modeled)
   1 = yes (i.e., vertical wind shear modeled)

Puff splitting allowed? (MSPLIT)      Default: 0     ! MSPLIT = 0 !
   0 = no (i.e., puffs not split)
   1 = yes (i.e., puffs are split)

Chemical mechanism flag (MCHEM)       Default: 0     ! MCHEM = 0 !
   0 = chemical transformation not
       modeled
   1 = transformation rates computed
       internally (MESOPUFF II scheme)
   2 = user-specified transformation
       rates used
   3 = transformation rates computed
       internally (RIVAD/ARM3 scheme)
   4 = secondary organic aerosol formation
       computed (MESOPUFF II scheme for OH)

Aqueous phase transformation flag (MAQCHEM)
(Used only if MCHEM = 1, or 3)        Default: 0     ! MAQCHEM = 0 !
   0 = aqueous phase transformation
       not modeled
   1 = transformation rates adjusted
       for aqueous phase reactions

Wet removal modeled ? (MWET)          Default: 1     ! MWET = 0 !
   0 = no
   1 = yes

Dry deposition modeled ? (MDRY)       Default: 1     ! MDRY = 0 !
   0 = no
   1 = yes
   (dry deposition method specified
    for each species in Input Group 3)

Method used to compute dispersion
coefficients (MDISP)                  Default: 3     ! MDISP = 2 !

   1 = dispersion coefficients computed from measured values
       of turbulence, sigma v, sigma w
   2 = dispersion coefficients from internally calculated
       sigma v, sigma w using micrometeorological variables
       (u*, w*, L, etc.)
   3 = PG dispersion coefficients for RURAL areas (computed using
       the ISCST multi-segment approximation) and MP coefficients in
       urban areas
   4 = same as 3 except PG coefficients computed using
       the MESOPUFF II eqns.
   5 = CTDM sigmas used for stable and neutral conditions.
       For unstable conditions, sigmas are computed as in
       MDISP = 3, described above.  MDISP = 5 assumes that
       measured values are read

Sigma-v/sigma-theta, sigma-w measurements used? (MTURBVW)
(Used only if MDISP = 1 or 5)         Default: 3     ! MTURBVW = 3 !
   1 = use sigma-v or sigma-theta measurements
       from PROFILE.DAT to compute sigma-y
       (valid for METFM = 1, 2, 3, 4)
   2 = use sigma-w measurements
       from PROFILE.DAT to compute sigma-z
       (valid for METFM = 1, 2, 3, 4)
   3 = use both sigma-(v/theta) and sigma-w
       from PROFILE.DAT to compute sigma-y and sigma-z
       (valid for METFM = 1, 2, 3, 4)
   4 = use sigma-theta measurements
       from PLMMET.DAT to compute sigma-y
       (valid only if METFM = 3)

Back-up method used to compute dispersion
```

```
   when measured turbulence data are
   missing (MDISP2)                    Default: 3     ! MDISP2 = 3 !
   (used only if MDISP = 1 or 5)
      2 = dispersion coefficients from internally calculated
          sigma v, sigma w using micrometeorological variables
          (u*, w*, L, etc.)
      3 = PG dispersion coefficients for RURAL areas (computed using
          the ISCST multi-segment approximation) and MP coefficients in
          urban areas
      4 = same as 3 except PG coefficients computed using
          the MESOPUFF II eqns.

   PG sigma-y,z adj. for roughness?    Default: 0     ! MROUGH = 0 !
   (MROUGH)
      0 = no
      1 = yes

   Partial plume penetration of        Default: 1     ! MPARTL = 1 !
   elevated inversion?
   (MPARTL)
      0 = no
      1 = yes

   Strength of temperature inversion   Default: 0     ! MTINV = 0 !
   provided in PROFILE.DAT extended records?
   (MTINV)
      0 = no (computed from measured/default gradients)
      1 = yes

   PDF used for dispersion under convective conditions?
                                       Default: 0     ! MPDF = 0 !
   (MPDF)
      0 = no
      1 = yes

   Sub-Grid TIBL module used for shore line?
                                       Default: 0     ! MSGTIBL = 0 !
   (MSGTIBL)
      0 = no
      1 = yes

   Boundary conditions (concentration) modeled?
                                       Default: 0     ! MBCON = 0 !
   (MBCON)
      0 = no
      1 = yes, using formatted BCON.DAT file
      2 = yes, using unformatted CONC.DAT file


   Analyses of fogging and icing impacts due to emissions from
   arrays of mechanically-forced cooling towers can be performed
   using CALPUFF in conjunction with a cooling tower emissions
   processor (CTEMISS) and its associated postprocessors.  Hourly
   emissions of water vapor and temperature from each cooling tower
   cell are computed for the current cell configuration and ambient
   conditions by CTEMISS. CALPUFF models the dispersion of these
   emissions and provides cloud information in a specialized format
   for further analysis. Output to FOG.DAT is provided in either
   'plume mode' or 'receptor mode' format.

   Configure for FOG Model output?
                                       Default: 0     ! MFOG = 0 !
   (MFOG)
      0 = no
      1 = yes  - report results in PLUME Mode format
      2 = yes  - report results in RECEPTOR Mode format


   Test options specified to see if
   they conform to regulatory
   values? (MREG)                      Default: 1     ! MREG = 0 !

      0 = NO checks are made
      1 = Technical options must conform to USEPA
          Long Range Transport (LRT) guidance
                     METFM    1 or 2
                     AVET     60. (min)
                     PGTIME   60. (min)
                     MGAUSS   1
                     MCTADJ   3
                     MTRANS   1
                     MTIP     1
                     MCHEM    1 or 3 (if modeling SOx, NOx)
                     MWET     1
                     MDRY     1
                     MDISP    2 or 3
                     MPDF     0 if MDISP=3
                              1 if MDISP=2
                     MROUGH   0
                     MPARTL   1
                     SYTDEP   550. (m)
                     MHFTSZ   0


!END!
```

INPUT GROUP: 3a, 3b -- Species list

Subgroup (3a)

The following species are modeled:

```
! CSPEC =         ODOR !            !END!


                                                    Dry                OUTPUT GROUP
    SPECIES          MODELED          EMITTED      DEPOSITED             NUMBER
     NAME         (0=NO, 1=YES)    (0=NO, 1=YES)   (0=NO,               (0=NONE,
   (Limit: 12                                        1=COMPUTED-GAS       1=1st CGRUP,
    Characters                                       2=COMPUTED-PARTICLE  2=2nd CGRUP,
    in length)                                       3=USER-SPECIFIED)    3= etc.)

!         ODOR  =          1,               1,          0,                 0   !


!END!
```

Subgroup (3b)

The following names are used for Species-Groups in which results for certain species are combined (added) prior to output. The CGRUP name will be used as the species name in output files. Use this feature to model specific particle-size distributions by treating each size-range as a separate species. Order must be consistent with 3(a) above.

INPUT GROUP: 4 -- Map Projection and Grid control parameters

Projection for all (X,Y):

Map projection
(PMAP) Default: UTM ! PMAP = UTM !

- UTM : Universal Transverse Mercator
- TTM : Tangential Transverse Mercator
- LCC : Lambert Conformal Conic
- PS : Polar Stereographic
- EM : Equatorial Mercator
- LAZA : Lambert Azimuthal Equal Area

False Easting and Northing (km) at the projection origin
(Used only if PMAP= TTM, LCC, or LAZA)
(FEAST) Default=0.0 ! FEAST = 0 !
(FNORTH) Default=0.0 ! FNORTH = 0 !

UTM zone (1 to 60)
(Used only if PMAP=UTM)
(IUTMZN) No Default ! IUTMZN = 56 !

Hemisphere for UTM projection?
(Used only if PMAP=UTM)
(UTMHEM) Default: N ! UTMHEM = S !

- N : Northern hemisphere projection
- S : Southern hemisphere projection

Latitude and Longitude (decimal degrees) of projection origin
(Used only if PMAP= TTM, LCC, PS, EM, or LAZA)
(RLAT0) No Default ! RLAT0 = 0N !
(RLON0) No Default ! RLON0 = 0E !

- TTM : RLON0 identifies central (true N/S) meridian of projection
  RLAT0 selected for convenience
- LCC : RLON0 identifies central (true N/S) meridian of projection
  RLAT0 selected for convenience
- PS : RLON0 identifies central (grid N/S) meridian of projection
  RLAT0 selected for convenience
- EM : RLON0 identifies central meridian of projection
  RLAT0 is REPLACED by 0.0N (Equator)
- LAZA: RLON0 identifies longitude of tangent-point of mapping plane
  RLAT0 identifies latitude of tangent-point of mapping plane

Matching parallel(s) of latitude (decimal degrees) for projection
(Used only if PMAP= LCC or PS)
(XLAT1) No Default ! XLAT1 = 30N !
(XLAT2) No Default ! XLAT2 = 60N !

- LCC : Projection cone slices through Earth's surface at XLAT1 and XLAT2
- PS : Projection plane slices through Earth at XLAT1
  (XLAT2 is not used)

```
----------
Note:  Latitudes and longitudes should be positive, and include a
       letter N,S,E, or W indicating north or south latitude, and
       east or west longitude.  For example,
       35.9  N Latitude  =  35.9N
       118.7 E Longitude = 118.7E


Datum-region
------------

The Datum-Region for the coordinates is identified by a character
string.  Many mapping products currently available use the model of the
Earth known as the World Geodetic System 1984 (WGS-G ).  Other local
models may be in use, and their selection in CALMET will make its output
consistent with local mapping products.  The list of Datum-Regions with
official transformation parameters provided by the National Imagery and
Mapping Agency (NIMA).

NIMA Datum - Regions(Examples)
------------------------------------------------------------------------------
WGS-G     WGS-84 GRS 80, Global coverage
NAS-C     NORTH AMERICAN 1927 Clarke 1866, MEAN FOR (CONUS)
NWS-27    NWS 6370KM Radius, Global Sphere (NAD27)
NWS-84    NWS 6370KM Radius, Global Sphere (WGS84)
ESR-S     ESRI REFERENCE Normal Sphere (6371KM Radius), Global Reference Sphere

Datum-region for output coordinates
(DATUM)                    Default: WGS-G     ! DATUM = WGS-G !


METEOROLOGICAL Grid:

Rectangular grid defined for projection PMAP,
with X the Easting and Y the Northing coordinate

       No. X grid cells (NX)      No default     ! NX = 75 !
       No. Y grid cells (NY)      No default     ! NY = 75 !
    No. vertical layers (NZ)      No default     ! NZ = 9 !

      Grid spacing (DGRIDKM)      No default     ! DGRIDKM = 0.2 !
                                  Units: km

           Cell face heights
               (ZFACE(nz+1))      No defaults
                                  Units: m
 ! ZFACE =  0.0, 20.0, 40.0, 80.0, 160.0, 320.0, 1000.0, 1500.0, 2200.0, 3000.0 !

        Reference Coordinates
       of SOUTHWEST corner of
            grid cell(1, 1):

        X coordinate (XORIGKM)     No default     ! XORIGKM = 276.941 !
        Y coordinate (YORIGKM)     No default     ! YORIGKM = 6135.503 !
                                  Units: km


COMPUTATIONAL Grid:

The computational grid is identical to or a subset of the MET. grid.
The lower left (LL) corner of the computational grid is at grid point
(IBCOMP, JBCOMP) of the MET. grid.  The upper right (UR) corner of the
computational grid is at grid point (IECOMP, JECOMP) of the MET. grid.
The grid spacing of the computational grid is the same as the MET. grid.

   X index of LL corner (IBCOMP)      No default     ! IBCOMP = 10 !
             (1 <= IBCOMP <= NX)

   Y index of LL corner (JBCOMP)      No default     ! JBCOMP = 10 !
             (1 <= JBCOMP <= NY)


   X index of UR corner (IECOMP)      No default     ! IECOMP = 65 !
             (1 <= IECOMP <= NX)

   Y index of UR corner (JECOMP)      No default     ! JECOMP = 65 !
             (1 <= JECOMP <= NY)



SAMPLING Grid (GRIDDED RECEPTORS):

The lower left (LL) corner of the sampling grid is at grid point
(IBSAMP, JBSAMP) of the MET. grid.  The upper right (UR) corner of the
sampling grid is at grid point (IESAMP, JESAMP) of the MET. grid.
The sampling grid must be identical to or a subset of the computational
grid.  It may be a nested grid inside the computational grid.
The grid spacing of the sampling grid is DGRIDKM/MESHDN.

   Logical flag indicating if gridded
   receptors are used (LSAMP)         Default: T     ! LSAMP = T !
   (T=yes, F=no)

   X index of LL corner (IBSAMP)      No default     ! IBSAMP = 15 !
    (IBCOMP <= IBSAMP <= IECOMP)

   Y index of LL corner (JBSAMP)      No default     ! JBSAMP = 15 !
```

```
        (JBCOMP <= JBSAMP <= JECOMP)


        X index of UR corner (IESAMP)      No default     ! IESAMP = 60 !
         (IBCOMP <= IESAMP <= IECOMP)

        Y index of UR corner (JESAMP)      No default     ! JESAMP = 60 !
         (JBCOMP <= JESAMP <= JECOMP)


       Nesting factor of the sampling
        grid (MESHDN)                      Default: 1     ! MESHDN = 1 !
        (MESHDN is an integer >= 1)

!END!


------------------------------------------------------------------------------


INPUT GROUP: 5 -- Output Options
--------------
                                          *                          *
     FILE                        DEFAULT VALUE             VALUE THIS RUN
     ----                        -------------             --------------

   Concentrations (ICON)               1                   ! ICON = 1 !
   Dry Fluxes (IDRY)                   1                   ! IDRY = 0 !
   Wet Fluxes (IWET)                   1                   ! IWET = 0 !
   Relative Humidity (IVIS)            1                   ! IVIS = 0 !
    (relative humidity file is
     required for visibility
     analysis)
   Use data compression option in output file?
   (LCOMPRS)                            Default: T         * LCOMPRS = *

   *
    0 = Do not create file, 1 = create file


    DIAGNOSTIC MASS FLUX OUTPUT OPTIONS:

       Mass flux across specified boundaries
       for selected species reported hourly?
       (IMFLX)                          Default: 0         ! IMFLX = 0 !
         0 = no
         1 = yes (FLUXBDY.DAT and MASSFLX.DAT filenames
                  are specified in Input Group 0)

       Mass balance for each species
       reported hourly?
       (IMBAL)                          Default: 0         ! IMBAL = 0 !
         0 = no
         1 = yes (MASSBAL.DAT filename is
              specified in Input Group 0)


    LINE PRINTER OUTPUT OPTIONS:

       Print concentrations (ICPRT)     Default: 0         ! ICPRT = 0 !
       Print dry fluxes (IDPRT)         Default: 0         ! IDPRT = 0 !
       Print wet fluxes (IWPRT)         Default: 0         ! IWPRT = 0 !
       (0 = Do not print, 1 = Print)

       Concentration print interval
       (ICFRQ) in hours                 Default: 1         ! ICFRQ = 1 !
       Dry flux print interval
       (IDFRQ) in hours                 Default: 1         ! IDFRQ = 1 !
       Wet flux print interval
       (IWFRQ) in hours                 Default: 1         ! IWFRQ = 1 !

       Units for Line Printer Output
       (IPRTU)                          Default: 1         ! IPRTU = 5 !
                      for               for
                Concentration     Deposition
           1 =       g/m**3          g/m**2/s
           2 =      mg/m**3         mg/m**2/s
           3 =      ug/m**3         ug/m**2/s
           4 =      ng/m**3         ng/m**2/s
           5 =     Odour Units

       Messages tracking progress of run
       written to the screen ?
       (IMESG)                          Default: 2         ! IMESG = 2 !
         0 = no
         1 = yes (advection step, puff ID)
         2 = yes (YYYYJJJHH, # old puffs, # emitted puffs)


     SPECIES (or GROUP for combined species) LIST FOR OUTPUT OPTIONS

                 ---- CONCENTRATIONS ----   ------ DRY FLUXES ------   ------ WET FLUXES ------   -- MASS FLUX --
   SPECIES
   /GROUP        PRINTED?  SAVED ON DISK?   PRINTED?  SAVED ON DISK?   PRINTED?  SAVED ON DISK?   SAVED ON DISK?
   -------       ------------------------   ------------------------   ------------------------   --------------
!         ODOR =     1,           1,           0,           0,           0,           0,           0   !
```

OPTIONS FOR PRINTING "DEBUG" QUANTITIES (much output)

Logical for debug output (LDEBUG)	Default: F	! LDEBUG = F !
First puff to track (IPFDEB)	Default: 1	! IPFDEB = 1 !
Number of puffs to track (NPFDEB)	Default: 1	! NPFDEB = 1 !
Met. period to start output (NN1)	Default: 1	! NN1 = 1 !
Met. period to end output (NN2)	Default: 10	! NN2 = 10 !

!END!

INPUT GROUP: 6a, 6b, & 6c -- Subgrid scale complex terrain inputs

---

Subgroup (6a)

Number of terrain features (NHILL)	Default: 0	! NHILL = 0 !
Number of special complex terrain receptors (NCTREC)	Default: 0	! NCTREC = 0 !
Terrain and CTSG Receptor data for CTSG hills input in CTDM format ? (MHILL) 1 = Hill and Receptor data created by CTDM processors & read from HILL.DAT and HILLRCT.DAT files 2 = Hill data created by OPTHILL & input below in Subgroup (6b); Receptor data in Subgroup (6c)	No Default	! MHILL = 2 !
Factor to convert horizontal dimensions to meters (MHILL=1)	Default: 1.0	! XHILL2M = 1.0 !
Factor to convert vertical dimensions to meters (MHILL=1)	Default: 1.0	! ZHILL2M = 1.0 !
X-origin of CTDM system relative to CALPUFF coordinate system, in Kilometers (MHILL=1)	No Default	! XCTDMKM = 0.0 !
Y-origin of CTDM system relative to CALPUFF coordinate system, in Kilometers (MHILL=1)	No Default	! YCTDMKM = 0.0 !

! END !

Subgroup (6b)

1 **

HILL information

HILL NO.	XC (km)	YC (km)	THETAH (deg.)	ZGRID (m)	RELIEF (m)	EXPO 1 (m)	EXPO 2 (m)	SCALE 1 (m)	SCALE 2 (m)	AMAX1 (m)	AMAX2 (m)

Subgroup (6c)

COMPLEX TERRAIN RECEPTOR INFORMATION

XRCT (km)	YRCT (km)	ZRCT (m)	XHH

1

Description of Complex Terrain Variables:

- XC, YC = Coordinates of center of hill
- THETAH = Orientation of major axis of hill (clockwise from North)
- ZGRID = Height of the 0 of the grid above mean sea level
- RELIEF = Height of the crest of the hill above the grid elevation
- EXPO 1 = Hill-shape exponent for the major axis
- EXPO 2 = Hill-shape exponent for the major axis
- SCALE 1 = Horizontal length scale along the major axis
- SCALE 2 = Horizontal length scale along the minor axis
- AMAX = Maximum allowed axis length for the major axis
- BMAX = Maximum allowed axis length for the major axis

```
          XRCT, YRCT = Coordinates of the complex terrain receptors
          ZRCT    = Height of the ground (MSL) at the complex terrain
                    Receptor
          XHH     = Hill number associated with each complex terrain receptor
                    (NOTE: MUST BE ENTERED AS A REAL NUMBER)

   **
     NOTE: DATA for each hill and CTSG receptor are treated as a separate
           input subgroup and therefore must end with an input group terminator.

