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19 January 2011

The Director-General
Planning NSW
GPO Box 39
SYDNEY NSW 2001



Attention: Chris Ritchie



Dear Sir

**Re: Shoalhaven Starches Expansion Project 06_0228
Independent Odour Audit**

Please find attached a copy of the Independent Odour Audit Report prepared by PAE Holmes.

This report was prepared to comply with Condition No 5 of Schedule 3 of the Project Approval Application No 06_0228 for the Shoalhaven Starches Expansion Project.

A copy of the report is also submitted to DECCW.

In order to comply with Condition 6 of Schedule 3 which requires the proponent to provide a response to any recommendations, we comment as follows:

1. Page 17 Item 7.1.1 Bio-Filter

We will arrange for the Odour Management Plan (OMP) to include the design specifications for the expanded/new biofilter when next updated or prior to when the new bio-filter is due to come on line.

2. Pages 18 & 19 Item 7.3 Recommendations for OMP.

We will have the OMP updated on an annual basis or as required.

We will have the recent changes to the odour control options included in the OMP when next updated.

We will have the OMP updated to reflect any additional odour controls if required following a re-assessment on the basis of odour complaints in the community over the course of Summer 2010/11.

3. Page 20 Item 8 Conclusions and Recommendations

We will install the DDG Loadout device with local air extraction ducted to the bio-filter. This will be completed by 30 June 2011.

We will continue to maintain good housekeeping around the DDG Storage Shed, Tent and Loadout facility.

We will implement additional controls taking air from the Palmer Cooler Stack to the boilers and controls on the DDG Loadout by mid 2011.

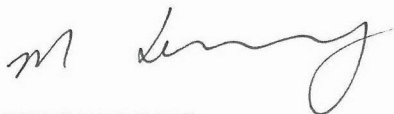
We will refer the odour unit readings to the Bio-Filter Consultant for review and action.

We will review the odour complaints data following the summer of 2010/2011 to determine if any additional odour controls over and above the mandatory odour controls are deemed necessary and that the implemented odour controls are operating effectively in minimizing complaints.

The above information is provided to comply with Schedule 2 Item 7 (1), (b), (c) and (d) of the Project Approval. We now apply for approval to increase Ethanol production up to the rate of 200 Million Litres of Ethanol per year subject to the completion of implementation of the remainder of the mandatory odour controls in Appendix 3 of the Project Approval; noting that an application has been submitted to remove the need to pelletise DDG product as part of these controls.

We look forward to the Director General's approval to increase Ethanol production as requested.

Yours faithfully



MING LEUNG
SITE MANAGER
SHOALHAVEN STARCHES PTY LTD



REPORT - FINAL

SHOALHAVEN STARCHES – INDEPENDENT ODOUR AUDIT 2010

Shoalhaven Starches

Job No: 3442

18 January 2011

PROJECT TITLE: SHOALHAVEN STARCHES –
INDEPENDENT ODOUR AUDIT 2010

JOB NUMBER: 3442

PREPARED FOR: Brian Hanley
SHOALHAVEN STARCHES

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1 INTRODUCTION

The Manildra Group operates Shoalhaven Starches at Bolong Road, Bomaderry, processing flour and grain to produce ethanol, starch, glucose, gluten and dried distillery's grain (DDG). There are two major components to the operation, referred to as the Factory and the Environmental Farm. Shoalhaven Starches lodged a major project application with the NSW Department of Planning (DoP) in December 2007 for the expansion of its ethanol production rate from 126 ML/annum to 300 ML/annum (Shoalhaven Starches Expansion Project).

In January 2009, the Minister for Planning approved the expansion, subject to the project approval conditions (06_0228). The approval allowed for the staged implementation of increased ethanol production rates (from 126 ML to 200 ML and from 200 ML to 300 ML) subject to the odour control and management measures summarised in **Table 1.1**.