-------------------------------------------------------------------------------


INPUT GROUP: 7 -- Chemical parameters for dry deposition of gases
--------------

      SPECIES     DIFFUSIVITY      ALPHA STAR      REACTIVITY    MESOPHYLL RESISTANCE     HENRY'S LAW COEFFICIENT
       NAME        (cm**2/s)                                          (s/cm)                (dimensionless)
      -------     -----------      ----------      ----------    --------------------     ----------------------
* DRYGAS = *

!END!


-------------------------------------------------------------------------------


INPUT GROUP: 8 -- Size parameters for dry deposition of particles
--------------

     For SINGLE SPECIES, the mean and standard deviation are used to
     compute a deposition velocity for NINT (see group 9) size-ranges,
     and these are then averaged to obtain a mean deposition velocity.

     For GROUPED SPECIES, the size distribution should be explicitly
     specified (by the 'species' in the group), and the standard deviation
     for each should be entered as 0.  The model will then use the
     deposition velocity for the stated mean diameter.

      SPECIES      GEOMETRIC MASS MEAN        GEOMETRIC STANDARD
       NAME             DIAMETER                 DEVIATION
                        (microns)                (microns)
       -------      -------------------        ------------------
* DRYPART = *
!END!


-------------------------------------------------------------------------------


INPUT GROUP: 9 -- Miscellaneous dry deposition parameters
--------------

     Reference cuticle resistance (s/cm)
     (RCUTR)                          Default: 30    ! RCUTR = 30 !
     Reference ground resistance  (s/cm)
     (RGR)                            Default: 10    ! RGR = 10 !
     Reference pollutant reactivity
     (REACTR)                         Default: 8     ! REACTR = 8 !

     Number of particle-size intervals used to
     evaluate effective particle deposition velocity
     (NINT)                           Default: 9     ! NINT = 9 !

     Vegetation state in unirrigated areas
     (IVEG)                           Default: 1     ! IVEG = 1 !
        IVEG=1 for active and unstressed vegetation
        IVEG=2 for active and stressed vegetation
        IVEG=3 for inactive vegetation

!END!


-------------------------------------------------------------------------------


INPUT GROUP: 10 -- Wet Deposition Parameters
---------------


                     Scavenging Coefficient -- Units: (sec)**(-1)

       Pollutant      Liquid Precip.       Frozen Precip.
       ---------      --------------       --------------
* WETDEPOS = *
!END!


-------------------------------------------------------------------------------


INPUT GROUP: 11 -- Chemistry Parameters
---------------

     Ozone data input option (MOZ)     Default: 0            ! MOZ = 0 !
     (Used only if MCHEM = 1, 3, or 4)
```

```
       0 = use a monthly background ozone value
       1 = read hourly ozone concentrations from
           the OZONE.DAT data file

     Monthly ozone concentrations
     (Used only if MCHEM = 1, 3, or 4 and
      MOZ = 0 or MOZ = 1 and all hourly O3 data missing)
     (BCKO3) in ppb                    Default: 12*80.
     ! BCKO3 = 80.00, 80.00, 80.00, 80.00, 80.00, 80.00, 80.00, 80.00, 80.00, 80.00, 80.00, 80.00 !

     Monthly ammonia concentrations
     (Used only if MCHEM = 1, or 3)
     (BCKNH3) in ppb                   Default: 12*10.
     ! BCKNH3 = 10.00, 10.00, 10.00, 10.00, 10.00, 10.00, 10.00, 10.00, 10.00, 10.00, 10.00, 10.00 !

     Nighttime SO2 loss rate (RNITE1)
     in percent/hour                   Default: 0.2          ! RNITE1 = .2 !

     Nighttime NOx loss rate (RNITE2)
     in percent/hour                   Default: 2.0          ! RNITE2 = 2.0 !

     Nighttime HNO3 formation rate (RNITE3)
     in percent/hour                   Default: 2.0          ! RNITE3 = 2.0 !

     H2O2 data input option (MH2O2)    Default: 0            ! MH2O2 = 0 !
     (Used only if MAQCHEM = 1)
       0 = use a monthly background H2O2 value
       1 = read hourly H2O2 concentrations from
           the H2O2.DAT data file

     Monthly H2O2 concentrations
     (Used only if MAQCHEM = 1 and
      MH2O2 = 0 or MH2O2 = 1 and all hourly H2O2 data missing)
     (BCKH2O2) in ppb                  Default: 12*1.
     ! BCKH2O2 = 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00 !


 --- Data for SECONDARY ORGANIC AEROSOL (SOA) Option
     (used only if MCHEM = 4)

     The SOA module uses monthly values of:
          Fine particulate concentration in ug/m^3 (BCKPMF)
          Organic fraction of fine particulate     (OFRAC)
          VOC / NOX ratio (after reaction)         (VCNX)
     to characterize the air mass when computing
     the formation of SOA from VOC emissions.
     Typical values for several distinct air mass types are:

        Month    1    2    3    4    5    6    7    8    9   10   11   12
                Jan  Feb  Mar  Apr  May  Jun  Jul  Aug  Sep  Oct  Nov  Dec

     Clean Continental
        BCKPMF   1.   1.   1.   1.   1.   1.   1.   1.   1.   1.   1.   1.
        OFRAC  .15  .15  .20  .20  .20  .20  .20  .20  .20  .20  .20  .15
        VCNX    50.  50.  50.  50.  50.  50.  50.  50.  50.  50.  50.  50.

     Clean Marine (surface)
        BCKPMF  .5   .5   .5   .5   .5   .5   .5   .5   .5   .5   .5   .5
        OFRAC  .25  .25  .30  .30  .30  .30  .30  .30  .30  .30  .30  .25
        VCNX    50.  50.  50.  50.  50.  50.  50.  50.  50.  50.  50.  50.

     Urban - low biogenic (controls present)
        BCKPMF  30.  30.  30.  30.  30.  30.  30.  30.  30.  30.  30.  30.
        OFRAC  .20  .20  .25  .25  .25  .25  .25  .25  .20  .20  .20  .20
        VCNX     4.   4.   4.   4.   4.   4.   4.   4.   4.   4.   4.   4.

     Urban - high biogenic (controls present)
        BCKPMF  60.  60.  60.  60.  60.  60.  60.  60.  60.  60.  60.  60.
        OFRAC  .25  .25  .30  .30  .30  .55  .55  .55  .35  .35  .35  .25
        VCNX    15.  15.  15.  15.  15.  15.  15.  15.  15.  15.  15.  15.

     Regional Plume
        BCKPMF  20.  20.  20.  20.  20.  20.  20.  20.  20.  20.  20.  20.
        OFRAC  .20  .20  .25  .35  .25  .40  .40  .40  .30  .30  .30  .20
        VCNX    15.  15.  15.  15.  15.  15.  15.  15.  15.  15.  15.  15.

     Urban - no controls present
        BCKPMF 100. 100. 100. 100. 100. 100. 100. 100. 100. 100. 100. 100.
        OFRAC  .30  .30  .35  .35  .35  .55  .55  .55  .35  .35  .35  .30
        VCNX     2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.

     Default: Clean Continental
     ! BCKPMF = 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00 !
     ! OFRAC = 0.15, 0.15, 0.20, 0.20, 0.20, 0.20, 0.20, 0.20, 0.20, 0.20, 0.20, 0.15 !
     ! VCNX = 50.00, 50.00, 50.00, 50.00, 50.00, 50.00, 50.00, 50.00, 50.00, 50.00, 50.00, 50.00 !


!END!


------------------------------------------------------------------------------


INPUT GROUP: 12 -- Misc. Dispersion and Computational Parameters
---------------

     Horizontal size of puff (m) beyond which
```

```
time-dependent dispersion equations (Heffter)
are used to determine sigma-y and
sigma-z (SYTDEP)                          Default: 550.   ! SYTDEP = 550 !

Switch for using Heffter equation for sigma z
as above (0 = Not use Heffter; 1 = use Heffter
(MHFTSZ)                                  Default: 0      ! MHFTSZ = 0 !

Stability class used to determine plume
growth rates for puffs above the boundary
layer (JSUP)                              Default: 5      ! JSUP = 5 !

Vertical dispersion constant for stable
conditions (k1 in Eqn. 2.7-3)  (CONK1)    Default: 0.01   ! CONK1 = 0.01 !

Vertical dispersion constant for neutral/
unstable conditions (k2 in Eqn. 2.7-4)
(CONK2)                                   Default: 0.1    ! CONK2 = 0.1 !

Factor for determining Transition-point from
Schulman-Scire to Huber-Snyder Building Downwash
scheme (SS used for Hs <Hb + TBD * HL)
(TBD)                                     Default: 0.5    ! TBD = 0.5 !
   TBD <0   ==> always use Huber-Snyder
   TBD = 1.5 ==> always use Schulman-Scire
   TBD = 0.5 ==> ISC Transition-point

Range of land use categories for which
urban dispersion is assumed
(IURB1, IURB2)                            Default: 10     ! IURB1 = 10 !
                                                   19     ! IURB2 = 19 !

Site characterization parameters for single-point Met data files ---------
(needed for METFM = 2,3,4)

   Land use category for modeling domain
   (ILANDUIN)                             Default: 20     ! ILANDUIN = 20 !

   Roughness length (m) for modeling domain
   (Z0IN)                                 Default: 0.25   ! Z0IN = .25 !

   Leaf area index for modeling domain
   (XLAIIN)                               Default: 3.0    ! XLAIIN = 3.0 !

   Elevation above sea level (m)
   (ELEVIN)                               Default: 0.0    ! ELEVIN = .0 !

   Latitude (degrees) for met location
   (XLATIN)                               Default: -999.  ! XLATIN = -999.0 !

   Longitude (degrees) for met location
   (XLONIN)                               Default: -999.  ! XLONIN = -999.0 !

Specialized information for interpreting single-point Met data files -----

   Anemometer height (m) (Used only if METFM = 2,3)
   (ANEMHT)                               Default: 10.    ! ANEMHT = 10.0 !

   Form of lateral turbulance data in PROFILE.DAT file
   (Used only if METFM = 4 or MTURBVW = 1 or 3)
   (ISIGMAV)                              Default: 1      ! ISIGMAV = 1 !
       0 = read sigma-theta
       1 = read sigma-v

   Choice of mixing heights (Used only if METFM = 4)
   (IMIXCTDM)                             Default: 0      ! IMIXCTDM = 0 !
       0 = read PREDICTED mixing heights
       1 = read OBSERVED mixing heights

Maximum length of a slug (met. grid units)
(XMXLEN)                                  Default: 1.0    ! XMXLEN = 1 !

Maximum travel distance of a puff/slug (in
grid units) during one sampling step
(XSAMLEN)                                 Default: 1.0    ! XSAMLEN = 1 !

Maximum Number of slugs/puffs release from
one source during one time step
(MXNEW)                                   Default: 99     ! MXNEW = 99 !

Maximum Number of sampling steps for
one puff/slug during one time step
(MXSAM)                                   Default: 99     ! MXSAM = 99 !

Number of iterations used when computing
the transport wind for a sampling step
that includes gradual rise (for CALMET
and PROFILE winds)
(NCOUNT)                                  Default: 2      ! NCOUNT = 2 !

Minimum sigma y for a new puff/slug (m)
(SYMIN)                                   Default: 1.0    ! SYMIN = 1 !

Minimum sigma z for a new puff/slug (m)
(SZMIN)                                   Default: 1.0    ! SZMIN = 1 !

Default minimum turbulence velocities
```

```
sigma-v and sigma-w for each
stability class (m/s)
(SVMIN(6) and SWMIN(6))     Default SVMIN : .50,  .50,  .50,  .50,  .50,  .50
                            Default SWMIN : .20,  .12,  .08,  .06,  .03,  .016

                          Stability Class :  A     B     C     D     E     F
                                             ---   ---   ---   ---   ---   ---
                                  ! SVMIN = 0.5, 0.5, 0.5, 0.5, 0.5, 0.5 !
                                  ! SWMIN = 0.2, 0.12, 0.08, 0.06, 0.03, 0.016 !

Divergence criterion for dw/dz across puff
used to initiate adjustment for horizontal
convergence (1/s)
Partial adjustment starts at CDIV(1), and
full adjustment is reached at CDIV(2)
(CDIV(2))                                 Default: 0.0,0.0  ! CDIV = 0, 0 !

Minimum wind speed (m/s) allowed for
non-calm conditions. Also used as minimum
speed returned when using power-law
extrapolation toward surface
(WSCALM)                                  Default: 0.5    ! WSCALM = 0.5 !

Maximum mixing height (m)
(XMAXZI)                                  Default: 3000.  ! XMAXZI = 3000 !

Minimum mixing height (m)
(XMINZI)                                  Default: 50.    ! XMINZI = 50 !

Default wind speed classes --
5 upper bounds (m/s) are entered;
the 6th class has no upper limit
(WSCAT(5))                      Default   :
                                ISC RURAL : 1.54, 3.09, 5.14, 8.23, 10.8 (10.8+)

                         Wind Speed Class :  1     2     3     4     5
                                             ---   ---   ---   ---   ---
                                  ! WSCAT = 1.54, 3.09, 5.14, 8.23, 10.8 !

Default wind speed profile power-law
exponents for stabilities 1-6
(PLX0(6))                       Default   : ISC RURAL values
                                ISC RURAL : .07, .07, .10, .15, .35, .55
                                ISC URBAN : .15, .15, .20, .25, .30, .30

                          Stability Class :  A     B     C     D     E     F
                                             ---   ---   ---   ---   ---   ---
                                    ! PLX0 = 0.07, 0.07, 0.1, 0.15, 0.35, 0.55 !

Default potential temperature gradient
for stable classes E, F (degK/m)
(PTG0(2))                       Default: 0.020, 0.035
                                   ! PTG0 = 0.02, 0.035 !

Default plume path coefficients for
each stability class (used when option
for partial plume height terrain adjustment
is selected -- MCTADJ=3)
(PPC(6))                   Stability Class :  A     B     C     D     E     F
                              Default  PPC : .50,  .50,  .50,  .50,  .35,  .35
                                             ---   ---   ---   ---   ---   ---
                                    ! PPC = 0.5, 0.5, 0.5, 0.5, 0.35, 0.35 !

Slug-to-puff transition criterion factor
equal to sigma-y/length of slug
(SL2PF)                                Default: 10.        ! SL2PF = 10 !

Puff-splitting control variables ------------------------

  VERTICAL SPLIT
  --------------

  Number of puffs that result every time a puff
  is split - nsplit=2 means that 1 puff splits
  into 2
  (NSPLIT)                             Default:   3        ! NSPLIT = 3 !

  Time(s) of a day when split puffs are eligible to
  be split once again; this is typically set once
  per day, around sunset before nocturnal shear develops.
  24 values: 0 is midnight (00:00) and 23 is 11 PM (23:00)
  0=do not re-split    1=eligible for re-split
  (IRESPLIT(24))                       Default:  Hour 17 = 1
  ! IRESPLIT = 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,1,0,0,0,0,0,0 !

  Split is allowed only if last hour's mixing
  height (m) exceeds a minimum value
  (ZISPLIT)                            Default: 100.       ! ZISPLIT = 100 !

  Split is allowed only if ratio of last hour's
  mixing ht to the maximum mixing ht experienced
  by the puff is less than a maximum value (this
  postpones a split until a nocturnal layer develops)
  (ROLDMAX)                            Default: 0.25       ! ROLDMAX = 0.25 !


  HORIZONTAL SPLIT
```

```
      ----------------

      Number of puffs that result every time a puff
      is split - nsplith=5 means that 1 puff splits
      into 5
      (NSPLITH)                         Default:   5        ! NSPLITH = 5 !

      Minimum sigma-y (Grid Cells Units) of puff
      before it may be split
      (SYSPLITH)                        Default:  1.0       ! SYSPLITH = 1 !

      Minimum puff elongation rate (SYSPLITH/hr) due to
      wind shear, before it may be split
      (SHSPLITH)                        Default:  2.        ! SHSPLITH = 2 !

      Minimum concentration (g/m^3) of each
      species in puff before it may be split
      Enter array of NSPEC values; if a single value is
      entered, it will be used for ALL species
      (CNSPLITH)                        Default:  1.0E-07   ! CNSPLITH = 1E-7 !

    Integration control variables ------------------------

      Fractional convergence criterion for numerical SLUG
      sampling integration
      (EPSSLUG)                         Default:   1.0e-04  ! EPSSLUG = 0.0001 !

      Fractional convergence criterion for numerical AREA
      source integration
      (EPSAREA)                         Default:   1.0e-06  ! EPSAREA = 1E-6 !

      Trajectory step-length (m) used for numerical rise
      integration
      (DSRISE)                          Default:   1.0      ! DSRISE = 1 !

    Boundary Condition (BC) Puff control variables -----------------------

      Minimum height (m) to which BC puffs are mixed as they are emitted
      (MBCON=2 ONLY).  Actual height is reset to the current mixing height
      at the release point if greater than this minimum.
      (HTMINBC)                         Default:   500.     * HTMINBC = *

      Search radius (km) about a receptor for sampling nearest BC puff.
      BC puffs are typically emitted with a spacing of one grid cell
      length, so the search radius should be greater than DGRIDKM.
      (RSAMPBC)                         Default:   4.       * RSAMPBC = *

      Near-Surface depletion adjustment to concentration profile used when
      sampling BC puffs?
      (MDEPBC)                          Default:   1        * MDEPBC = *
         0 = Concentration is NOT adjusted for depletion
         1 = Adjust Concentration for depletion

!END!


--------------------------------------------------------------------------------


INPUT GROUPS: 13a, 13b, 13c, 13d -- Point source parameters
---------------------------------

---------------
Subgroup (13a)
---------------

    Number of point sources with
    parameters provided below      (NPT1)  No default  ! NPT1 = 70 !

    Units used for point source
    emissions below                (IPTU)  Default: 1  ! IPTU = 5 !
          1 =        g/s
          2 =       kg/hr
          3 =       lb/hr
          4 =     tons/yr
          5 =     Odour Unit * m**3/s  (vol. flux of odour compound)
          6 =     Odour Unit * m**3/min
          7 =     metric tons/yr

    Number of source-species
    combinations with variable
    emissions scaling factors
    provided below in (13d)        (NSPT1) Default: 0  ! NSPT1 = 0 !

    Number of point sources with
    variable emission parameters
    provided in external file      (NPT2)  No default  ! NPT2 = 0 !

    (If NPT2 > 0, these point
    source emissions are read from
    the file: PTEMARB.DAT)

!END!

---------------
Subgroup (13b)
---------------
```

[a]

POINT SOURCE: CONSTANT DATA

Source No.	X UTM Coordinate (km)	Y UTM Coordinate (km)	Stack Height (m)	Base Elevation (m)	Stack Diameter (m)	Exit Vel. (m/s)	Exit Temp. (deg. K)	[b] Bldg. Dwash	[c] Emission Rates
1	281.906	6140.352	26.0	5.0	1.3	0.1	318	1.0	7.28E03
2	281.902	6140.357	25.5	5.0	3.2	0.1	347	1.0	8.82E04
3	281.901	6140.339	21.0	5.0	2.5	0.1	340	1.0	1.69E05
4	281.913	6140.354	27.0	5.0	3.2	0.1	328	1.0	4.22E04
5	281.919	6140.336	30.0	5.0	2.7	0.1	350	1.0	3.45E05
6	281.899	6140.343	24.0	5.0	0.3	0.1	307	1.0	6.52E02
7	281.896	6140.350	25.0	5.0	0.7	0.1	328	1.0	1.04E04
8	281.895	6140.354	24.5	5.0	0.4	0.1	316	1.0	1.38E03
9	281.894	6140.337	23.0	5.0	0.3	0.1	316	1.0	2.22E02
10	281.896	6140.334	23.5	5.0	0.3	0.1	307	1.0	3.14E02
11	281.912	6140.305	30.0	5.0	0.2	0.1	310	1.0	7.70E01
12	281.951	6140.319	2.0	5.0	0.3	0.1	304	1.0	8.05E02
13	281.952	6140.321	2.5	5.0	0.4	0.1	306	1.0	1.15E03
14	281.954	6140.322	2.5	5.0	0.4	0.1	306	1.0	1.15E03
15	281.945	6140.318	2.8	5.0	0.1	0.1	302	1.0	8.00E00
16	281.939	6140.317	2.8	5.0	0.2	2.4	308	1.0	4.20E01
17	281.869	6140.351	20.0	5.0	1.2	23	318	1.0	1.27E04
18	281.873	6140.353	20.0	5.0	1.2	21	319	1.0	2.34E04
19	281.864	6140.354	19.0	5.0	1.4	0.1	335	1.0	2.26E03
20	281.732	6140.203	8.0	5.0	0.1	0.1	290	1.0	8.05E03
21	281.757	6140.195	8.5	5.0	0.2	0.1	358	1.0	4.60E04
22	281.749	6140.199	12.0	5.0	0.2	0.1	361	1.0	2.05E04

```
23 ! SRCNAM = DDG30 !
```

```
23 ! X =  281.752, 6140.193,     6.0,   5.0,       0.1,   2.5,    369,  1.0, 3.30E03 !
23 ! FMFAC =        1 !   !END!

24 ! SRCNAM = DDG26 !
24 ! X =  281.747, 6140.193,    12.0,   5.0,       0.5,   0.1,    364,  1.0, 4.22E04 !
24 ! FMFAC =        1 !   !END!

25 ! SRCNAM = DDG32 !
25 ! X =  281.759, 6140.189,     6.0,   5.0,       0.1,   0.1,    346,  1.0, 9.58E02 !
25 ! FMFAC =        1 !   !END!

26 ! SRCNAM = DDG28 !
26 ! X =  281.744, 6140.187,     6.0,   5.0,       0.1,   2.5,    369,  1.0, 3.30E03 !
26 ! FMFAC =        1 !   !END!

27 ! SRCNAM = DDG31 !
27 ! X =  281.754, 6140.201,    11.5,   5.0,       0.2,   0.1,    329,  1.0, 3.03E03 !
27 ! FMFAC =        1 !   !END!

28 ! SRCNAM = DDG2A !
28 ! X =  281.832, 6140.227,    14.0,   5.0,       0.2,   0.4,    329,  1.0, 2.99E02 !
28 ! FMFAC =        1 !   !END!

29 ! SRCNAM = DDG5A !
29 ! X =  281.824, 6140.244,    20.0,   5.0,       0.2,   2.1,    347,  1.0, 1.96E03 !
29 ! FMFAC =        1 !   !END!

30 ! SRCNAM = DDG16 !
30 ! X =  281.815, 6140.277,    16.0,   5.0,       0.7,   0.1,    335,  1.0, 2.03E04 !
30 ! FMFAC =        1 !   !END!

31 ! SRCNAM = DDG1 !
31 ! X =  281.823, 6140.275,    12.0,   5.0,       0.1,   0.1,    330,  1.0, 4.98E02 !
31 ! FMFAC =        1 !   !END!

32 ! SRCNAM = DDG19 !
32 ! X =  281.808, 6140.255,    11.0,   5.0,       0.1,   3.3,    362,  1.0, 1.04E03 !
32 ! FMFAC =        1 !   !END!

33 ! SRCNAM = DDG25 !
33 ! X =  281.735, 6140.205,     0.1,   5.0,       0.3,   0.1,    300,  1.0, 7.28E03 !
33 ! FMFAC =        1 !   !END!

34 ! SRCNAM = DDG40 !
34 ! X =  281.816, 6140.223,    13.0,   5.0,      0.92,   0.1,    329,  1.0, 6.90E03 !
34 ! FMFAC =        1 !   !END!

35 ! SRCNAM = DDG45 !
35 ! X =  281.835, 6140.229,     5.0,   5.0,       0.1,   4.1,    309,  1.0, 5.37E03 !
35 ! FMFAC =        1 !   !END!

36 ! SRCNAM = D2 !
36 ! X =  281.936, 6140.407,    10.0,   5.0,       0.1,    13,    337,  1.0, 3.11E03 !
36 ! FMFAC =        1 !   !END!

37 ! SRCNAM = D6 !
37 ! X =  281.937, 6140.413,    13.0,   5.0,       0.2,   0.6,    309,  1.0, 9.20E02 !
37 ! FMFAC =        1 !   !END!

38 ! SRCNAM = D11 !
38 ! X =  281.941, 6140.418,    12.0,   5.0,       0.1,   1.6,    373,  1.0, 3.80E01 !
38 ! FMFAC =        1 !   !END!

39 ! SRCNAM = D12 !
39 ! X =  281.963, 6140.423,    36.0,   5.0,       0.1,   1.6,    250,  1.0, 2.45E02 !
39 ! FMFAC =        1 !   !END!

40 ! SRCNAM = C1 !
40 ! X =  281.946, 6140.350,    21.0,   5.0,       0.1,   0.1,    350,  1.0, 4.60E01 !
40 ! FMFAC =        1 !   !END!

41 ! SRCNAM = C4 !
41 ! X =  281.950, 6140.339,    21.0,   5.0,       0.2,    20,    314,  1.0, 8.05E03 !
41 ! FMFAC =        1 !   !END!

42 ! SRCNAM = C2 !
42 ! X =  281.988, 6140.368,     8.0,   5.0,       0.1,   0.1,    293,  1.0, 1.00E01 !
42 ! FMFAC =        1 !   !END!

43 ! SRCNAM = C18 !
43 ! X =  281.995, 6140.358,     2.5,   5.0,      0.32,   0.1,    307,  1.0, 5.75E02 !
43 ! FMFAC =        1 !   !END!

44 ! SRCNAM = C19 !
44 ! X =  281.978, 6140.402,     8.0,   5.0,       0.1,   0.1,    304,  1.0, 2.90E01 !
44 ! FMFAC =        1 !   !END!

45 ! SRCNAM = B3 !
45 ! X =  281.933, 6140.358,    24.0,   5.0,       0.3,   2.8,    373,  1.0, 2.19E03 !
45 ! FMFAC =        1 !   !END!

46 ! SRCNAM = B7 !
46 ! X =  281.960, 6140.353,     6.0,   5.0,       0.5,   0.3,    327,  1.0, 9.39E03 !
46 ! FMFAC =        1 !   !END!

47 ! SRCNAM = E1 !
47 ! X =  281.938, 6140.369,    23.0,   5.0,      0.37,   0.1,    304,  1.0, 4.22E02 !
```

```
 47 ! FMFAC =        1 !   !END!

 48 ! SRCNAM = E4 !
 48 ! X =  281.985, 6140.334,    15.0,   5.0,       0.4,   0.1,    312,  1.0, 2.11E02 !
 48 ! FMFAC =        1 !   !END!

 49 ! SRCNAM = E7 !
 49 ! X =  281.983, 6140.390,     9.0,   5.0,       0.1,   2.2,    373,  1.0, 2.61E03 !
 49 ! FMFAC =        1 !   !END!

 50 ! SRCNAM = E8 !
 50 ! X =  281.959, 6140.387,    17.0,   5.0,       0.2,    18,    360,  1.0, 1.50E04 !
 50 ! FMFAC =        1 !   !END!

 51 ! SRCNAM = E9 !
 51 ! X =  281.987, 6140.335,     8.0,   5.0,      0.22,   0.1,    311,  1.0, 1.31E02 !
 51 ! FMFAC =        1 !   !END!

 52 ! SRCNAM = E10 !
 52 ! X =  281.935, 6140.374,     8.0,   5.0,       0.1,   0.1,    308,  1.0, 4.22E02 !
 52 ! FMFAC =        1 !   !END!

 53 ! SRCNAM = E11 !
 53 ! X =  281.948, 6140.374,     5.0,   5.0,       0.1,   0.1,    311,  1.0, 4.60E01 !
 53 ! FMFAC =        1 !   !END!

 54 ! SRCNAM = E13 !
 54 ! X =  281.926, 6140.376,    10.0,   5.0,       0.2,   0.1,    362,  1.0, 2.45E03 !
 54 ! FMFAC =        1 !   !END!

 55 ! SRCNAM = E14A !
 55 ! X =  281.947, 6140.391,    17.0,   5.0,      0.45,   0.8,    306,  1.0, 4.22E03 !
 55 ! FMFAC =        1 !   !END!

 56 ! SRCNAM = E14B !
 56 ! X =  281.952, 6140.393,    17.0,   5.0,      0.45,   0.8,    306,  1.0, 4.22E03 !
 56 ! FMFAC =        1 !   !END!

 57 ! SRCNAM = E14C !
 57 ! X =  281.959, 6140.395,    17.0,   5.0,      0.45,   0.8,    306,  1.0, 4.22E03 !
 57 ! FMFAC =        1 !   !END!

 58 ! SRCNAM = E15Y4 !
 58 ! X =  281.943, 6140.381,    17.0,   5.0,       0.4,   3.2,    302,  1.0, 3.26E04 !
 58 ! FMFAC =        1 !   !END!

 59 ! SRCNAM = E15Y5 !
 59 ! X =  281.952, 6140.384,    17.0,   5.0,       0.4,   3.2,    302,  1.0, 3.26E04 !
 59 ! FMFAC =        1 !   !END!

 60 ! SRCNAM = E22 !
 60 ! X =  281.931, 6140.378,    15.0,   5.0,       0.3,   0.1,    300,  1.0, 3.83E02 !
 60 ! FMFAC =        1 !   !END!

 61 ! SRCNAM = E24 !
 61 ! X =  281.988, 6140.332,     4.0,   5.0,      0.51,   0.1,    294,  1.0, 2.30E02 !
 61 ! FMFAC =        1 !   !END!

 62 ! SRCNAM = DDG2B !
 62 ! X =  281.837, 6140.230,    14.0,   5.0,       0.2,   0.4,    329,  1.0, 2.99E02 !
 62 ! FMFAC =        1 !   !END!

 63 ! SRCNAM = DDG5B !
 63 ! X =  281.828, 6140.246,    20.0,   5.0,       0.2,   2.1,    347,  1.0, 1.96E03 !
 63 ! FMFAC =        1 !   !END!

 64 ! SRCNAM = DDG46 !
 64 ! X =  281.841, 6140.218,    10.0,   5.0,       4.5,   7.4,    302,  1.0, 1.57E05 !
 64 ! FMFAC =        1 !   !END!

 65 ! SRCNAM = DDG18 !
 65 ! X =  281.712, 6140.212,    19.0,   5.0,       0.3,   0.1,    320,  1.0, 1.99E03 !
 65 ! FMFAC =        1 !   !END!

 66 ! SRCNAM = E23A !
 66 ! X =  281.905, 6140.414,    10.0,   5.0,       3.4,  10.6,    306,  1.0, 2.59E04 !
 66 ! FMFAC =        1 !   !END!

 67 ! SRCNAM = E23B !
 67 ! X =  281.906, 6140.409,    10.0,   5.0,       3.4,  10.6,    306,  1.0, 2.59E04 !
 67 ! FMFAC =        1 !   !END!

 68 ! SRCNAM = E23C !
 68 ! X =  281.908, 6140.405,    10.0,   5.0,       3.4,  10.6,    306,  1.0, 2.59E04 !
 68 ! FMFAC =        1 !   !END!

 69 ! SRCNAM = E23D !
 69 ! X =  281.909, 6140.401,    10.0,   5.0,       3.4,  10.6,    306,  1.0, 2.59E04 !
 69 ! FMFAC =        1 !   !END!