Table 1.1: Odour Conditions in Project Approval

Schedule 3 Ref	Condition
Implementation of Mandatory Odour Controls	
Condition 2	<i>Prior to increasing ethanol production rates on site above 126 million litres a year or within 12 months of this approval, whichever is sooner, the Proponent shall implement all the mandatory odour controls listed in Appendix 3 and described in detail in the Odour Management Plan (see condition 4 below), to the satisfaction of the Director-General.</i>
Condition 3	<i>The Proponent shall implement additional mandatory odour controls as may be directed by the Director-General, arising from the Department's assessment of any:</i> <i>a) Independent Odour Audit (see condition 5 below);</i> <i>b) Independent Environmental Audit (see condition 4 of schedule 4); or</i> <i>c) any monitoring results, incidents or complaints related to the project.</i>
Odour Management Plan	
Condition 4	<i>The Proponent shall prepare and implement an Odour Management Plan for the project to the satisfaction of the Director-General. This plan must:</i> <i>a) be prepared in consultation with DECC by a suitably independent, qualified and experienced expert whose appointment has been endorsed by the Director-General, and submitted to the Director-General for approval within 3 months of the date of this approval;</i> <i>b) describe in detail the measures that would be implemented on site to control the odour impacts of the project, and to ensure that these controls remain effective over time;</i> <i>c) identify triggers for remedial action; and</i> <i>d) include a program for monitoring the odour impacts of the project.</i>
Independent Odour Audit	
Condition 5	<i>Within 3 months of the implementation of the mandatory odour controls (see Appendix 3), and annually thereafter unless the Director-General directs otherwise, the Proponent shall commission and pay the full cost of an Independent Odour Audit of the project. This audit must be conducted by a suitably qualified, experienced and independent expert whose appointment has been endorsed by the Director-General. During the audit, this expert must:</i> <i>a) consult with DECC and the Department;</i> <i>b) audit the effectiveness of the odour controls on site in regard to protecting receivers against offensive odour;</i> <i>c) review the Proponent's production data (that are relevant to the odour audit) and complaint records;</i> <i>d) review the Odour Management Plan for the project;</i> <i>e) measure all key odour sources on site, and compare the results of these measurements against the predictions in the EA;</i> <i>f) determine whether the project is complying with the requirements in this approval; and, if necessary,</i> <i>g) recommend and prioritise measures to either improve the odour controls on site and/or the Odour Management Plan, such that receivers would be protected against offensive odour from the site.</i>
Condition 6	<i>Within 6 weeks of the completion of this audit, the Proponent shall submit a copy of the audit report to both DECC and the Department with a response to any recommendations contained in the audit report.</i>

PAEHolmes have been appointed by Shoalhaven Starches to conduct an Independent Odour Audit, with the appointment endorsed by the DoP. The odour audit is undertaken in accordance with the requirements set out in Condition 5, Schedule 3 of the project approval.

The following report summarises the outcome of the Independent Odour Audit.

1.1 Audit Objectives

The objectives of the audit are to address the requirements of project approval condition 5, schedule 3, outlined in **Table 1.1**. This is achieved as follows:

Table 1.2: Overview of Audit Objectives

Relevant Condition 5	How this condition is addressed	Relevant Section of Audit Report
a) consult with DECC and the Department;	Meeting with the DECCW and DoP on 13/05/2010 to review site audit and discuss status of implementation of odour controls	N/A
b) audit the effectiveness of the odour controls on site in regard to protecting receivers against offensive odour;	Site visit on 3/05/2010 and 4/05/2010 to review status and effectiveness of odour controls. A follow up site visit on 13/01/2010 to review recent progress in implementation of odour controls. Odour surveys for all relevant sources and compare to pre implementation of odour controls and odour data presented in the EA;	Refer Section 3
c) review the Proponent's production data (that are relevant to the odour audit) and complaint records;	Review relevant complaints data for pre and post commissioning of odour controls; Review of production data relevant to cleaning of ductwork	Refer Section 0 and Section 6
d) review the Odour Management Plan for the project;	Review Odour Management Plan and provide recommendations where required;	Refer Section 7
e) measure all key odour sources on site, and compare the results of these measurements against the predictions in the EA;	Odour surveys were undertaken during the audit site visit on 3/05/2010 and 4/05/2010; Subsequent odour surveys on the DDG Dryer odour control (scrubber and boiler outlets) on 19/05/2010; Additional odour surveys on 27/09/2010 and 6/10/2010 for Pond 4 and revised DDG Dryer odour control (scrubber and boilers); Survey results compared to pre implementation of odour controls and odour data presented in the EA;	Refer Section 3
f) determine whether the project is complying with the requirements in this approval; and, if necessary,	Site inspection of completed odour control measures and comparison to mandatory odour controls	Refer Section 8
g) recommend and prioritise measures to either improve the odour controls on site and/or the Odour Management Plan, such that receivers would be protected against offensive odour from the site.	Recommendations are provided for on-going maintenance, next steps for odour control, review and updates to Odour Management Plan;	Refer Section 7.3 & 8 & 9

2 BACKGROUND

GHD Pty Ltd conducted an odour audit for Shoalhaven Starches in October 2007 (**GHD, 2007**). The audit identified and quantified each potential odour source and identified available options to prevent and / or minimise odour emissions. Dispersion modelling was conducted for all sources with scenarios modelled with and without odour control. The likely environmental benefits of each option were assessed and preferred options for odour control identified.

In July 2008, GHD Pty Ltd prepared an Air Quality Assessment for the ethanol expansion project, as part of the Environmental Assessment submitted for the development application (**GHD, 2008**). The assessment built on the findings from the odour audit and developed a detailed odour emissions inventory for the site. Odour sources were ranked and prioritised for odour control. Three implementation stages (Stage 1, Stage 2 and Stage 3) were proposed for odour control at the Factory site.