 70 ! SRCNAM = E23E !
 70 ! X =  281.910, 6140.397,    10.0,   5.0,       3.4,  10.6,    306,  1.0, 2.59E04 !
 70 ! FMFAC =        1 !   !END!
```

---

a
Data for each source are treated as a separate input subgroup
and therefore must end with an input group terminator.

SRCNAM is a 12-character name for a source
(No default)
X is an array holding the source data listed by the column headings
(No default)
SIGYZI is an array holding the initial sigma-y and sigma-z (m)
(Default: 0.,0.)
FMFAC is a vertical momentum flux factor (0. or 1.0) used to represent
the effect of rain-caps or other physical configurations that
reduce momentum rise associated with the actual exit velocity.
(Default: 1.0 -- full momentum used)

b
0. = No building downwash modeled, 1. = downwash modeled
NOTE: must be entered as a REAL number (i.e., with decimal point)

c
An emission rate must be entered for every pollutant modeled.
Enter emission rate of zero for secondary pollutants that are
modeled, but not emitted. Units are specified by IPTU
(e.g. 1 for g/s).

Subgroup (13c)

BUILDING DIMENSION DATA FOR SOURCES SUBJECT TO DOWNWASH

Source a
No. Effective building width and height (in meters) every 10 degrees
---

1 ! SRCNAM = S01 !
1 ! HEIGHT = 30.00, 30.00, 30.00, 30.00, 30.00, 29.00,
29.00, 29.00, 29.00, 29.00, 29.00, 30.00,
30.00, 39.00, 39.00, 39.00, 30.00, 30.00,
30.00, 30.00, 30.00, 30.00, 30.00, 29.00,
29.00, 29.00, 29.00, 29.00, 29.00, 30.00,
30.00, 39.00, 39.00, 39.00, 30.00, 30.00 !
1 ! WIDTH = 35.51, 34.94, 33.31, 30.67, 34.07, 41.52,
37.50, 42.18, 46.00, 48.43, 49.38, 40.05,
43.85, 24.32, 24.42, 24.61, 48.31, 48.00,
35.51, 34.94, 33.31, 30.67, 34.07, 41.52,
37.50, 42.18, 46.00, 48.43, 49.38, 40.05,
43.85, 24.32, 24.42, 24.61, 48.31, 48.00 !
!END!
2 ! SRCNAM = S02 !
2 ! HEIGHT = 30.00, 30.00, 30.00, 30.00, 30.00, 26.00,
26.00, 26.00, 29.00, 29.00, 29.00, 30.00,
30.00, 30.00, 30.00, 30.00, 30.00, 30.00,
30.00, 30.00, 30.00, 30.00, 30.00, 26.00,
26.00, 26.00, 29.00, 29.00, 29.00, 30.00,
30.00, 39.00, 39.00, 39.00, 30.00, 30.00 !
2 ! WIDTH = 46.23, 34.94, 33.31, 30.67, 34.07, 23.10,
22.29, 22.70, 46.00, 48.43, 49.38, 40.05,
43.85, 46.32, 47.37, 47.33, 48.31, 48.00,
46.23, 34.94, 33.31, 30.67, 34.07, 23.10,
22.29, 22.70, 46.00, 48.43, 49.38, 40.05,
43.85, 24.32, 24.42, 24.55, 48.31, 48.00 !
!END!
3 ! SRCNAM = S03 !
3 ! HEIGHT = 30.00, 30.00, 30.00, 30.00, 30.00, 29.00,
29.00, 29.00, 29.00, 30.00, 30.00, 30.00,
30.00, 39.00, 39.00, 30.00, 30.00, 30.00,
30.00, 30.00, 30.00, 30.00, 30.00, 29.00,
29.00, 29.00, 29.00, 30.00, 30.00, 30.00,
30.00, 39.00, 39.00, 30.00, 30.00, 30.00 !
3 ! WIDTH = 46.23, 43.05, 45.90, 40.60, 34.07, 41.52,
37.50, 42.18, 46.00, 28.96, 35.04, 40.05,
43.85, 24.30, 24.30, 47.33, 48.31, 48.00,
35.51, 34.94, 33.31, 30.67, 34.07, 41.52,
37.50, 42.18, 46.00, 28.96, 35.04, 40.05,
43.85, 24.30, 24.30, 47.33, 48.31, 48.00 !
!END!
4 ! SRCNAM = S04 !
4 ! HEIGHT = 30.00, 30.00, 30.00, 30.00, 30.00, 29.00,
29.00, 29.00, 29.00, 29.00, 29.00, 30.00,
30.00, 39.00, 39.00, 39.00, 39.00, 30.00,
30.00, 30.00, 30.00, 30.00, 30.00, 29.00,
29.00, 29.00, 29.00, 29.00, 29.00, 30.00,
30.00, 39.00, 39.00, 39.00, 39.00, 30.00 !
4 ! WIDTH = 35.51, 34.94, 33.31, 30.67, 34.07, 41.52,
37.50, 42.18, 46.00, 48.43, 49.38, 40.05,
43.85, 24.32, 24.42, 24.69, 24.78, 48.00,
35.51, 34.94, 33.31, 30.67, 34.07, 41.52,
37.50, 42.18, 46.00, 48.43, 49.38, 40.05,
43.85, 24.32, 24.42, 24.69, 24.78, 48.00 !
!END!
5 ! SRCNAM = S05 !
5 ! HEIGHT = 39.00, 30.00, 30.00, 30.00, 29.00, 29.00,
29.00, 29.00, 29.00, 30.00, 30.00, 30.00,
30.00, 39.00, 39.00, 39.00, 39.00, 39.00,
39.00, 30.00, 30.00, 30.00, 29.00, 29.00,
29.00, 29.00, 29.00, 30.00, 30.00, 30.00,

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                    30.00,   39.00,   39.00,   39.00,   39.00,   39.00 !
   5 ! WIDTH   =    24.10,   43.05,   38.57,   30.67,   44.34,   41.52,
                    37.50,   42.18,   46.00,   28.96,   35.04,   40.05,
                    43.85,   24.32,   24.42,   24.69,   24.88,   24.88,
                    24.10,   34.94,   33.31,   30.67,   44.34,   41.52,
                    37.50,   42.18,   46.00,   28.96,   35.04,   40.05,
                    43.85,   24.32,   24.42,   24.69,   24.88,   24.88 !
!END!
   6 ! SRCNAM = S06 !
   6 ! HEIGHT  =    30.00,   30.00,   30.00,   30.00,   30.00,   29.00,
                    29.00,   29.00,   29.00,   30.00,   30.00,   30.00,
                    30.00,   39.00,   39.00,   30.00,   30.00,   30.00,
                    30.00,   30.00,   30.00,   30.00,   30.00,   29.00,
                    29.00,   29.00,   29.00,   30.00,   30.00,   30.00,
                    30.00,   39.00,   39.00,   30.00,   30.00,   30.00 !
   6 ! WIDTH   =    46.23,   49.80,   45.90,   40.60,   34.07,   41.52,
                    37.50,   42.18,   46.00,   28.96,   35.04,   40.05,
                    43.85,   24.32,   24.36,   47.33,   48.31,   48.00,
                    46.23,   34.94,   33.31,   30.67,   34.07,   41.52,
                    37.50,   42.18,   46.00,   28.96,   35.04,   40.05,
                    43.85,   24.32,   24.36,   47.33,   48.31,   48.00 !
!END!
   7 ! SRCNAM = S07 !
   7 ! HEIGHT  =    30.00,   30.00,   30.00,   30.00,   30.00,   26.00,
                    26.00,   29.00,   29.00,   29.00,   30.00,   30.00,
                    30.00,   30.00,   39.00,   30.00,   30.00,   30.00,
                    30.00,   30.00,   30.00,   30.00,   30.00,   26.00,
                    26.00,   29.00,   29.00,   29.00,   30.00,   30.00,
                    30.00,   39.00,   39.00,   30.00,   30.00,   30.00 !
   7 ! WIDTH   =    46.23,   49.80,   45.90,   40.60,   34.07,   23.10,
                    22.29,   42.18,   46.00,   48.43,   35.04,   40.05,
                    43.85,   46.32,   24.40,   47.33,   48.31,   48.00,
                    46.23,   34.94,   33.31,   30.67,   34.07,   23.10,
                    22.29,   42.18,   46.00,   48.43,   35.04,   40.05,
                    43.85,   24.32,   24.40,   47.33,   48.31,   48.00 !
!END!
   8 ! SRCNAM = S08 !
   8 ! HEIGHT  =    30.00,   30.00,   30.00,   30.00,   30.00,   26.00,
                    26.00,   26.00,   29.00,   29.00,   30.00,   30.00,
                    30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                    30.00,   30.00,   30.00,   30.00,   30.00,   26.00,
                    26.00,   26.00,   29.00,   29.00,   30.00,   30.00,
                    30.00,   39.00,   39.00,   30.00,   30.00,   30.00 !
   8 ! WIDTH   =    52.19,   34.94,   45.90,   40.60,   34.07,   23.10,
                    22.29,   22.70,   46.00,   48.43,   35.04,   40.05,
                    43.85,   46.32,   47.37,   47.33,   48.31,   48.00,
                    52.19,   34.94,   33.31,   30.67,   34.07,   23.10,
                    22.29,   22.70,   46.00,   48.43,   35.04,   40.05,
                    43.85,   24.32,   24.41,   47.33,   48.31,   48.00 !
!END!
   9 ! SRCNAM = S09 !
   9 ! HEIGHT  =    30.00,   25.00,   29.00,   30.00,   30.00,   29.00,
                    29.00,   29.00,   29.00,   30.00,   30.00,   30.00,
                    30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                    30.00,   30.00,   30.00,   30.00,   30.00,   29.00,
                    29.00,   29.00,   29.00,   30.00,   30.00,   30.00,
                    30.00,   30.00,   30.00,   30.00,   30.00,   30.00 !
   9 ! WIDTH   =    46.23,   29.24,   31.48,   40.60,   34.07,   41.52,
                    37.50,   42.18,   46.00,   28.96,   35.04,   40.05,
                    43.85,   30.02,   47.37,   47.33,   48.31,   48.00,
                    46.23,   34.94,   33.31,   30.67,   34.07,   41.52,
                    37.50,   42.18,   46.00,   28.96,   35.04,   40.05,
                    43.85,   30.02,   47.37,   47.33,   48.31,   48.00 !
!END!
  10 ! SRCNAM = S10 !
  10 ! HEIGHT  =    30.00,   29.00,   29.00,   30.00,   29.00,   29.00,
                    29.00,   29.00,   29.00,   30.00,   30.00,   30.00,
                    30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                    30.00,   30.00,   30.00,   30.00,   29.00,   29.00,
                    29.00,   29.00,   29.00,   30.00,   30.00,   30.00,
                    30.00,   30.00,   30.00,   30.00,   30.00,   30.00 !
  10 ! WIDTH   =    46.23,   31.95,   31.48,   40.60,   44.34,   41.52,
                    37.50,   42.18,   46.00,   28.96,   35.04,   40.05,
                    43.85,   30.27,   47.37,   47.33,   48.31,   48.00,
                    46.23,   34.94,   33.31,   30.67,   44.34,   41.52,
                    37.50,   42.18,   46.00,   28.96,   35.04,   40.05,
                    43.85,   30.27,   47.37,   47.33,   48.31,   48.00 !
!END!
  11 ! SRCNAM = S11 !
  11 ! HEIGHT  =    30.00,   30.00,   30.00,   30.00,   29.00,   29.00,
                    29.00,   29.00,   29.00,   30.00,   30.00,   30.00,
                    30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                    30.00,   30.00,   30.00,   30.00,   29.00,   29.00,
                    29.00,   29.00,   29.00,   30.00,   30.00,   30.00,
                    30.00,   30.00,   30.00,   30.00,   30.00,   30.00 !
  11 ! WIDTH   =    46.23,   43.05,   38.57,   32.91,   44.34,   41.52,
                    37.50,   42.18,   46.00,   28.96,   35.04,   40.05,
                    43.85,   46.32,   47.37,   47.33,   48.31,   48.00,
                    35.51,   34.94,   33.31,   32.91,   44.34,   41.52,
                    37.50,   42.18,   46.00,   28.96,   35.04,   40.05,
                    43.85,   46.32,   47.37,   47.33,   48.31,   48.00 !
!END!
  12 ! SRCNAM = S12 !
  12 ! HEIGHT  =    39.00,   30.00,   30.00,   30.00,   29.00,   29.00,
                    29.00,   29.00,   29.00,   30.00,   30.00,   30.00,
                    30.00,   39.00,   39.00,   39.00,   39.00,   39.00,
                    39.00,   30.00,   30.00,   30.00,   29.00,   29.00,
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                  29.00,   29.00,   29.00,   30.00,   30.00,   30.00,
                  30.00,   39.00,   39.00,   39.00,   39.00,   39.00 !
  12 ! WIDTH   =   24.10,   43.05,   38.57,   32.91,   44.34,   41.52,
                  37.50,   42.18,   46.00,   28.96,   35.04,   40.05,
                  43.85,   24.32,   24.42,   24.69,   25.00,   25.00,
                  24.10,   43.05,   38.57,   32.91,   44.34,   41.52,
                  37.50,   42.18,   46.00,   28.96,   35.04,   40.05,
                  43.85,   24.32,   24.42,   24.69,   25.00,   25.00 !
!END!
  13 ! SRCNAM = S13A !
  13 ! HEIGHT  =   39.00,   30.00,   30.00,   30.00,   29.00,   29.00,
                  29.00,   29.00,   29.00,   30.00,   30.00,   30.00,
                  30.00,   39.00,   39.00,   39.00,   39.00,   39.00,
                  39.00,   30.00,   30.00,   30.00,   29.00,   29.00,
                  29.00,   29.00,   29.00,   30.00,   30.00,   30.00,
                  30.00,   39.00,   39.00,   39.00,   39.00,   39.00 !
  13 ! WIDTH   =   24.10,   43.05,   38.57,   32.91,   44.34,   41.52,
                  37.50,   42.18,   46.00,   28.96,   35.04,   40.05,
                  43.85,   24.31,   24.31,   24.31,   24.31,   24.31,
                  24.10,   43.05,   38.57,   32.91,   44.34,   41.52,
                  37.50,   42.18,   46.00,   28.96,   35.04,   40.05,
                  43.85,   24.31,   24.31,   24.31,   24.31,   24.31 !
!END!
  14 ! SRCNAM = S13B !
  14 ! HEIGHT  =   30.00,   30.00,   30.00,   30.00,   29.00,   29.00,
                  29.00,   29.00,   29.00,   30.00,   30.00,   30.00,
                  30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                  30.00,   30.00,   30.00,   30.00,   29.00,   29.00,
                  29.00,   29.00,   29.00,   30.00,   30.00,   30.00,
                  30.00,   30.00,   30.00,   30.00,   30.00,   30.00 !
  14 ! WIDTH   =   30.03,   43.05,   38.57,   32.91,   44.34,   41.52,
                  37.50,   42.18,   46.00,   28.96,   35.04,   40.05,
                  43.85,   30.03,   30.03,   30.03,   30.03,   30.03,
                  30.03,   43.05,   38.57,   32.91,   44.34,   41.52,
                  37.50,   42.18,   46.00,   28.96,   35.04,   40.05,
                  43.85,   30.03,   30.03,   30.03,   30.03,   30.03 !
!END!
  15 ! SRCNAM = S14 !
  15 ! HEIGHT  =   39.00,   30.00,   30.00,   30.00,   29.00,   29.00,
                  29.00,   29.00,   29.00,   30.00,   30.00,   30.00,
                  30.00,   39.00,   39.00,   39.00,   39.00,   39.00,
                  39.00,   30.00,   30.00,   30.00,   29.00,   29.00,
                  29.00,   29.00,   29.00,   30.00,   30.00,   30.00,
                  30.00,   39.00,   39.00,   39.00,   39.00,   39.00 !
  15 ! WIDTH   =   24.10,   43.05,   38.57,   32.91,   44.34,   41.52,
                  37.50,   42.18,   46.00,   28.96,   35.04,   40.05,
                  43.85,   24.32,   24.42,   24.69,   25.14,   25.00,
                  24.10,   34.94,   38.57,   32.91,   44.34,   41.52,
                  37.50,   42.18,   46.00,   28.96,   35.04,   40.05,
                  43.85,   24.32,   24.42,   24.69,   25.14,   25.00 !
!END!
  16 ! SRCNAM = S15 !
  16 ! HEIGHT  =   39.00,   30.00,   30.00,   30.00,   29.00,   29.00,
                  29.00,   29.00,   29.00,   30.00,   30.00,   30.00,
                  30.00,   39.00,   39.00,   39.00,   39.00,   39.00,
                  39.00,   30.00,   30.00,   30.00,   29.00,   29.00,
                  29.00,   29.00,   29.00,   30.00,   30.00,   30.00,
                  30.00,   39.00,   39.00,   39.00,   39.00,   39.00 !
  16 ! WIDTH   =   24.10,   43.05,   38.57,   32.91,   44.34,   41.52,
                  37.50,   42.18,   46.00,   28.96,   35.04,   40.05,
                  43.85,   24.32,   24.42,   24.69,   25.14,   25.00,
                  24.10,   34.94,   38.57,   32.91,   44.34,   41.52,
                  37.50,   42.18,   46.00,   28.96,   35.04,   40.05,
                  43.85,   24.32,   24.42,   24.69,   25.14,   25.00 !
!END!
  17 ! SRCNAM = S18 !
  17 ! HEIGHT  =   18.00,   21.00,   21.00,   21.00,   26.00,   26.00,
                  26.00,   26.00,   29.00,   29.00,   30.00,   30.00,
                  30.00,   30.00,   30.00,   18.00,   21.00,   21.00,
                  21.00,   21.00,   30.00,   30.00,   30.00,   30.00,
                  26.00,   26.00,   29.00,   29.00,   30.00,   30.00,
                  30.00,   30.00,   30.00,   18.00,   21.00,   21.00 !
  17 ! WIDTH   =   33.19,   35.03,   34.02,   32.38,   23.20,   23.10,
                  22.29,   22.70,   46.00,   48.43,   35.04,   40.05,
                  43.85,   46.32,   47.37,   29.64,   33.97,   35.00,
                  35.36,   35.03,   45.90,   30.67,   34.07,   26.50,
                  22.29,   22.70,   46.00,   48.43,   35.04,   40.05,
                  43.85,   46.32,   47.37,   29.64,   33.97,   35.00 !
!END!
  18 ! SRCNAM = S19 !
  18 ! HEIGHT  =   21.00,   21.00,   30.00,   26.00,   26.00,   26.00,
                  26.00,   26.00,   29.00,   29.00,   30.00,   30.00,
                  30.00,   30.00,   30.00,   30.00,   21.00,   21.00,
                  21.00,   21.00,   30.00,   30.00,   30.00,   30.00,
                  26.00,   26.00,   29.00,   29.00,   30.00,   30.00,
                  30.00,   30.00,   30.00,   30.00,   21.00,   21.00 !
  18 ! WIDTH   =   35.36,   35.03,   45.90,   22.60,   23.20,   23.10,
                  22.29,   22.70,   46.00,   48.43,   35.04,   40.05,