Dispersion modelling was conducted for each stage to determine the effectiveness of the controls for existing sources as well as the proposed ethanol upgrade. The modelling suggested that Stage 1 odour controls were, for the most part, effective in counteracting the potential for increased odour impact from the upgrade. It was concluded that progression to Stage 2 and Stage 3 odour controls could be staged, based on the effectiveness of the Stage 1 odour control to reduce the incidences of community odour complaints.

Stage 1 odour controls, therefore, formed the basis of the *Mandatory Odour Controls* outlined in the Project Approval, which were required to be implemented within 12 months of the approval. The requirement to implement Stage 2 and Stage 3 controls would be determined following the outcomes of the Independent Odour Audit.

It is noted that the primary objective of 2010 Independent Odour Audit is to assess the effectiveness of current odour controls (Stage 1). This will primarily involve quantifying the odour reduction at source and review of complaints data to assess the potential reductions in community odour impact. Odour impacts and complaints are strongly seasonal and drop during winter. Therefore as there is insufficient odour complaint data since the implementation of the odour controls is available to effectively measure reduced incidence of complaints (i.e. summer periods) recommendations will be made for ongoing review.

The installation and commissioning of a Wastewater Treatment Plant (WWTP) is also included in the project approval *Mandatory Odour Controls*.

Objective: A key outcome of the 2010 Odour Audit is to confirm that all *Mandatory Odour Controls* have been effectively implemented and have achieved reductions in odour.

2.1 Proposed Amendments to Mandatory Odour Controls

In March 2010 Shoalhaven Starches submitted an application to DoP for proposed amendments to the Mandatory Odour Controls. The proposed modifications are outlined in an Environment Assessment (**Cowman Stoddart Pty Ltd, 2010**) which seeks to remove / modify the mandatory odour controls relating to the pelletising of DDG products and the fitting of heavy curtains to the storage shed and load out tent.

Rather than pelletising the DDG product, it is now proposed to extract air during loading in the load-out area and direct to the biofilter.

The following clarification is made to the terminology used to describe the DDG Product area, the key components of which are described in the GHD reports as the DDG Product Storage Shed, the DDG Product Load-out Awning, DDG Product Load-Out Tent.

It is our understanding that the proposed odour controls will be applied to the DDG Product Load-out Awning. A new DDG load out device will be installed with local air extraction ducted to the biofilter. This is in lieu of the proposed palletising of the DDG product.

Another proposed change to the Mandatory Odour Controls was to increase the Palmer Cooler Stack from 10m to 26m to aid dispersion and reduce the off-site odour impact. Shoalhaven Starches have now decided to collect the air from this source and put it into the boilers (as outlined in an email from Mr. Scott Foggo of Shoalhaven Starches, dated 18 November 2010). Directing this air to the boilers is a preferable solution to simply increasing the dispersion potential by increasing the stack height. Not only will some of the odour be destroyed in the boilers, the improved dispersion will be achieved by directing this source through the boilers (boiler #5 stack is 54 m high compared to the proposed 26 m extension to the Palmer Cooler Stack).

Objective: A key outcome of the 2010 Odour Audit is to review and comment on the proposed *Mandatory Odour Controls*.

2.2 Odour Management Plan

In accordance with Condition 4 of the Project Approval, an Odour Management Plan has been prepared by The Odour Unit (**The Odour Unit, 2010**) and is discussed further in Section 6.

Objective: A key outcome of the 2010 Odour Audit is to review the Odour Management Plan and provide recommendations for additional information where required.

3 ACTUAL AND PROPOSED ODOUR CONTROLS

Mandatory Odour Controls are outlined in Appendix 3 of the Project Approval and can be broadly grouped into the following categories:

- Factory odour sources that are captured and ducted to the Biofilter;
- Factory odour sources that are captured and have wet-legs installed;
- DDG Dryer Building odour sources capture and destroyed in the boilers;
- Factory odour sources that have been decommissioned;
- Factory odour sources that require best practice housekeeping;
- Factory odour sources relating to the DDG Product storage area; and
- Odour sources at the Environmental Farm and Waste Water Treatment Plant.

Alternatives to the Mandatory Odour Controls in the Project Approval have been presented to DoP and proposed in consultation DECCW, mainly in relation to the pelletising of DDG product. A summary of the Mandatory Odour Controls and proposed modifications are provided in **Table 3.1**.

Table 3.1: Project Approval Mandatory Odour Controls

Mandatory Odour Controls	
Install and commission biofilter and duct high priority dry distiller's grain (DDG) plant sources to biofilter including:	
	- DDG liquids line
	- DDG liquids plant condensate tank
	- Finisher feed tank
	- Feed Holding Tank
	- DDG solids line
Install wet legs on sources not ducted to biofilter, including:	
	- Farm tank
	- Ethanol plant jet cooker retention tank F7
	- Glucose plant enzyme tanks
	- DDG (solids) plant decanter feed tank
Decommission designated odour sources:	
	- Ethanol plant cooling towers
	- Kestner dryer exhaust at starch plant
Regularly clean starch and gluten dryer ductwork	
Install and commission a wastewater treatment plant at the Environmental Farm	
Proposed Alternative Mandatory Odour Controls	
Installation of a DDG load out device with local air extraction ducted to the biofilter. This is in lieu of the proposed palletising of the DDG product.	
Duct air from the Palmer Cooler to the boilers.	
Changes to the DDG solids line – odour control in boilers rather than biofilter	

The following sections provide an overview of the status of implementation of Mandatory Odour Controls observed on 3 and 4 May 2010 and during a subsequent site visit on 13 January 2011.

The objective of the site visit was to:

- Review all implemented odour controls at the site;
- Identify sources that have been modified / changed since the implementation of odour controls and nominate sources for odour monitoring (completed by independent odour monitoring consultants); and
- Confirm with the odour monitoring consultant the sources to be sampled and the number of samples required.

3.1 Factory Odour Sources

A summary of the observations made in relation to the mandatory odour controls is provided in **Table 3.2**.

Table 3.2: Implemented Odour Controls - Factory

Audit Reference	Source	Implemented Odour Control	Variation from Mandatory Odour Control
DDG Liquids Line			
DDG23	Condensate tank	Sources capped and ducted to Biofilter	Installed as required in Mandatory Odour Controls
DDG26	Finish feed tank		
DDG31	Feed holding tank		
DDG20	Feed dump tank		
DDG24	Vent condenser		
DDG28	Finisher pump tank		
DDG30	Dryer feed tank		
DDG32	CIP tank		
DDG solids line			
DDG2 – 6	Decanters	Collected and ducted, for destruction in boilers.	These sources were not identified in GHD 2008 for Stage 1 odour control and therefore not identified as high priority for Mandatory Odour Control. Stage 2 odour control would be to duct these sources to biofilter
DDG- 13	DDG Dryers	Collected and ducted, for destruction in boilers.	
DDG14	Cyclones	The cyclone dryers bleed air are directed to boilers #5 and #6 above the grate.	
DDG16	Palmer Cooler Stack	It is now proposed to take the air from this source and put it into the boilers for destruction. Timing for completion – mid 2011	
DDG39	Dryer Building	Foul air from sources within the building are collected at source and ducted, for destruction in boilers.	Identified in GHD 2008 for Stage 1 odour control by ducting to biofilter
Wet Legs			
DDG1	DDG (Solids) Decanter Tank Feed	Wet leg installed	Installed as required in Mandatory Odour Controls
F18	Farm tank		
E7	Jet Cooker 2&4 - Grain Retention Tank		
B7	Enzyme tanks (7 of)		
E23	Ethanol plant cooling towers	Odour source eliminated - decommissioned	
DDG40	Starch plant - Kestner dryer exhaust		
DDG Product Storage			
DDG37	Storage Area Grounds	Improvements made to area with a new bitumen seal directly in front of and behind storage shed. The sealed areas are swept at the end of each day to avoid DDG product collecting and becoming a dust / odour source. Notable improvements to the housekeeping in the area were observed on 13 January 2011	Implemented as required in Mandatory Odour Controls. Futher work is also proposed to seal the road used for trucks entering and leaving the DDG load out area. This will reduce fugitive dust generation.

3.2 Environmental Farm

The 2007 odour audit (**GHD, 2007**) identified the Environmental Farm as a significant source of odour from the operation of Shoalhaven Starches, from the storage of effluent in Ponds 1 to 6 and from the irrigation of the farm with untreated effluent.

The wastewater treatment plant (WWTP) treats water from the factory (8.4 ML/day) for re-use in the factory (4.5 ML/day) and farm irrigation. It is expected that the WWTP will reduce odour impacts from the Farm by improving the quality of effluent stored in the Ponds and used in the spray irrigation system.

At the time of the site visit on the 3 and 4 May 2010, the Bulk Volume Fermenter (BVF) and Sulphur Oxidation (SO) Basin were operational. The Membrane bioreactor (MBR) and Reverse Osmosis (RO) plant are operational. Factory effluent stored in Ponds 1, 3 and 5 was relatively acidic (pH of about ~2.5 – 3). Pond 4 also contained factory effluent and was uncovered at the time of the site visit. Pond 6 was used for storage of effluent from the SO Basin (pH of ~8). Odour monitoring was undertaken at all these sources except Pond 2, which was almost empty and is discussed further in **Section 4**.

The WWTP is now fully operational and the wastewater stored in Ponds 1, 2, 3, 5 and 6 has been treated and is ready for irrigation. Untreated wastewater is stored in Pond 4 which was covered in June 2010 and is used for emergency storage of untreated factory effluent.