                  43.85,   46.32,   47.37,   47.33,   33.97,   35.00,
                  35.36,   35.03,   45.90,   30.67,   34.07,   26.50,
                  22.29,   22.70,   46.00,   48.43,   35.04,   40.05,
                  43.85,   46.32,   47.37,   47.33,   33.97,   35.00 !
!END!
  19 ! SRCNAM = S20 !
  19 ! HEIGHT  =   21.00,   21.00,   21.00,   21.00,   21.00,   26.00,
                  26.00,   26.00,   29.00,   29.00,   30.00,   30.00,
                  30.00,   29.00,   30.00,   18.00,   18.00,   21.00,
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                  21.00,   21.00,   30.00,   30.00,   30.00,   30.00,
                  26.00,   26.00,   29.00,   29.00,   30.00,   30.00,
                  30.00,   30.00,   30.00,   18.00,   18.00,   21.00 !
  19 ! WIDTH   =  35.36,   35.03,   34.02,   32.38,   30.16,   23.10,
                  22.29,   22.70,   46.00,   48.43,   35.04,   40.05,
                  43.85,   49.71,   47.37,   29.64,   31.80,   35.00,
                  35.36,   35.03,   45.90,   30.67,   34.07,   26.50,
                  22.29,   22.70,   46.00,   48.43,   35.04,   40.05,
                  43.85,   46.32,   47.37,   29.64,   31.80,   35.00 !
!END!
  20 ! SRCNAM = DDG24 !
  20 ! HEIGHT  =  18.00,   18.00,   18.00,   18.00,   18.00,   18.00,
                  18.00,   18.00,   18.00,   18.00,   18.00,   18.00,
                  18.00,   18.00,   18.00,   18.00,   18.00,   18.00,
                  18.00,   18.00,   18.00,   18.00,   18.00,   18.00,
                  18.00,   18.00,   18.00,   18.00,   18.00,   18.00,
                  18.00,   18.00,   18.00,   18.00,   18.00,   18.00 !
  20 ! WIDTH   =  23.05,   26.40,   28.95,   30.62,   31.36,   31.15,
                  30.07,   30.24,   30.00,   28.85,   26.82,   23.98,
                  20.41,   16.22,   11.54,    9.30,   14.37,   19.00,
                  23.05,   26.40,   28.95,   30.62,   31.36,   31.15,
                  30.07,   30.24,   30.00,   28.85,   26.82,   23.98,
                  20.41,   16.22,   11.54,    9.30,   14.37,   19.00 !
!END!
  21 ! SRCNAM = DDG23 !
  21 ! HEIGHT  =  11.50,   12.00,   12.00,   12.00,   18.00,   18.00,
                  18.00,   18.00,   18.00,   18.00,   18.00,   18.00,
                  18.00,   11.50,   11.50,   11.50,   11.50,   11.50,
                  11.50,   12.00,   12.00,   16.00,   18.00,   18.00,
                  18.00,   18.00,   18.00,   18.00,   18.00,   18.00,
                  18.00,   11.50,   11.50,   11.50,   11.50,   11.50 !
  21 ! WIDTH   =  10.33,   37.62,   39.11,   39.49,   31.36,   31.15,
                  30.07,   30.24,   30.00,   28.85,   26.82,   23.98,
                  20.41,   16.13,   15.55,   14.65,   13.46,   12.00,
                  10.33,   37.62,   39.11,   21.48,   31.36,   31.15,
                  30.07,   30.24,   30.00,   28.85,   26.82,   23.98,
                  20.41,   16.13,   15.55,   14.65,   13.46,   12.00 !
!END!
  22 ! SRCNAM = DDG20 !
  22 ! HEIGHT  =  12.00,   18.00,   18.00,   18.00,   18.00,   18.00,
                  18.00,   18.00,   18.00,   18.00,   18.00,   18.00,
                  18.00,   18.00,   12.00,   12.00,   12.00,   12.00,
                  12.00,   18.00,   18.00,   18.00,   18.00,   18.00,
                  18.00,   18.00,   18.00,   18.00,   18.00,   18.00,
                  18.00,   18.00,   12.00,   12.00,   12.00,   12.00 !
  22 ! WIDTH   =  35.05,   26.40,   28.95,   30.62,   31.36,   31.15,
                  30.07,   30.24,   30.00,   28.85,   26.82,   23.98,
                  20.41,   16.22,   20.58,   21.88,   27.07,   31.50,
                  35.05,   26.40,   28.95,   30.62,   31.36,   31.15,
                  30.07,   30.24,   30.00,   28.85,   26.82,   23.98,
                  20.41,   16.22,   20.58,   21.88,   27.07,   31.50 !
!END!
  23 ! SRCNAM = DDG30 !
  23 ! HEIGHT  =  12.00,   12.00,   12.00,   18.00,   18.00,   18.00,
                  18.00,   18.00,   18.00,   18.00,   18.00,   18.00,
                  18.00,   18.00,   12.00,   12.00,   12.00,   12.00,
                  12.00,   12.00,   12.00,   18.00,   18.00,   18.00,
                  18.00,   18.00,   18.00,   18.00,   18.00,   18.00,
                  18.00,   18.00,   12.00,   12.00,   12.00,   12.00 !
  23 ! WIDTH   =  35.05,   37.62,   39.11,   30.62,   31.36,   31.15,
                  30.07,   30.24,   30.00,   28.85,   26.82,   23.98,
                  20.41,   16.22,   20.58,   21.88,   27.07,   31.50,
                  35.05,   37.62,   39.11,   30.62,   31.36,   31.15,
                  30.07,   30.24,   30.00,   28.85,   26.82,   23.98,
                  20.41,   16.22,   20.58,   21.88,   27.07,   31.50 !
!END!
  24 ! SRCNAM = DDG26 !
  24 ! HEIGHT  =  12.00,   18.00,   18.00,   18.00,   18.00,   18.00,
                  18.00,   18.00,   18.00,   18.00,   18.00,   18.00,
                  18.00,   18.00,   12.00,   12.00,   12.00,   12.00,
                  12.00,   18.00,   18.00,   18.00,   18.00,   18.00,
                  18.00,   18.00,   18.00,   18.00,   18.00,   18.00,
                  18.00,   18.00,   12.00,   12.00,   12.00,   12.00 !
  24 ! WIDTH   =  35.05,   26.40,   28.95,   30.62,   31.36,   31.15,
                  30.07,   30.24,   30.00,   28.85,   26.82,   23.98,
                  20.41,   16.22,   20.58,   21.88,   27.07,   31.50,
                  35.05,   26.40,   28.95,   30.62,   31.36,   31.15,
                  30.07,   30.24,   30.00,   28.85,   26.82,   23.98,
                  20.41,   16.22,   20.58,   21.88,   27.07,   31.50 !
!END!
  25 ! SRCNAM = DDG32 !
  25 ! HEIGHT  =  11.50,    8.00,    8.00,    8.00,    8.00,   12.00,
                  18.00,   18.00,   18.00,   18.00,   18.00,   18.00,
                  18.00,   12.00,   11.50,   11.50,   11.50,   11.50,
                  11.50,    8.00,    8.00,   16.00,   16.00,   12.00,
                  18.00,   18.00,   18.00,   18.00,   18.00,   18.00,
                  18.00,   12.00,   11.50,   11.50,   11.50,   11.50 !
  25 ! WIDTH   =  10.33,   13.88,   13.92,   13.68,   13.19,   36.91,
                  30.07,   30.24,   30.00,   28.85,   26.82,   23.98,
                  20.41,   19.49,   15.55,   14.65,   13.46,   12.00,
                  10.33,   13.88,   13.92,   21.48,   18.51,   36.91,
                  30.07,   30.24,   30.00,   28.85,   26.82,   23.98,
                  20.41,   19.49,   15.55,   14.65,   13.46,   12.00 !
!END!
  26 ! SRCNAM = DDG28 !
  26 ! HEIGHT  =  18.00,   18.00,   18.00,   18.00,   18.00,   18.00,
                  18.00,   18.00,   18.00,   18.00,   18.00,   18.00,
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                  18.00,   18.00,   18.00,   12.00,   18.00,   18.00,
                  18.00,   18.00,   18.00,   18.00,   18.00,   18.00,
                  18.00,   18.00,   18.00,   18.00,   18.00,   18.00,
                  18.00,   18.00,   18.00,   12.00,   18.00,   18.00 !
  26 ! WIDTH   =   23.05,   26.40,   28.95,   30.62,   31.36,   31.15,
                  30.07,   30.24,   30.00,   28.85,   26.82,   23.98,
                  20.41,   16.22,   11.54,   21.88,   14.37,   19.00,
                  23.05,   26.40,   28.95,   30.62,   31.36,   31.15,
                  30.07,   30.24,   30.00,   28.85,   26.82,   23.98,
                  20.41,   16.22,   11.54,   21.88,   14.37,   19.00 !
!END!
  27 ! SRCNAM = DDG31 !
  27 ! HEIGHT  =   12.00,   12.00,   18.00,   18.00,   18.00,   18.00,
                  18.00,   18.00,   18.00,   18.00,   18.00,   18.00,
                  18.00,   11.50,   11.50,   11.50,   11.50,   12.00,
                  12.00,   12.00,   18.00,   18.00,   18.00,   18.00,
                  18.00,   18.00,   18.00,   18.00,   18.00,   18.00,
                  18.00,   11.50,   11.50,   11.50,   11.50,   12.00 !
  27 ! WIDTH   =   35.05,   37.62,   28.95,   30.62,   31.36,   31.15,
                  30.07,   30.24,   30.00,   28.85,   26.82,   23.98,
                  20.41,   16.13,   15.55,   14.65,   13.46,   31.50,
                  35.05,   37.62,   28.95,   30.62,   31.36,   31.15,
                  30.07,   30.24,   30.00,   28.85,   26.82,   23.98,
                  20.41,   16.13,   15.55,   14.65,   13.46,   31.50 !
!END!
  28 ! SRCNAM = DDG2A !
  28 ! HEIGHT  =   16.00,   16.00,   13.00,   13.00,   13.00,   13.00,
                  13.00,   13.00,   13.00,   16.00,   16.00,   16.00,
                  16.00,   16.00,   16.00,   16.00,   16.00,   16.00,
                  16.00,   21.00,   29.00,   30.00,   29.00,   27.00,
                  13.00,   13.00,   13.00,   16.00,   16.00,   16.00,
                  16.00,   16.00,   16.00,   16.00,   16.00,   16.00 !
  28 ! WIDTH   =   26.21,   25.39,   21.37,   18.54,   15.16,   11.31,
                  11.22,   15.22,   18.77,   24.33,   26.08,   27.03,
                  27.17,   26.48,   24.98,   23.91,   25.46,   26.23,
                  26.21,   73.22,   31.48,   32.91,   44.34,   44.98,
                  11.22,   15.22,   18.77,   24.33,   26.08,   27.03,
                  27.17,   26.48,   24.98,   23.91,   25.46,   26.23 !
!END!
  29 ! SRCNAM = DDG5A !
  29 ! HEIGHT  =   16.00,   16.00,   16.00,   16.00,   16.00,   16.00,
                  16.00,   16.00,   16.00,   16.00,   16.00,   16.00,
                  16.00,   16.00,   16.00,   16.00,   16.00,   16.00,
                  16.00,   16.00,   21.00,   29.00,   29.00,   29.00,
                  16.00,   16.00,   16.00,   16.00,   16.00,   16.00,
                  16.00,   16.00,   16.00,   16.00,   16.00,   16.00 !
  29 ! WIDTH   =   26.21,   25.39,   23.79,   21.48,   18.51,   14.98,
                  14.98,   18.70,   21.85,   24.33,   26.08,   27.03,
                  27.17,   26.48,   24.98,   23.91,   25.46,   26.23,
                  26.21,   25.39,   75.06,   30.05,   44.34,   41.52,
                  14.98,   18.70,   21.85,   24.33,   26.08,   27.03,
                  27.17,   26.48,   24.98,   23.91,   25.46,   26.23 !
!END!
  30 ! SRCNAM = DDG16 !
  30 ! HEIGHT  =   16.00,   16.00,   16.00,   10.00,   10.00,   10.00,
                  10.00,   10.00,   10.00,   10.00,   10.00,   10.00,
                  16.00,   16.00,   16.00,   16.00,   16.00,   16.00,
                  16.00,   18.00,   18.00,   26.00,   26.00,   29.00,
                  29.00,   29.00,   10.00,   10.00,   10.00,   10.00,
                  16.00,   16.00,   16.00,   16.00,   16.00,   16.00 !
  30 ! WIDTH   =   26.21,   25.39,   23.79,   75.83,   76.32,   74.50,
                  72.61,   76.47,   78.00,   77.16,   73.98,   68.55,
                  27.17,   26.48,   24.98,   23.91,   25.46,   26.23,
                  26.21,   32.38,   30.58,   22.60,   23.20,   41.52,
                  37.50,   42.18,   78.00,   77.16,   73.98,   68.55,
                  27.17,   26.48,   24.98,   23.91,   25.46,   26.23 !
!END!
  31 ! SRCNAM = DDG1 !
  31 ! HEIGHT  =   16.00,   16.00,   16.00,   16.00,   10.00,   10.00,
                  10.00,   18.00,   10.00,   10.00,   10.00,   10.00,
                  10.00,   16.00,   16.00,   16.00,   16.00,   16.00,
                  18.00,   18.00,   18.00,   26.00,   29.00,   29.00,
                  29.00,   29.00,   10.00,   10.00,   10.00,   10.00,
                  10.00,   16.00,   16.00,   16.00,   16.00,   16.00 !
  31 ! WIDTH   =   26.21,   25.39,   23.79,   21.48,   76.32,   74.50,
                  72.61,   79.49,   78.00,   77.16,   73.98,   68.55,
                  61.06,   26.48,   24.98,   23.91,   25.46,   26.23,
                  33.19,   32.38,   30.58,   22.60,   44.34,   41.52,
                  37.50,   42.18,   78.00,   77.16,   73.98,   68.55,
                  61.06,   26.48,   24.98,   23.91,   25.46,   26.23 !
!END!
  32 ! SRCNAM = DDG19 !
  32 ! HEIGHT  =   16.00,   16.00,   16.00,   16.00,   16.00,   16.00,
                  16.00,   16.00,   16.00,   16.00,   16.00,   16.00,
                  16.00,   16.00,   16.00,   16.00,   16.00,   16.00,
                  16.00,   16.00,   16.00,   16.00,   29.00,   29.00,
                  29.00,   16.00,   16.00,   16.00,   16.00,   16.00,
                  16.00,   16.00,   16.00,   16.00,   16.00,   16.00 !
  32 ! WIDTH   =   26.21,   25.39,   23.79,   21.48,   18.51,   14.98,
                  14.98,   18.70,   21.85,   24.33,   26.08,   27.03,
                  27.17,   26.48,   24.98,   23.91,   25.46,   26.23,
                  26.21,   25.39,   23.79,   21.48,   44.34,   41.52,
                  37.50,   18.70,   21.85,   24.33,   26.08,   27.03,
                  27.17,   26.48,   24.98,   23.91,   25.46,   26.23 !
!END!
  33 ! SRCNAM = DDG25 !
  33 ! HEIGHT  =   18.00,   18.00,   18.00,   18.00,   18.00,   18.00,
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                  18.00,   18.00,   18.00,   18.00,   18.00,   18.00,
                  18.00,   18.00,   18.00,   18.00,   18.00,   18.00,
                  18.00,   18.00,   18.00,   18.00,   18.00,   18.00,
                  18.00,   18.00,   18.00,   18.00,   18.00,   18.00,
                  18.00,   18.00,   18.00,   18.00,   18.00,   18.00 !
  33 ! WIDTH   =   23.05,   26.40,   28.95,   30.62,   31.36,   31.15,
                  30.07,   30.24,   30.00,   28.85,   26.82,   23.98,
                  20.41,   16.22,   11.54,    9.30,   14.37,   19.00,
                  23.05,   26.40,   28.95,   30.62,   31.36,   31.15,
                  30.07,   30.24,   30.00,   28.85,   26.82,   23.98,
                  20.41,   16.22,   11.54,    9.30,   14.37,   19.00 !
!END!
  34 ! SRCNAM = DDG40 !
  34 ! HEIGHT  =   16.00,   16.00,   16.00,   16.00,   13.00,   13.00,
                  18.00,   18.00,   18.00,   13.00,   13.00,   13.00,
                  13.00,   16.00,   16.00,   16.00,   16.00,   16.00,
                  16.00,   16.00,   16.00,   30.00,   29.00,   29.00,
                  13.00,   13.00,   13.00,   13.00,   13.00,   13.00,
                  13.00,   16.00,   16.00,   16.00,   16.00,   16.00 !
  34 ! WIDTH   =   26.21,   25.39,   23.79,   21.48,   15.16,   11.31,
                  30.07,   30.24,   30.00,   21.74,   24.06,   25.64,
                  26.44,   26.48,   24.98,   23.91,   25.46,   26.23,
                  26.21,   25.39,   23.79,   29.03,   44.34,   41.52,
                  11.22,   15.22,   18.77,   21.74,   24.06,   25.64,
                  26.44,   26.48,   24.98,   23.91,   25.46,   26.23 !
!END!
  35 ! SRCNAM = DDG45 !
  35 ! HEIGHT  =   16.00,   13.00,   13.00,   13.00,   13.00,   13.00,
                  13.00,   13.00,   13.00,   16.00,   16.00,   16.00,
                  16.00,   16.00,   16.00,   16.00,   16.00,   16.00,
                  16.00,   21.00,   29.00,   30.00,   29.00,   27.00,
                  13.00,   13.00,   13.00,   16.00,   16.00,   16.00,
                  16.00,   16.00,   16.00,   16.00,   16.00,   16.00 !
  35 ! WIDTH   =   26.21,   23.54,   21.37,   18.54,   15.16,   11.31,
                  11.22,   15.22,   18.77,   24.33,   26.08,   27.03,
                  27.17,   26.48,   24.98,   23.91,   25.46,   26.23,
                  26.21,   73.22,   31.48,   32.91,   44.34,   44.98,
                  11.22,   15.22,   18.77,   24.33,   26.08,   27.03,
                  27.17,   26.48,   24.98,   23.91,   25.46,   26.23 !
!END!
  36 ! SRCNAM = D2 !