Odour monitoring has been conducted on all Ponds now storing treated wastewater, during autumn, winter and spring 2010 and is presented and is discussed further in **Section 4**.

4 ODOUR MONITORING RESULTS

The odour measurements taken during the GHD audit are used as a baseline against which to compare odour measurement taken during the 2010 Independent Odour Audit. Odour monitoring at the Factory was conducted on 5 May 2010 by Stephenson Environmental Management Australia (SEMA). Subsequent monitoring was conducted for the DDG dryer odour control on 19 May 2010, 27 September 2010 and 6 October 2010.

Ongoing testing for the Biofilter and the Wastewater Treatment Plant Ponds has also been commissioned by Shoalhaven Starches, and is discussed below.

4.1 Biofilter Odour Control

The results of the monitoring conducted during May 2010 for the Biofilter inlet and outlet are shown in **Table 4.1**: The average odour concentration obtained at the outlet was 382 OU, which is within the expected odour performance design of the biofilter; The outlet odour concentration is significantly less than the odour concentration measured at the Biofilter inlet (10,358 OU) and suggests at least 96% destruction efficiency;

Table 4.1: Odour Destruction Efficiency of Biofilter – May 2010

Average Biofilter Inlet Odour Concentration (OU)	Average Biofilter Outlet Odour Concentration (OU)	Destruction Efficiency
10,358	382	96.3

A comparison is also made with the odour concentrations data presented in the 2007 Odour Audit (**GHD 2007**) for those sources now ducted to the Biofilter (refer **Table 4.2**). The total odour concentration for all sources directed to the Biofilter was 953,000 OU, which suggests a significant odour reduction potential (>99.9%).

Table 4.2: Odour Concentrations (OU) for Sources now directed to Biofilter (GHD 2007)

Audit Ref:	Source	Odour Concentration
DDG23	Condensate tank	240,000
DDG26	Finish feed tank	200,000
DDG31	Feed holding tank	38,000
DDG20	Feed dump tank	33,000
DDG24	Vent condensor	300,000
DDG28	Finisher pump tank	Not Sampled
DDG30	Dryer feed tank	110,000
DDG32	CIP tank	32,000
	Total	953,000

Subsequent monitoring on the Biofilter was conducted during Winter and Spring 2010 and the results are presented in **Table 4.3**. The results indicate that the biofilter is not operating as effectively as it was during the testing in May 2010. The outlet concentration is above the design specifications of a few hundred odour units (OU) for both Winter and Spring 2010. It is recommended that the operation of the biofilter is checked by an biofilter consultant to determine if the medium needs replacing or other adjustments are required.

Table 4.3: Ongoing Biofilter Odour Monitoring Results

Odour Survey	Odour Concentration for Biofilter Inlet (OU)	Odour Concentration for Biofilter Outlet (OU)	Destruction Efficiency %
Winter 2010	17,080	1,602	90.6
Spring 2010	6,761	635	90.6

4.2 DDG Odour Control System

The proposed DDG Dryer odour control system has been evolving since Project Approval and Mandatory Odour Control implementation.

Odour testing on 4 May 2010 showed that treatment of all DDG air in the #5 & 6 boilers was successful in terms of odour destruction (refer **Table 4.4**) but proved to be unsustainable due to water vapour causing the boiler to corrode. The odour concentration obtained at the odour scrubber outlet (5,523 OU) represents odorous flows from sources within the DDG Dryer building (dryers, decanters, cyclones) ducted to the boilers for destruction. The odour concentration at boilers #5 & 6 (473 OU) demonstrates that this odour mitigation measure is effective in reducing odour. Subsequent testing on 19 May 2010 and the 6 October was conducted to test odour concentrations when bleed and cyclone air is put into the boiler above the grate. The odour testing results suggest that this configuration is also effective with destruction efficiency high at 84%-93%. The results of this testing is shown in **Table 4.4**.

In summary, the ducting of DDG building odorous flows to the boilers for destruction is considered an effective odour control measure.

Table 4.4: 2010 Odour Monitoring Results – DDG System Controls

Date	Odour Scrubber Outlet Odour Concentration (OU)	Boiler #5&6 Odour Concentration (OU)	Destruction Rate (%)
4 May 2010	5,523	473	91%
19 May 2010	4,811	762	84%
6 October 2010	3,102	228	93%

4.2.1 Palmer Cooler Stack

Monitoring results for the Palmer Cooler Stack are presented in **Table 4.5**. The results are comparable to those obtained by ETC in 2007 (1,700 OU) (**GHD, 2007**) but differ significantly from those obtained by The Odour Unit on 26/08/2009 (10,100 OU) and on 24/9/2009 (3,300 OU) (**Cowman Stoddart 2010**). This suggests that the emission from this source is very sensitive to changes in process conditions. This will now be eliminated as it is proposed to also duct this source to boilers.

The draft revised Mandatory Odour Controls were to increase the Palmer Cooler stack to improve dispersion. Advice from Shoalhaven Starches (email from Mr Scott Foggo dated 18 November 2010) indicates that the preferred odour control for this source is to extract air to the boilers. This is a good solution as the odour would be destroyed (to a certain percentage depending on where it goes in) and improved dispersion would be achieved via the boiler stacks (boiler #5 stack is 54 m high compared to the previously proposed 26 m extension to the Palmer Cooler Stack).

Table 4.5: 2010 Odour Monitoring Results – Palmer Cooler Stack

Audit Ref:	Source	Odour Concentration (OU)	Flow Rate Nm ³ /min	OER (OU.m ³ /s)
DDG16	Palmer Cooler	1,219	254	5,160

4.3 Wastewater Treatment Plant

Odour monitoring at the Wastewater Treatment Plant was conducted during the audit site visit on 4 May 2010 by SEMA. At the time, untreated wastewater stored in Ponds 1, 3 and 5 was relatively acidic (pH of about ~2.5 – 3). Pond 4 also contained untreated wastewater and was uncovered. Pond 6 was used for storage of treated wastewater from the SO Basin (pH of ~8).

The results of the odour monitoring are summarised in **Table 4.6**. The column showing results for autumn refers to the testing conducted under these conditions. It is clear that the treated wastewater stored in Pond 6 (116 OU) is significantly less odorous than untreated wastewater stored in Ponds 1, 3, 4 and 5 (664 OU – 1,345 OU).

Shoalhaven Starches have commissioned ongoing monitoring of the Ponds and subsequent monitoring was conducted in winter and spring 2010 to demonstrate the performance of odour controls as the WWTP became fully operational and the wastewater stored in Ponds 1, 2, 3, 5 was treated.

The monitoring results shown for winter and spring for Ponds 4, 5 and 6 show the reduced odour concentration of the wastewater once it is treated. It is noted that Pond 4 still stores untreated wastewater however it was covered in June 2010 and is used for emergency storage of untreated factory wastewater. The odour monitoring results for Pond 4 in spring show the effectiveness of the cover. There is a small area uncovered to accommodate the pump and proposed solutions for this are currently being investigated.

The total Ponds odour concentration based on the monitoring conducted in Spring 2010 and, is now measured at 312 OU. This assumes Pond 1, 2 and 3, which could not be sampled, have an equivalent odour concentration to the treated wastewater stored in Pond 5.

This shows a significant reduction of 95% in the total odour concentration measured in autumn 2010 when untreated wastewater was stored in all ponds except Pond 6.

Table 4.6: 2010 Odour Monitoring Results – Ponds and Wastewater Treatment Plant

Audit Ref:	Source	Odour Concentration (OU) – Autumn	Odour Concentration (OU) – Winter	Odour Concentration (OU) – Spring
F2	Pond 1	664	Empty	Empty
F3	Pond 2	Empty	Empty	Empty
F4	Pond 3	1,059	1,072	Empty
F5, F6	Pond 4	1,345	159	42
F7	Pond 5	1,151	133	56
F8	Pond 6	116	51	46
F	SO Basin	146	163	123

Note: * Empty means insufficient volume of water to safely access for sampling.

A comparison is made to the modelling in the EA for the ethanol upgrade (**GHD, 2008**) which used a Specific Odour Emissions Rates (SOER) of 0.1 OU.m³/m²/s for the Ponds after the commissioning of the WWTP. All results for the Ponds are currently below this value. The measured SOER for the SO Basin is also significantly less than what was modelled.

5 ODOUR COMPLAINT DATA

A preliminary assessment of complaints data is provided to determine the effectiveness of Stage 1 odour controls. However there is less than 1 year of complaint data collected since the implementation of Stage 1 odour controls and importantly, odour impacts and complaints are strongly seasonal with higher levels of complaints during summer months followed by a decline during winter months.

Early indications suggest that the implementation of the mandatory odour controls are proving effective with a downward trend in complaint numbers observed to date, as indicated in **Figure 5.1**. The seasonal change is reflected in the odour complaints data in **Figure 5.1** which show clear seasonal patterns and increase around summer months.

Since the implementation of Stage 1 (mandatory) controls in early 2010, conditions have been such that odour complaints are expected to decrease, regardless of odour controls. A better indication of the effectiveness of the odour controls will be achieved by comparing odour complaints after the summer period 2010/2011.

However, early indications suggested that the controls are effective. Between October 2010 and January 2011, only 7 complaints have been received, compared to 9 in the same period for 2009/2010, 66 in 2008/2009 and 87 in 2007/2008.

Table 5.1 summarises the complaints received for summer periods (November to January to allow comparison with 2010/2011) for the past four years.