  36 ! HEIGHT  =   39.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                  30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                  30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                  30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                  30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                  30.00,   30.00,   30.00,   30.00,   39.00,   39.00 !
  36 ! WIDTH   =   24.10,   34.94,   33.31,   30.67,   34.07,   26.50,
                  18.13,   24.39,   32.00,   30.00,   32.64,   34.52,
                  35.34,   35.10,   33.78,   31.61,   33.43,   35.00,
                  35.51,   34.94,   33.31,   30.67,   34.07,   26.50,
                  18.13,   24.39,   32.00,   30.00,   32.64,   34.52,
                  35.34,   35.10,   33.78,   31.61,   25.14,   25.00 !
!END!
  37 ! SRCNAM = D6 !
  37 ! HEIGHT  =   39.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                  30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                  30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                  30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                  30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                  30.00,   30.00,   30.00,   30.00,   39.00,   39.00 !
  37 ! WIDTH   =   24.10,   34.94,   33.31,   30.67,   34.07,   26.50,
                  18.13,   24.39,   32.00,   30.00,   32.64,   34.52,
                  35.34,   35.10,   33.78,   31.61,   33.43,   35.00,
                  35.51,   34.94,   33.31,   30.67,   34.07,   26.50,
                  18.13,   24.39,   32.00,   30.00,   32.64,   34.52,
                  35.34,   35.10,   33.78,   31.61,   25.14,   25.00 !
!END!
  38 ! SRCNAM = D11 !
  38 ! HEIGHT  =   39.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                  30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                  30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                  30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                  30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                  30.00,   30.00,   30.00,   30.00,   39.00,   39.00 !
  38 ! WIDTH   =   24.10,   34.94,   33.31,   30.67,   34.07,   26.50,
                  18.13,   24.39,   32.00,   30.00,   32.64,   34.52,
                  35.34,   35.10,   33.78,   31.61,   33.43,   35.00,
                  35.51,   34.94,   33.31,   30.67,   34.07,   26.50,
                  18.13,   24.39,   32.00,   30.00,   32.64,   34.52,
                  35.34,   35.10,   33.78,   31.61,   25.14,   25.00 !
!END!
  39 ! SRCNAM = D12 !
  39 ! HEIGHT  =   39.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                  30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                  30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                  30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                  30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                  30.00,   30.00,   30.00,   30.00,   30.00,   39.00 !
  39 ! WIDTH   =   24.10,   34.94,   33.31,   30.67,   34.07,   26.50,
                  18.13,   24.39,   32.00,   30.00,   32.64,   34.52,
                  35.34,   35.10,   33.78,   31.61,   33.43,   35.00,
                  35.51,   34.94,   33.31,   30.67,   34.07,   26.50,
                  18.13,   24.39,   32.00,   30.00,   32.64,   34.52,
                  35.34,   35.10,   33.78,   31.61,   33.43,   24.50 !
!END!
  40 ! SRCNAM = C1 !
```

```
  40 ! HEIGHT  =   39.00,   30.00,   30.00,   30.00,   29.00,   29.00,
                   29.00,   29.00,   29.00,   29.00,   29.00,   27.00,
                   27.00,   30.00,   30.00,   39.00,   39.00,   39.00,
                   39.00,   30.00,   30.00,   30.00,   29.00,   29.00,
                   29.00,   29.00,   29.00,   29.00,   29.00,   27.00,
                   27.00,   30.00,   30.00,   39.00,   39.00,   39.00 !
  40 ! WIDTH   =   24.10,   34.94,   33.31,   32.91,   44.34,   41.52,
                   37.50,   42.18,   46.00,   48.43,   49.38,   40.44,
                   43.67,   51.98,   47.37,   24.69,   25.14,   25.00,
                   24.10,   34.94,   33.31,   32.91,   44.34,   41.52,
                   37.50,   42.18,   46.00,   48.43,   49.38,   40.44,
                   43.67,   51.98,   47.37,   24.69,   25.14,   25.00 !
!END!
  41 ! SRCNAM = C4 !
  41 ! HEIGHT  =   39.00,   30.00,   30.00,   30.00,   29.00,   29.00,
                   29.00,   29.00,   29.00,   29.00,   29.00,   29.00,
                   29.00,   30.00,   39.00,   39.00,   39.00,   39.00,
                   39.00,   30.00,   30.00,   30.00,   29.00,   29.00,
                   29.00,   29.00,   29.00,   29.00,   29.00,   29.00,
                   29.00,   30.00,   39.00,   39.00,   39.00,   39.00 !
  41 ! WIDTH   =   24.10,   34.94,   38.57,   32.91,   44.34,   41.52,
                   37.50,   42.18,   46.00,   48.43,   49.38,   49.41,
                   50.32,   46.32,   24.42,   24.69,   25.07,   25.00,
                   24.10,   34.94,   38.57,   32.91,   44.34,   41.52,
                   37.50,   42.18,   46.00,   48.43,   49.38,   49.41,
                   50.32,   46.32,   24.42,   24.69,   25.07,   25.00 !
!END!
  42 ! SRCNAM = C2 !
  42 ! HEIGHT  =   27.00,   27.00,   30.00,   30.00,   29.00,   29.00,
                   29.00,   29.00,   26.00,   30.00,   30.00,   30.00,
                   30.00,   30.00,   30.00,   30.00,   30.00,    8.00,
                   27.00,   27.00,   29.00,   29.00,   29.00,   29.00,
                   29.00,   29.00,   21.00,   30.00,   30.00,   30.00,
                   30.00,   30.00,   30.00,   30.00,   30.00,    8.00 !
  42 ! WIDTH   =   59.81,   59.99,   38.57,   32.91,   44.34,   41.52,
                   37.50,   42.18,   22.68,   38.63,   32.64,   34.52,
                   35.34,   35.10,   33.78,   31.61,   38.29,   10.00,
                   59.81,   59.99,   45.91,   30.05,   44.34,   41.52,
                   37.50,   42.18,   45.00,   38.63,   32.64,   34.52,
                   35.34,   35.10,   33.78,   31.61,   38.29,   10.00 !
!END!
  43 ! SRCNAM = C18 !
  43 ! HEIGHT  =    8.00,   27.00,   27.00,   30.00,   29.00,   29.00,
                  29.00,   29.00,   29.00,   25.00,   30.00,   30.00,
                  30.00,   30.00,   30.00,   30.00,    8.00,    8.00,
                   8.00,   27.00,   27.00,   30.00,   29.00,   27.00,
                  29.00,   29.00,   29.00,   21.00,   30.00,   30.00,
                  30.00,   18.00,   18.00,   18.00,    6.00,    6.00 !
  43 ! WIDTH   =   10.37,   59.99,   58.52,   32.91,   44.34,   41.52,
                   37.50,   42.18,   46.00,   19.86,   44.09,   34.52,
                   35.34,   35.10,   33.78,   31.61,   32.15,   36.00,
                   38.75,   59.99,   58.52,   32.91,   44.34,   44.98,
                   37.50,   42.18,   46.00,   50.10,   44.09,   34.52,
                   35.34,   20.88,   22.30,   23.31,   13.79,   17.00 !
!END!
  44 ! SRCNAM = C19 !
  44 ! HEIGHT  =   30.00,   30.00,   30.00,   30.00,   29.00,   26.00,
                   20.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                   30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                   30.00,   20.00,   20.00,   20.00,   27.00,   20.00,
                   20.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                   30.00,   30.00,   30.00,   30.00,   30.00,   30.00 !
  44 ! WIDTH   =   30.00,   43.05,   38.57,   32.91,   44.34,   23.10,
                   37.01,   24.39,   32.00,   30.00,   32.64,   34.52,
                   35.34,   35.10,   33.78,   31.61,   33.43,   35.00,
                   36.55,   49.16,   49.31,   48.10,   50.89,   41.86,
                   37.01,   24.39,   32.00,   30.00,   32.64,   34.52,
                   35.34,   35.10,   33.78,   31.61,   33.43,   35.00 !
!END!
  45 ! SRCNAM = B3 !
  45 ! HEIGHT  =   39.00,   30.00,   30.00,   30.00,   29.00,   29.00,
                   29.00,   29.00,   29.00,   26.00,   25.00,   27.00,
                   29.00,   30.00,   39.00,   39.00,   39.00,   39.00,
                   39.00,   30.00,   30.00,   30.00,   29.00,   29.00,
                   29.00,   29.00,   29.00,   26.00,   25.00,   27.00,
                   29.00,   30.00,   39.00,   39.00,   39.00,   39.00 !
  45 ! WIDTH   =   24.10,   34.94,   33.31,   30.67,   44.34,   41.52,
                   37.50,   42.18,   46.00,   21.98,   24.06,   40.44,
                   50.32,   46.32,   24.42,   24.69,   25.14,   25.00,
                   24.10,   34.94,   33.31,   30.67,   44.34,   41.52,
                   37.50,   42.18,   46.00,   21.98,   24.06,   40.44,
                   50.32,   46.32,   24.42,   24.69,   25.14,   25.00 !
!END!
  46 ! SRCNAM = B7 !
  46 ! HEIGHT  =   30.00,   30.00,   30.00,   30.00,   29.00,   29.00,
                   29.00,   29.00,   29.00,   26.00,   25.00,   30.00,
                   30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                   30.00,   30.00,   30.00,   30.00,   29.00,   29.00,
                   29.00,   29.00,   29.00,   25.00,   25.00,   30.00,
                   30.00,   30.00,   30.00,   30.00,   30.00,   30.00 !
  46 ! WIDTH   =   30.03,   43.05,   38.57,   32.91,   44.34,   41.52,
                   37.50,   42.18,   46.00,   21.98,   24.06,   48.21,
                   50.87,   35.10,   33.78,   31.61,   33.43,   30.03,
                   30.03,   43.05,   38.57,   32.91,   44.34,   41.52,
                   37.50,   42.18,   46.00,   19.86,   24.06,   48.21,
                   50.87,   35.10,   33.78,   31.61,   33.43,   30.03 !
!END!
```

```
  47 ! SRCNAM = E1 !
  47 ! HEIGHT  =   39.00,   30.00,   30.00,   30.00,   29.00,   29.00,
                   26.00,   26.00,   21.00,   25.00,   25.00,   30.00,
                   30.00,   30.00,   30.00,   30.00,   30.00,   39.00,
                   39.00,   30.00,   30.00,   30.00,   29.00,   29.00,
                   21.00,   26.00,   21.00,   25.00,   25.00,   30.00,
                   30.00,   30.00,   30.00,   39.00,   39.00,   39.00 !
  47 ! WIDTH   =   24.10,   34.94,   33.31,   30.67,   44.34,   41.52,
                   22.29,   22.70,   45.00,   19.86,   24.06,   48.21,
                   50.87,   51.98,   33.78,   31.61,   33.43,   25.00,
                   24.10,   34.94,   33.31,   30.67,   44.34,   41.52,
                   43.47,   22.70,   45.00,   19.86,   24.06,   48.21,
                   50.87,   51.98,   33.78,   24.69,   25.14,   25.00 !
!END!
  48 ! SRCNAM = E4 !
  48 ! HEIGHT  =   27.00,   27.00,   27.00,   30.00,   29.00,   29.00,
                   29.00,   29.00,   29.00,   29.00,   29.00,   27.00,
                   30.00,   30.00,   30.00,   30.00,   30.00,   18.00,
                   27.00,   27.00,   27.00,   30.00,   29.00,   29.00,
                   29.00,   29.00,   29.00,   29.00,   29.00,   27.00,
                   21.00,   18.00,   18.00,   18.00,   18.00,    8.00 !
  48 ! WIDTH   =   59.81,   59.99,   58.52,   32.91,   44.34,   41.52,
                   37.50,   42.18,   46.00,   48.43,   49.38,   40.44,
                   50.87,   35.10,   33.78,   31.61,   33.43,   24.00,
                   59.81,   59.99,   58.52,   32.91,   44.34,   41.52,
                   37.50,   42.18,   46.00,   48.43,   49.38,   40.44,
                   58.77,  102.22,  102.73,   90.58,   65.74,   10.00 !
!END!
  49 ! SRCNAM = E7 !
  49 ! HEIGHT  =   27.00,   30.00,   30.00,   30.00,   29.00,   29.00,
                   26.00,   20.00,   30.00,   30.00,   30.00,   30.00,
                   30.00,   30.00,   30.00,   30.00,   30.00,   27.00,
                   21.00,   21.00,   18.00,   18.00,   27.00,   27.00,
                   21.00,   20.00,   30.00,   30.00,   30.00,   30.00,
                   30.00,   30.00,   30.00,   30.00,   30.00,   27.00 !
  49 ! WIDTH   =   59.81,   43.05,   38.57,   32.91,   44.34,   41.52,
                   22.29,   35.99,   32.00,   30.00,   32.64,   34.52,
                   35.34,   35.10,   33.78,   31.61,   38.29,   58.00,
                   87.04,   73.22,   21.64,   20.03,   50.89,   44.98,
                   60.52,   35.99,   32.00,   30.00,   32.64,   34.52,
                   35.34,   35.10,   33.78,   31.61,   38.29,   58.00 !
!END!
  50 ! SRCNAM = E8 !
  50 ! HEIGHT  =   39.00,   30.00,   30.00,   30.00,   29.00,   26.00,
                   26.00,   20.00,   30.00,   30.00,   30.00,   30.00,
                   30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                   30.00,   30.00,   30.00,   30.00,   29.00,   21.00,
                   21.00,   20.00,   30.00,   30.00,   30.00,   30.00,
                   30.00,   30.00,   30.00,   30.00,   30.00,   39.00 !
  50 ! WIDTH   =   24.10,   34.94,   33.31,   30.67,   44.34,   23.10,
                   22.29,   35.99,   32.00,   30.00,   32.64,   34.52,
                   35.34,   35.10,   33.78,   31.61,   33.43,   35.00,
                   35.51,   34.94,   33.31,   30.67,   44.34,   50.73,
                   43.47,   35.99,   32.00,   30.00,   32.64,   34.52,
                   35.34,   35.10,   33.78,   31.61,   33.43,   24.52 !
!END!
  51 ! SRCNAM = E9 !
  51 ! HEIGHT  =    8.00,   27.00,   27.00,   30.00,   29.00,   29.00,
                   29.00,   29.00,   29.00,   29.00,   29.00,   27.00,
                   30.00,   30.00,   30.00,   30.00,   30.00,   18.00,
                    8.00,   27.00,   27.00,   30.00,   29.00,   29.00,
                   29.00,   29.00,   29.00,   29.00,   29.00,   27.00,
                   21.00,   18.00,   18.00,   18.00,    8.00,    8.00 !
  51 ! WIDTH   =   10.37,   59.99,   58.52,   32.91,   44.34,   41.52,
                   37.50,   42.18,   46.00,   48.43,   49.38,   40.44,
                   50.87,   35.10,   33.78,   31.61,   33.43,   24.00,
                   10.37,   59.99,   58.52,   32.91,   44.34,   41.52,
                   37.50,   42.18,   46.00,   48.43,   49.38,   40.44,
                   58.77,  102.22,  102.73,   90.58,    9.33,   10.00 !
!END!
  52 ! SRCNAM = E10 !
  52 ! HEIGHT  =   39.00,   30.00,   30.00,   30.00,   30.00,   26.00,
                   26.00,   26.00,   21.00,   25.00,   30.00,   30.00,
                   30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                   30.00,   30.00,   30.00,   30.00,   30.00,   26.00,
                   26.00,   26.00,   21.00,   25.00,   30.00,   30.00,
                   30.00,   30.00,   30.00,   39.00,   39.00,   39.00 !
  52 ! WIDTH   =   24.10,   34.94,   33.31,   30.67,   34.07,   23.10,
                   22.29,   22.70,   45.00,   19.86,   44.09,   48.21,
                   50.87,   51.98,   33.78,   31.61,   33.43,   35.00,
                   35.51,   34.94,   33.31,   30.67,   34.07,   23.10,
                   22.29,   22.70,   45.00,   19.86,   44.09,   48.21,
                   50.87,   51.98,   33.78,   24.69,   25.14,   25.00 !
!END!
  53 ! SRCNAM = E11 !
  53 ! HEIGHT  =   39.00,   30.00,   30.00,   30.00,   29.00,   29.00,
                   26.00,   26.00,   21.00,   25.00,   30.00,   30.00,
                   30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                   30.00,   30.00,   30.00,   30.00,   29.00,   29.00,
                   21.00,   21.00,   21.00,   25.00,   30.00,   30.00,
                   30.00,   30.00,   30.00,   30.00,   39.00,   39.00 !
  53 ! WIDTH   =   24.10,   34.94,   33.31,   30.67,   44.34,   41.52,
                   22.29,   22.70,   45.00,   19.86,   44.09,   48.21,