It is recommended that regular and ongoing reviews of odour complaints data are undertaken by Shoalhaven Starches, initially following April 2011, to ensure that the downward trend in complaints is maintained and that the implemented odour controls are operating effectively in minimising complaints.

Table 5.1: Summary of Complaints Data for Summer Months

Year	Complaints received
2007 / 2008	87
2008 / 2009	66
2009/ 2010	9
2010 / 2011	7 *

Note: * Complaint numbers presented for October to January as only complaints data to Mid January 2011 available.

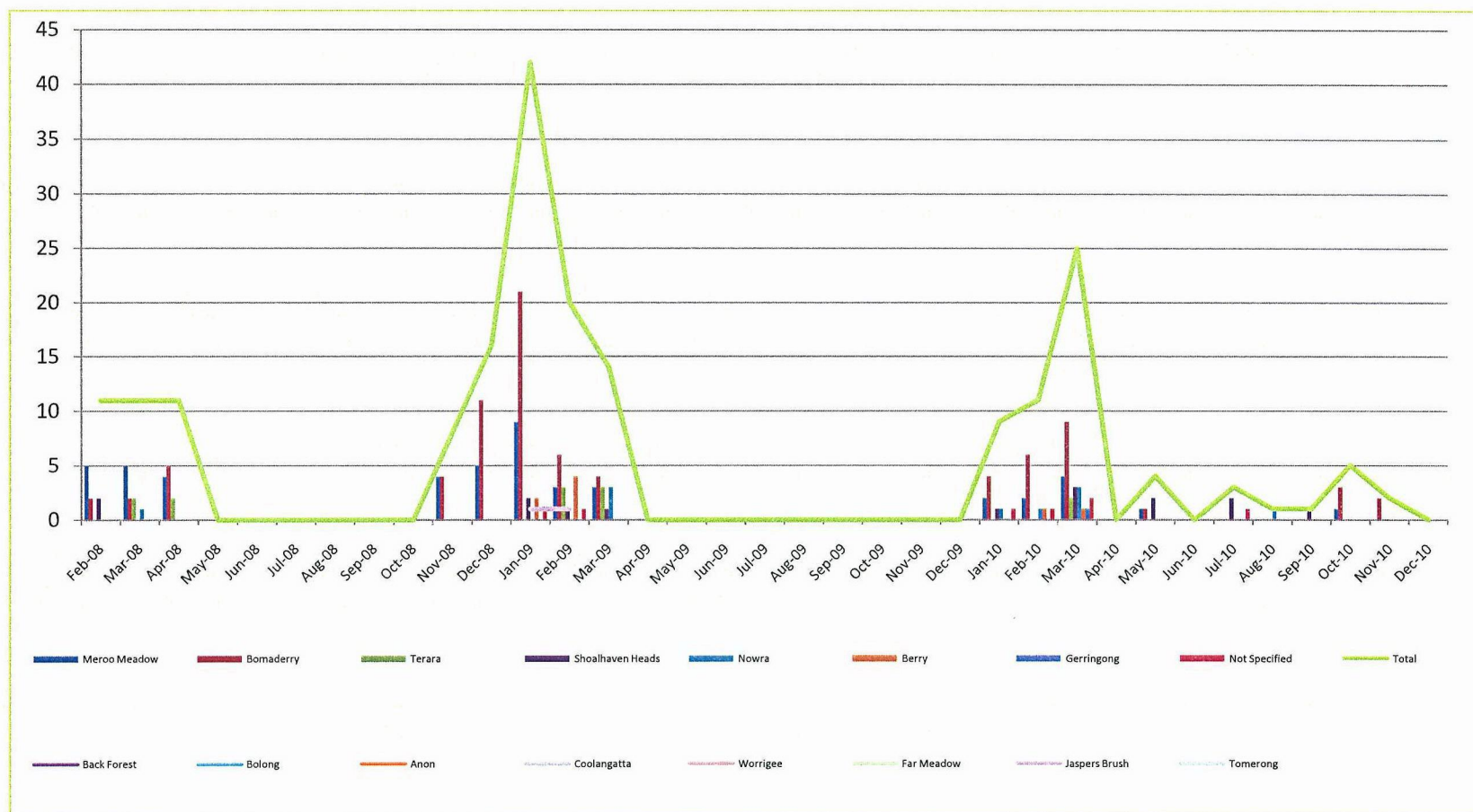


Figure 5.1: Odour Complaint Data

6 PRODUCTION DATA

There is a Mandatory Odour Control which requires regular cleaning of the gluten and starch dryer ductwork. A review of the production data supplied by Shoalhaven Starches indicates that this requirement has been satisfied to date.

A summary of the plant shut down records shows that the gluten dryers are inspected and or cleaned 6 monthly and the starch dryers are inspected and cleaned every 8 weeks (refer **Table 6.1**).