                   35.34,   35.10,   33.78,   31.61,   33.43,   35.00,
                   35.51,   34.94,   33.31,   30.67,   44.34,   41.52,
                   43.47,   41.65,   45.00,   19.86,   44.09,   48.21,
                   35.34,   35.10,   33.78,   31.61,   25.12,   25.00 !
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!END!
  54 ! SRCNAM = E13 !
  54 ! HEIGHT  =   39.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                   26.00,   20.00,   21.00,   25.00,   30.00,   30.00,
                   30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                   30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                   26.00,   20.00,   21.00,   25.00,   30.00,   30.00,
                   30.00,   30.00,   39.00,   39.00,   39.00,   39.00 !
  54 ! WIDTH   =   24.10,   34.94,   33.31,   30.67,   34.07,   26.50,
                   22.29,   35.99,   45.00,   19.86,   44.09,   48.21,
                   50.87,   51.98,   47.37,   47.33,   33.43,   35.00,
                   35.51,   34.94,   33.31,   30.67,   34.07,   26.50,
                   22.29,   35.99,   45.00,   19.86,   44.09,   48.21,
                   50.87,   51.98,   24.42,   24.69,   25.14,   25.00 !
!END!
  55 ! SRCNAM = E14A !
  55 ! HEIGHT  =   39.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                   20.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                   30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                   30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                   20.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                   30.00,   30.00,   30.00,   30.00,   39.00,   39.00 !
  55 ! WIDTH   =   24.10,   34.94,   33.31,   30.67,   34.07,   26.50,
                   37.01,   24.39,   32.00,   30.00,   32.64,   34.52,
                   35.34,   35.10,   33.78,   31.61,   33.43,   35.00,
                   35.51,   34.94,   33.31,   30.67,   34.07,   26.50,
                   37.01,   24.39,   32.00,   30.00,   32.64,   34.52,
                   35.34,   35.10,   33.78,   31.61,   25.12,   25.00 !
!END!
  56 ! SRCNAM = E14B !
  56 ! HEIGHT  =   39.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                   20.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                   30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                   30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                   20.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                   30.00,   30.00,   30.00,   30.00,   30.00,   39.00 !
  56 ! WIDTH   =   24.10,   34.94,   33.31,   30.67,   34.07,   26.50,
                   37.01,   24.39,   32.00,   30.00,   32.64,   34.52,
                   35.34,   35.10,   33.78,   31.61,   33.43,   35.00,
                   35.51,   34.94,   33.31,   30.67,   34.07,   26.50,
                   37.01,   24.39,   32.00,   30.00,   32.64,   34.52,
                   35.34,   35.10,   33.78,   31.61,   33.43,   24.96 !
!END!
  57 ! SRCNAM = E14C !
  57 ! HEIGHT  =   39.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                   20.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                   30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                   30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                   20.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                   30.00,   30.00,   30.00,   30.00,   30.00,   39.00 !
  57 ! WIDTH   =   24.10,   34.94,   33.31,   30.67,   34.07,   26.50,
                   37.01,   24.39,   32.00,   30.00,   32.64,   34.52,
                   35.34,   35.10,   33.78,   31.61,   33.43,   35.00,
                   35.51,   34.94,   33.31,   30.67,   34.07,   26.50,
                   37.01,   24.39,   32.00,   30.00,   32.64,   34.52,
                   35.34,   35.10,   33.78,   31.61,   33.43,   24.57 !
!END!
  58 ! SRCNAM = E15Y4 !
  58 ! HEIGHT  =   39.00,   30.00,   30.00,   30.00,   30.00,   26.00,
                   26.00,   20.00,   30.00,   30.00,   30.00,   30.00,
                   30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                   30.00,   30.00,   30.00,   30.00,   30.00,   21.00,
                   21.00,   20.00,   30.00,   30.00,   30.00,   30.00,
                   30.00,   30.00,   30.00,   30.00,   39.00,   39.00 !
  58 ! WIDTH   =   24.10,   34.94,   33.31,   30.67,   34.07,   23.10,
                   22.29,   35.99,   32.00,   38.63,   44.09,   34.52,
                   35.34,   35.10,   33.78,   31.61,   33.43,   35.00,
                   35.51,   34.94,   33.31,   30.67,   34.07,   50.73,
                   43.47,   35.99,   32.00,   38.63,   44.09,   34.52,
                   35.34,   35.10,   33.78,   31.61,   25.14,   25.00 !
!END!
  59 ! SRCNAM = E15Y5 !
  59 ! HEIGHT  =   39.00,   30.00,   30.00,   30.00,   30.00,   26.00,
                   26.00,   20.00,   30.00,   30.00,   30.00,   30.00,
                   30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                   30.00,   30.00,   30.00,   30.00,   30.00,   21.00,
                   21.00,   20.00,   30.00,   30.00,   30.00,   30.00,
                   30.00,   30.00,   30.00,   30.00,   30.00,   39.00 !
  59 ! WIDTH   =   24.10,   34.94,   33.31,   30.67,   34.07,   23.10,
                   22.29,   35.99,   32.00,   30.00,   32.64,   34.52,
                   35.34,   35.10,   33.78,   31.61,   33.43,   35.00,
                   35.51,   34.94,   33.31,   30.67,   34.07,   50.73,
                   43.47,   35.99,   32.00,   30.00,   32.64,   34.52,
                   35.34,   35.10,   33.78,   31.61,   33.43,   24.94 !
!END!
  60 ! SRCNAM = E22 !
  60 ! HEIGHT  =   39.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                   26.00,   20.00,   25.00,   30.00,   30.00,   30.00,
                   30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                   30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                   26.00,   20.00,   25.00,   30.00,   30.00,   30.00,
                   30.00,   30.00,   30.00,   39.00,   39.00,   39.00 !
  60 ! WIDTH   =   24.10,   34.94,   33.31,   30.67,   34.07,   26.50,
                   22.29,   35.99,   15.05,   38.63,   44.09,   48.21,
                   50.87,   51.98,   33.78,   31.61,   33.43,   35.00,
                   35.51,   34.94,   33.31,   30.67,   34.07,   26.50,
                   22.29,   35.99,   15.05,   38.63,   44.09,   48.21,
```

```
                  50.87,   51.98,   33.78,   24.69,   25.14,   25.00 !
!END!
  61 ! SRCNAM = E24 !
  61 ! HEIGHT  =    8.00,    8.00,   27.00,   27.00,   29.00,   29.00,
                   29.00,   29.00,   29.00,   29.00,   29.00,   27.00,
                   30.00,   30.00,   30.00,   30.00,   30.00,    8.00,
                    8.00,    8.00,   27.00,   27.00,   29.00,   29.00,
                   29.00,   29.00,   29.00,   29.00,   29.00,   27.00,
                   21.00,   18.00,   18.00,   18.00,    8.00,    8.00 !
  61 ! WIDTH   =   10.37,   10.42,   58.52,   55.45,   44.34,   41.52,
                   37.50,   42.18,   46.00,   48.43,   49.38,   40.44,
                   50.87,   35.10,   33.78,   31.61,   33.43,   10.00,
                   10.37,   10.42,   58.52,   55.45,   44.34,   41.52,
                   37.50,   42.18,   46.00,   48.43,   49.38,   40.44,
                   58.77,  102.22,  102.73,   90.58,    9.33,   10.00 !
!END!
  62 ! SRCNAM = DDG2B !
  62 ! HEIGHT  =   16.00,   13.00,   13.00,   13.00,   13.00,   13.00,
                   13.00,   13.00,   13.00,   16.00,   16.00,   16.00,
                   16.00,   16.00,   16.00,   16.00,   16.00,   16.00,
                   16.00,   21.00,   29.00,   30.00,   29.00,   27.00,
                   13.00,   13.00,   13.00,   16.00,   16.00,   16.00,
                   16.00,   16.00,   16.00,   16.00,   16.00,   16.00 !
  62 ! WIDTH   =   26.21,   23.54,   21.37,   18.54,   15.16,   11.31,
                   11.22,   15.22,   18.77,   24.33,   26.08,   27.03,
                   27.17,   26.48,   24.98,   23.91,   25.46,   26.23,
                   26.21,   73.22,   31.48,   32.91,   44.34,   44.98,
                   11.22,   15.22,   18.77,   24.33,   26.08,   27.03,
                   27.17,   26.48,   24.98,   23.91,   25.46,   26.23 !
!END!
  63 ! SRCNAM = DDG5B !
  63 ! HEIGHT  =   16.00,   16.00,   16.00,   16.00,   16.00,   16.00,
                   16.00,   16.00,   16.00,   16.00,   16.00,   16.00,
                   16.00,   16.00,   16.00,   16.00,   16.00,   16.00,
                   16.00,   16.00,   26.00,   29.00,   29.00,   29.00,
                   16.00,   16.00,   16.00,   16.00,   16.00,   16.00,
                   16.00,   16.00,   16.00,   16.00,   16.00,   16.00 !
  63 ! WIDTH   =   26.21,   25.39,   23.79,   21.48,   18.51,   14.98,
                   14.98,   18.70,   21.85,   24.33,   26.08,   27.03,
                   27.17,   26.48,   24.98,   23.91,   25.46,   26.23,
                   26.21,   25.39,   21.31,   30.05,   44.34,   41.52,
                   14.98,   18.70,   21.85,   24.33,   26.08,   27.03,
                   27.17,   26.48,   24.98,   23.91,   25.46,   26.23 !
!END!
  64 ! SRCNAM = DDG46 !
  64 ! HEIGHT  =   13.00,   13.00,   10.00,   10.00,   10.00,   10.00,
                   10.00,   10.00,   13.00,   13.00,   13.00,   16.00,
                   16.00,   16.00,   16.00,   16.00,   16.00,   13.00,
                   13.00,   21.00,   30.00,   30.00,   29.00,   10.00,
                   10.00,   10.00,   13.00,   13.00,   13.00,   16.00,
                   16.00,   16.00,   16.00,   16.00,   16.00,   13.00 !
  64 ! WIDTH   =   24.99,   23.54,   74.23,   75.83,   76.32,   74.50,
                   72.61,   76.47,   18.77,   21.74,   24.06,   27.03,
                   27.17,   26.48,   24.98,   23.91,   25.46,   25.69,
                   24.99,   73.22,   38.57,   32.91,   44.34,   74.50,
                   72.61,   76.47,   18.77,   21.74,   24.06,   27.03,
                   27.17,   26.48,   24.98,   23.91,   25.46,   25.69 !
!END!
  65 ! SRCNAM = DDG18 !
  65 ! HEIGHT  =   18.00,   18.00,   18.00,   18.00,   18.00,   18.00,
                   18.00,   18.00,   18.00,   18.00,   18.00,   18.00,
                   18.00,   18.00,   18.00,    8.00,   18.00,   18.00,
                   18.00,   18.00,   18.00,   18.00,   18.00,   18.00,
                   18.00,   18.00,   18.00,   18.00,   18.00,   18.00,
                   18.00,   18.00,   18.00,    8.00,   18.00,   18.00 !
  65 ! WIDTH   =   23.05,   26.40,   28.95,   30.62,   31.36,   31.15,
                   30.07,   30.24,   30.00,   28.85,   26.82,   23.98,
                   20.41,   16.22,   11.54,   25.79,   14.37,   19.00,
                   23.05,   26.40,   28.95,   30.62,   31.36,   31.15,
                   30.07,   30.24,   30.00,   28.85,   26.82,   23.98,
                   20.41,   16.22,   11.54,   25.79,   14.37,   19.00 !
!END!
  66 ! SRCNAM = E23A !
  66 ! HEIGHT  =   30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                   30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                   30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                   30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                   30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                   30.00,   30.00,   39.00,   39.00,   39.00,   30.00 !
  66 ! WIDTH   =   52.19,   49.80,   45.90,   40.60,   34.07,   26.50,
                   18.13,   24.39,   32.00,   30.00,   32.64,   34.52,
                   35.34,   35.10,   51.51,   49.80,   52.19,   53.00,
                   52.19,   49.80,   45.90,   40.60,   34.07,   26.50,
                   18.13,   24.39,   32.00,   30.00,   32.64,   34.52,
                   35.34,   35.10,   24.42,   24.69,   25.09,   48.00 !
!END!
  67 ! SRCNAM = E23B !
  67 ! HEIGHT  =   30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                   30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                   30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                   30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                   30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                   30.00,   30.00,   39.00,   39.00,   39.00,   30.00 !
  67 ! WIDTH   =   46.23,   49.80,   45.90,   30.67,   34.07,   26.50,
                   18.13,   24.39,   32.00,   30.00,   32.64,   34.52,
                   35.34,   51.98,   51.51,   49.80,   52.19,   53.00,
                   52.19,   49.80,   45.90,   30.67,   34.07,   26.50,
```

```
                  18.13,   24.39,   32.00,   30.00,   32.64,   34.52,
                  35.34,   51.98,   24.42,   24.69,   25.09,   48.00 !
!END!
  68 ! SRCNAM = E23C !
  68 ! HEIGHT  =   30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                  30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                  30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                  30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                  30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                  30.00,   30.00,   39.00,   39.00,   39.00,   30.00 !
  68 ! WIDTH   =   46.23,   49.80,   33.31,   30.67,   34.07,   26.50,
                  18.13,   24.39,   32.00,   30.00,   32.64,   34.52,
                  35.34,   51.98,   51.51,   49.80,   52.19,   53.00,
                  52.19,   49.80,   33.31,   30.67,   34.07,   26.50,
                  18.13,   24.39,   32.00,   30.00,   32.64,   34.52,
                  35.34,   51.98,   24.42,   24.69,   25.11,   48.00 !
!END!
  69 ! SRCNAM = E23D !
  69 ! HEIGHT  =   30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                  30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                  30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                  30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                  30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                  30.00,   30.00,   39.00,   39.00,   39.00,   30.00 !
  69 ! WIDTH   =   46.23,   34.94,   33.31,   30.67,   34.07,   26.50,
                  18.13,   24.39,   32.00,   30.00,   32.64,   34.52,
                  50.87,   51.98,   51.51,   49.80,   52.19,   53.00,
                  52.19,   34.94,   33.31,   30.67,   34.07,   26.50,
                  18.13,   24.39,   32.00,   30.00,   32.64,   34.52,
                  50.87,   51.98,   24.42,   24.69,   25.12,   48.00 !
!END!
  70 ! SRCNAM = E23E !
  70 ! HEIGHT  =   30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                  30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                  30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                  30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                  30.00,   30.00,   30.00,   30.00,   30.00,   30.00,
                  30.00,   30.00,   39.00,   39.00,   39.00,   30.00 !
  70 ! WIDTH   =   46.23,   34.94,   33.31,   30.67,   34.07,   26.50,
                  18.13,   24.39,   32.00,   30.00,   32.64,   48.21,
                  50.87,   51.98,   51.51,   49.80,   52.19,   53.00,
                  52.19,   34.94,   33.31,   30.67,   34.07,   26.50,
                  18.13,   24.39,   32.00,   30.00,   32.64,   48.21,
                  50.87,   51.98,   24.42,   24.69,   25.12,   48.00 !
!END!
```

---

[a] Each pair of width and height values is treated as a separate input subgroup and therefore must end with an input group terminator.

Subgroup (13d)

POINT SOURCE: VARIABLE EMISSIONS DATA [a]

Use this subgroup to describe temporal variations in the emission rates given in 13b. Factors entered multiply the rates in 13b. Skip sources here that have constant emissions. For more elaborate variation in source parameters, use PTEMARB.DAT and NPT2 > 0.

IVARY determines the type of variation, and is source-specific:
(IVARY) Default: 0

- 0 = Constant
- 1 = Diurnal cycle (24 scaling factors: hours 1-24)
- 2 = Monthly cycle (12 scaling factors: months 1-12)
- 3 = Hour & Season (4 groups of 24 hourly scaling factors, where first group is DEC-JAN-FEB)
- 4 = Speed & Stab. (6 groups of 6 scaling factors, where first group is Stability Class A, and the speed classes have upper bounds (m/s) defined in Group 12
- 5 = Temperature (12 scaling factors, where temperature classes have upper bounds (C) of: 0, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 50+)

---

[a] Data for each species are treated as a separate input subgroup and therefore must end with an input group terminator.

INPUT GROUPS: 14a, 14b, 14c, 14d -- Area source parameters

Subgroup (14a)

```
     Number of polygon area sources with
     parameters specified below (NAR1)       No default  ! NAR1 = 9 !

     Units used for area source
     emissions below          (IARU)       Default: 1  ! IARU = 5 !
           1 =        g/m**2/s
           2 =       kg/m**2/hr
           3 =       lb/m**2/hr
           4 =     tons/m**2/yr
           5 =     Odour Unit * m/s  (vol. flux/m**2 of odour compound)
           6 =     Odour Unit * m/min
           7 =     metric tons/m**2/yr

     Number of source-species
     combinations with variable
     emissions scaling factors
     provided below in (14d)        (NSAR1) Default: 0  ! NSAR1 = 9 !

     Number of buoyant polygon area sources
     with variable location and emission
     parameters (NAR2)                      No default  ! NAR2 = 0 !
     (If NAR2 > 0, ALL parameter data for
     these sources are read from the file: BAEMARB.DAT)

!END!

---------------
Subgroup (14b)
---------------
                                      a
          AREA SOURCE: CONSTANT DATA
          --------------------------
                                                                 b
Source           Effect.    Base      Initial    Emission
 No.             Height   Elevation   Sigma z     Rates
                   (m)       (m)        (m)
-------          ------    ------     --------   ---------

   1 ! SRCNAM = F2 !
   1 ! X =         2.0,     10.0,           1, 2.30E00 !
!END!
   2 ! SRCNAM = F3 !
   2 ! X =         2.0,      4.0,           1, 2.30E00 !
!END!
   3 ! SRCNAM = F4 !
   3 ! X =         2.0,     10.0,           1, 7.50E00 !
!END!
   4 ! SRCNAM = F5 !
   4 ! X =         2.0,     10.0,           1, 9.20E00 !
!END!
   5 ! SRCNAM = F7 !
   5 ! X =         2.0,      9.8,           1, 2.30E00 !
!END!
   6 ! SRCNAM = F8 !
   6 ! X =         2.0,     10.3,           1, 2.30E00 !
!END!
   7 ! SRCNAM = F12A !
   7 ! X =         0.0,     36.0,           0, 5.00E-02 !
!END!
   8 ! SRCNAM = F12B !
   8 ! X =         0.0,     12.6,           0, 8.70E-02 !
!END!
   9 ! SRCNAM = DDG37 !
   9 ! X =         0.0,      5.0,           1, 1.02E00 !
!END!

--------
    a
     Data for each source are treated as a separate input subgroup
     and therefore must end with an input group terminator.
    b
     An emission rate must be entered for every pollutant modeled.
     Enter emission rate of zero for secondary pollutants that are
     modeled, but not emitted.  Units are specified by IARU
     (e.g. 1 for g/m**2/s).

---------------
Subgroup (14c)
---------------

          COORDINATES (UTM-km) FOR EACH VERTEX(4) OF EACH POLYGON
          -------------------------------------------------------
Source                                                          a
 No.      Ordered list of X followed by list of Y, grouped by source
------    ------------------------------------------------------------

   1 ! SRCNAM = F2 !
   1 ! XVERT = 283.160,283.173,283.222,283.207 !
   1 ! YVERT = 6141.423,6141.503,6141.495,6141.415 !
!END!
   2 ! SRCNAM = F3 !
   2 ! XVERT = 283.220,283.231,283.268,283.255 !
   2 ! YVERT = 6141.418,6141.496,6141.492,6141.410 !
!END!
   3 ! SRCNAM = F4 !
   3 ! XVERT = 283.266,283.279,283.383,283.369 !
```

```
   3 ! YVERT = 6141.412,6141.496,6141.478,6141.394 !
!END!
   4 ! SRCNAM = F5 !
   4 ! XVERT = 283.244,283.248,283.274,283.271 !
   4 ! YVERT = 6141.381,6141.406,6141.401,6141.389 !
!END!
   5 ! SRCNAM = F7 !
   5 ! XVERT = 283.355,283.397,283.525,283.482 !
   5 ! YVERT = 6141.229,6141.459,6141.432,6141.204 !
!END!
   6 ! SRCNAM = F8 !
   6 ! XVERT = 283.190,283.218,283.508,283.551,283.533 !
   6 ! YVERT = 6141.529,6141.694,6141.647,6141.562,6141.461 !
!END!
   7 ! SRCNAM = F12A !
   7 ! XVERT = 284.870,284.410,284.600,285.090 !
   7 ! YVERT = 6144.440,6144.330,6143.590,6143.720 !
!END!
   8 ! SRCNAM = F12B !
   8 ! XVERT = 283.510,283.670,284.330,284.130,283.770 !
   8 ! YVERT = 6141.690,6142.770,6142.650,6141.360,6141.430 !
!END!
   9 ! SRCNAM = DDG37 !
   9 ! XVERT = 281.700,281.696,281.711,281.714 !
   9 ! YVERT = 6140.223,6140.232,6140.237,6140.227 !
!END!

--------
    a
     Data for each source are treated as a separate input subgroup
     and therefore must end with an input group terminator.


---------------
Subgroup (14d)
---------------
                                              a
          AREA SOURCE: VARIABLE EMISSIONS DATA
          ------------------------------------

     Use this subgroup to describe temporal variations in the emission
     rates given in 14b.  Factors entered multiply the rates in 14b.
     Skip sources here that have constant emissions.  For more elaborate
     variation in source parameters, use BAEMARB.DAT and NAR2 > 0.

     IVARY determines the type of variation, and is source-specific:
     (IVARY)                                Default: 0
           0 =       Constant
           1 =       Diurnal cycle (24 scaling factors: hours 1-24)
           2 =       Monthly cycle (12 scaling factors: months 1-12)
           3 =       Hour & Season (4 groups of 24 hourly scaling factors,
                                    where first group is DEC-JAN-FEB)
           4 =       Speed & Stab. (6 groups of 6 scaling factors, where
                                    first group is Stability Class A,
                                    and the speed classes have upper
                                    bounds (m/s) defined in Group 12
           5 =       Temperature   (12 scaling factors, where temperature
                                    classes have upper bounds (C) of:
                                    0, 5, 10, 15, 20, 25, 30, 35, 40,
                                    45, 50, 50+)


   1 ! SRCNAM = F2 !
   1 ! IVARY = 4 !    (6 speed classes for each stability)
   1 ! ODOR          = 2.3,2.3,2.3,2.3,2.3,2.3,
                       2.3,2.3,2.3,2.3,2.3,2.3,
                       2.3,2.3,2.3,2.3,2.3,2.3,
                       2.3,2.3,2.3,2.3,2.3,2.3,
                       1.9,1.9,1.9,1.9,1.9,1.9,
                       1.9,1.9,1.9,1.9,1.9,1.9      !
!END!
   2 ! SRCNAM = F3 !
   2 ! IVARY = 4 !    (6 speed classes for each stability)
   2 ! ODOR          = 2.3,2.3,2.3,2.3,2.3,2.3,
                       2.3,2.3,2.3,2.3,2.3,2.3,
                       2.3,2.3,2.3,2.3,2.3,2.3,
                       2.3,2.3,2.3,2.3,2.3,2.3,
                       1.9,1.9,1.9,1.9,1.9,1.9,
                       1.9,1.9,1.9,1.9,1.9,1.9      !
!END!
   3 ! SRCNAM = F4 !
   3 ! IVARY = 4 !    (6 speed classes for each stability)
   3 ! ODOR          = 2.3,2.3,2.3,2.3,2.3,2.3,
                       2.3,2.3,2.3,2.3,2.3,2.3,
                       2.3,2.3,2.3,2.3,2.3,2.3,
                       2.3,2.3,2.3,2.3,2.3,2.3,
                       1.9,1.9,1.9,1.9,1.9,1.9,
                       1.9,1.9,1.9,1.9,1.9,1.9      !
!END!
   4 ! SRCNAM = F5 !
   4 ! IVARY = 4 !    (6 speed classes for each stability)
   4 ! ODOR          = 2.3,2.3,2.3,2.3,2.3,2.3,
                       2.3,2.3,2.3,2.3,2.3,2.3,
                       2.3,2.3,2.3,2.3,2.3,2.3,
                       2.3,2.3,2.3,2.3,2.3,2.3,
                       1.9,1.9,1.9,1.9,1.9,1.9,
                       1.9,1.9,1.9,1.9,1.9,1.9      !
```

```
!END!
   5 ! SRCNAM = F7 !
   5 ! IVARY = 4 !    (6 speed classes for each stability)
   5 ! ODOR          = 2.3,2.3,2.3,2.3,2.3,2.3,
                       2.3,2.3,2.3,2.3,2.3,2.3,
                       2.3,2.3,2.3,2.3,2.3,2.3,
                       2.3,2.3,2.3,2.3,2.3,2.3,
                       1.9,1.9,1.9,1.9,1.9,1.9,
                       1.9,1.9,1.9,1.9,1.9,1.9      !
!END!
   6 ! SRCNAM = F8 !
   6 ! IVARY = 4 !    (6 speed classes for each stability)
   6 ! ODOR          = 2.3,2.3,2.3,2.3,2.3,2.3,
                       2.3,2.3,2.3,2.3,2.3,2.3,
                       2.3,2.3,2.3,2.3,2.3,2.3,
                       2.3,2.3,2.3,2.3,2.3,2.3,
                       1.9,1.9,1.9,1.9,1.9,1.9,
                       1.9,1.9,1.9,1.9,1.9,1.9      !
!END!
   7 ! SRCNAM = F12A !
   7 ! IVARY = 4 !    (6 speed classes for each stability)
   7 ! ODOR          = 2.3,2.3,2.3,2.3,2.3,2.3,
                       2.3,2.3,2.3,2.3,2.3,2.3,
                       2.3,2.3,2.3,2.3,2.3,2.3,
                       2.3,2.3,2.3,2.3,2.3,2.3,
                       1.9,1.9,1.9,1.9,1.9,1.9,
                       1.9,1.9,1.9,1.9,1.9,1.9      !
!END!
   8 ! SRCNAM = F12B !
   8 ! IVARY = 4 !    (6 speed classes for each stability)
   8 ! ODOR          = 2.3,2.3,2.3,2.3,2.3,2.3,
                       2.3,2.3,2.3,2.3,2.3,2.3,
                       2.3,2.3,2.3,2.3,2.3,2.3,
                       2.3,2.3,2.3,2.3,2.3,2.3,
                       1.9,1.9,1.9,1.9,1.9,1.9,
                       1.9,1.9,1.9,1.9,1.9,1.9      !
!END!
   9 ! SRCNAM = DDG37 !
   9 ! IVARY = 4 !    (6 speed classes for each stability)
   9 ! ODOR          = 2.3,2.3,2.3,2.3,2.3,2.3,
                       2.3,2.3,2.3,2.3,2.3,2.3,
                       2.3,2.3,2.3,2.3,2.3,2.3,
                       2.3,2.3,2.3,2.3,2.3,2.3,
                       1.9,1.9,1.9,1.9,1.9,1.9,
                       1.9,1.9,1.9,1.9,1.9,1.9      !
!END!
```

---

a
Data for each species are treated as a separate input subgroup
and therefore must end with an input group terminator.

INPUT GROUPS: 15a, 15b, 15c -- Line source parameters

Subgroup (15a)

Number of buoyant line sources
with variable location and emission
parameters (NLN2) — No default ! NLN2 = 0 !

(If NLN2 > 0, ALL parameter data for
these sources are read from the file: LNEMARB.DAT)

Number of buoyant line sources (NLINES) — No default ! NLINES = 0 !

Units used for line source
emissions below (ILNU) — Default: 1 ! ILNU = 1 !

1 =	g/s
2 =	kg/hr
3 =	lb/hr
4 =	tons/yr
5 =	Odour Unit * m**3/s (vol. flux of odour compound)
6 =	Odour Unit * m**3/min
7 =	metric tons/yr

Number of source-species
combinations with variable
emissions scaling factors
provided below in (15c) (NSLN1) Default: 0 ! NSLN1 = 0 !

Maximum number of segments used to model
each line (MXNSEG) — Default: 7 ! MXNSEG = 7 !

The following variables are required only if NLINES > 0. They are
used in the buoyant line source plume rise calculations.

Number of distances at which
transitional rise is computed — Default: 6 ! NLRISE = 6 !

Average building length (XL) — No default * XL = *
(in meters)

Average building height (HBL)	No default (in meters)	* HBL = *
Average building width (WBL)	No default (in meters)	* WBL = *
Average line source width (WML)	No default (in meters)	* WML = *
Average separation between buildings (DXL)	No default (in meters)	* DXL = *
Average buoyancy parameter (FPRIMEL)	No default (in m**4/s**3)	* FPRIMEL = *

!END!

Subgroup (15b)

BUOYANT LINE SOURCE: CONSTANT DATA

Source No.	Beg. X Coordinate (km)	Beg. Y Coordinate (km)	End. X Coordinate (km)	End. Y Coordinate (km)	Release Height (m)	Base Elevation (m)	Emission Rates [a]

---

a
Data for each source are treated as a separate input subgroup
and therefore must end with an input group terminator.

b
An emission rate must be entered for every pollutant modeled.
Enter emission rate of zero for secondary pollutants that are
modeled, but not emitted. Units are specified by ILNTU
(e.g. 1 for g/s).

Subgroup (15c)

BUOYANT LINE SOURCE: VARIABLE EMISSIONS DATA [a]

Use this subgroup to describe temporal variations in the emission
rates given in 15b. Factors entered multiply the rates in 15b.
Skip sources here that have constant emissions.

IVARY determines the type of variation, and is source-specific:
(IVARY) Default: 0

0 =	Constant
1 =	Diurnal cycle (24 scaling factors: hours 1-24)
2 =	Monthly cycle (12 scaling factors: months 1-12)
3 =	Hour & Season (4 groups of 24 hourly scaling factors, where first group is DEC-JAN-FEB)
4 =	Speed & Stab. (6 groups of 6 scaling factors, where first group is Stability Class A, and the speed classes have upper bounds (m/s) defined in Group 12
5 =	Temperature (12 scaling factors, where temperature classes have upper bounds (C) of: 0, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 50+)

---
a
Data for each species are treated as a separate input subgroup
and therefore must end with an input group terminator.

INPUT GROUPS: 16a, 16b, 16c -- Volume source parameters

Subgroup (16a)

Number of volume sources with
parameters provided in 16b,c (NVL1) No default ! NVL1 = 21 !

Units used for volume source
emissions below in 16b (IVLU) Default: 1 ! IVLU = 5 !

1 =	g/s
2 =	kg/hr
3 =	lb/hr
4 =	tons/yr
5 =	Odour Unit * m**3/s (vol. flux of odour compound)

```
          6 =     Odour Unit * m**3/min
          7 =     metric tons/yr

     Number of source-species
     combinations with variable
     emissions scaling factors
     provided below in (16c)      (NSVL1)    Default: 0  ! NSVL1 = 0 !

     Number of volume sources with
     variable location and emission
     parameters                   (NVL2)     No default  ! NVL2 = 0 !

     (If NVL2 > 0, ALL parameter data for
      these sources are read from the VOLEMARB.DAT file(s) )

!END!

---------------
Subgroup (16b)
---------------
                                    a
          VOLUME SOURCE: CONSTANT DATA
          ----------------------------
                                                                        b
         X UTM      Y UTM      Effect.    Base     Initial    Initial    Emission
       Coordinate  Coordinate   Height   Elevation  Sigma y    Sigma z     Rates
          (km)       (km)        (m)       (m)       (m)        (m)
       ----------  ----------   ------    ------    --------   --------   --------

   1 ! SRCNAM = F1 !
   1 ! X =  282.816, 6141.120,     6.0,      5.0,        1.5,       1.5, 3.37E05 !
!END!
   2 ! SRCNAM = F9A !
   2 ! X =  285.100, 6143.710,     1.0,     36.0,        5.0,       1.5, 5.33E05 !
!END!
   3 ! SRCNAM = F9B !
   3 ! X =  285.070, 6143.810,     1.0,     25.8,        1.5,         5, 5.33E05 !
!END!
   4 ! SRCNAM = F9C !
   4 ! X =  285.040, 6143.910,     1.0,     36.0,        1.5,         5, 5.33E05 !
!END!
   5 ! SRCNAM = F9D !
   5 ! X =  285.020, 6144.000,     1.0,     36.0,        5.0,       1.5, 5.33E05 !
!END!
   6 ! SRCNAM = F9E !
   6 ! X =  284.990, 6144.100,     1.0,     36.0,        5.0,       1.5, 5.33E05 !
!END!
   7 ! SRCNAM = F11A !
   7 ! X =  283.710, 6142.700,     2.0,     19.8,       20.0,         4, 6.80E04 !
!END!
   8 ! SRCNAM = F11B !
   8 ! X =  283.610, 6142.080,     2.0,     17.8,       20.0,         4, 6.80E04 !
!END!
   9 ! SRCNAM = F11C !
   9 ! X =  284.260, 6142.640,     2.0,      9.2,       20.0,         4, 1.19E05 !
!END!
  10 ! SRCNAM = F11D !
  10 ! X =  284.170, 6141.980,     2.0,      9.3,       20.0,         4, 1.19E05 !
!END!
  11 ! SRCNAM = F9F !
  11 ! X =  284.060, 6142.400,     1.0,     10.0,        5.0,       1.5, 6.39E05 !
!END!
  12 ! SRCNAM = F9G !
  12 ! X =  284.160, 6142.400,     1.0,     10.1,        5.0,       1.5, 6.39E05 !
!END!
  13 ! SRCNAM = F9H !
  13 ! X =  284.260, 6142.400,     1.0,     10.0,        5.0,       1.5, 6.39E05 !
!END!
  14 ! SRCNAM = F9I !
  14 ! X =  283.900, 6141.680,     1.0,      5.9,        5.0,       1.5, 6.39E05 !
!END!
  15 ! SRCNAM = F9J !
  15 ! X =  283.950, 6141.590,     1.0,      4.4,        5.0,       1.5, 6.39E05 !
!END!
  16 ! SRCNAM = F9K !
  16 ! X =  283.990, 6141.490,     1.0,      3.9,        5.0,       1.5, 6.39E05 !
!END!
  17 ! SRCNAM = DDG35 !
  17 ! X =  281.712, 6140.210,     5.0,      5.0,        3.5,       2.5, 1.24E02 !
!END!
  18 ! SRCNAM = DDG34 !
  18 ! X =  281.700, 6140.206,     4.0,      5.0,        2.5,         2, 1.57E04 !
!END!
  19 ! SRCNAM = DDG36 !
  19 ! X =  281.691, 6140.192,     3.0,      5.0,        4.0,       1.5, 2.96E04 !
!END!
  20 ! SRCNAM = DDG39 !
  20 ! X =  281.838, 6140.235,     8.0,      5.0,        8.0,         4, 1.62E05 !
!END!
  21 ! SRCNAM = F18 !
  21 ! X =  281.929, 6140.376,     1.5,      5.0,        0.8,      0.75, 1.76E04 !
!END!

--------
    a
     Data for each source are treated as a separate input subgroup
     and therefore must end with an input group terminator.
```

b
An emission rate must be entered for every pollutant modeled.
Enter emission rate of zero for secondary pollutants that are
modeled, but not emitted. Units are specified by IVLU
(e.g. 1 for g/s).

Subgroup (16c)
---

a
VOLUME SOURCE: VARIABLE EMISSIONS DATA

Use this subgroup to describe temporal variations in the emission
rates given in 16b. Factors entered multiply the rates in 16b.
Skip sources here that have constant emissions. For more elaborate
variation in source parameters, use VOLEMARB.DAT and NVL2 > 0.

IVARY determines the type of variation, and is source-specific:
(IVARY) Default: 0
0 = Constant
1 = Diurnal cycle (24 scaling factors: hours 1-24)
2 = Monthly cycle (12 scaling factors: months 1-12)
3 = Hour & Season (4 groups of 24 hourly scaling factors,
where first group is DEC-JAN-FEB)
4 = Speed & Stab. (6 groups of 6 scaling factors, where
first group is Stability Class A,
and the speed classes have upper
bounds (m/s) defined in Group 12
5 = Temperature (12 scaling factors, where temperature
classes have upper bounds (C) of:
0, 5, 10, 15, 20, 25, 30, 35, 40,
45, 50, 50+)

---
a
Data for each species are treated as a separate input subgroup
and therefore must end with an input group terminator.

INPUT GROUPS: 17a & 17b -- Non-gridded (discrete) receptor information
---

Subgroup (17a)

Number of non-gridded receptors (NREC) No default ! NREC = 0 !

!END!

Subgroup (17b)
---

a
NON-GRIDDED (DISCRETE) RECEPTOR DATA

Receptor No.	X UTM Coordinate (km)	Y UTM Coordinate (km)	Ground Elevation (m)	Height Above Ground (m) b

---
a
Data for each receptor are treated as a separate input subgroup
and therefore must end with an input group terminator.

b
Receptor height above ground is optional. If no value is entered,
the receptor is placed on the ground.

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Document Status

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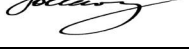
1	S Anderson	D Telford	Original signed	J Ellaway		12/10/07