Table 6.1: Mainpac Maintenance System Shut Down Records

Task Description	Frequency	Frequency Type	Task group	Status	Date last Done
No 4 S/D SCRUBBER TOWER CLEAN	2	Months	SHUT	Active	2-Dec-10
CLEAN No 3 S/D SCRUBBER	2	Months	SHUT	Active	8-Dec-10
CHECK AND CLEAN HEAT EXCHANGE	1	Years	SHUT	Active	26-Aug-10
CLEAN No 1 G/D DUCTING	6	Months	SHUT	Active	27-Jan-10
CLEAN No 2 G/D DUCTING	6	Months	SHUT	Active	27-Jan-10
CLEAN No 3 G/D DUCTING	6	Months	SHUT	Active	27-Jan-10
CLEAN No 4 G/D DUCTING	6	Months	SHUT	Active	27-Jan-10
CLEAN No 5 G/D DUCTING	6	Months	SHUT	Active	27-Jan-10
CLEAN No 7 G/D DUCTING	6	Months	SHUT	Active	27-Jan-10
CHECK No 1 G/D CLEAN AIR SPACE	1	Years	SHUT	Active	26-Aug-10
CHECK No 2 G/D CLEAN AIR SPACE	1	Years	SHUT	Active	17-Aug-10
CHECK No 3 G/D CLEAN AIR SPACE	1	Years	SHUT	Active	17-Dec-09
CHECK No 4 G/D CLEAN AIR SPACE	1	Years	SHUT	Active	28-Oct-09
CHECK No 5 G/D CLEAN AIR SPACE	1	Years	SHUT	Active	28-Oct-09
CHECK No 7 G/D CLEAN AIR SPACE	6	Months	SHUT	Active	28-Oct-09

7 ODOUR MANAGEMENT PLAN

Project Approval Condition 4 (Schedule 3) requires the preparation of An Odour Management Plan (OMP), with the following conditions:

- a) be prepared in consultation with DECC by a suitably independent, qualified and experienced expert whose appointment has been endorsed by the Director-General, and submitted to the Director-General for approval within 3 months of the date of this approval;*
- b) describe in detail the measures that would be implemented on site to control the odour impacts of the project, and to ensure that these controls remain effective over time;*
- c) identify triggers for remedial action; and*
- d) include a program for monitoring the odour impacts of the project.*

The Odour Management Plan (Final Report, dated May 2010) has been prepared by Mr Terry Schulz (of The Odour Unit (TOU)), who is a suitably qualified expert (**TOU, 2010**).

7.1 Odour Controls

The mandatory and additional odour controls are outlined in the OMP, although would need to be updated to reflect the change in proposed controls for the combustion of foul air from the DDG Dryers in the boilers. The OMP details the main mandatory odour control technologies for the biofilter and the WWTP.

7.1.1 Biofilter

The technical specifications indicate that the Biofilter is designed to treat 12,272 Am³/hr of odorous air with a performance indicator of a few hundred odour units (OU). It is also noted that more than 500 OU are possible as the medium ages, and this may be acceptable provided the DDG odour character is absent.

The OMP outlined monitoring requirements, one of which the determination of odour reduction efficiency to determine of medium requires replacement and or other adjustments need to be made. It is noted that recent monitoring indicates that although odour reduction efficiency remains high, the biofilter may be operating out of specifications and needs to be checked by a biofilter consultant.

It is proposed that odorous air during DDG loadout will be captured and treated in the Biofilter. The odour reduction efficiency should also be re-tested once flow from the DDG Loadout is captured and directed to the biofilter.

The OMP does not provide Biofilter design requirements for the proposed Ethanol upgrade, however it is acknowledged that the OMP is a live document and it is expected that it would be updated to include Stage 2 and Stage 3 odour controls, as required. The OMP should include design specifications for the expanded / new Biofilter when next updated or prior to when the new biofilter is due to come online.

7.1.2 WWTP

The operation, management and maintenance of the WWTP are summarised in the OMP but provided in more detail in the ADI Operating manual (BVF) and the Tenix Operating Manual (MBR/RO), which have not been reviewed as part of the audit.

Under normal operating conditions, it is expected that the operation of the WWTP will not result in odour emissions. There are procedures in place to ensure that the WWTP is well maintained and operates correctly. Contingency is provided for power failures, and process upsets resulting in high organic loading of the wastewater.

In the event that organic loading to the BVF is too high, the wastewater will be re-directed to the covered Pond 4. Wastewater will be stored here until normal conditions resume, and the wastewater will then be progressively returned to the BVF for treatment. Pond 4 was covered in June 2010 and is available for contingency / emergency conditions.

Section 3.2.4 of the OMP indicates that treatment process upsets may result in "out-of-specification" wastewater being directed to the effluent balance pond and other storage ponds. However this is an extremely unlikely event due to controls in place including online monitoring, daily testing, and a very large buffering capacity of the BVF.

7.2 Monitoring Requirements

Monitoring requirements are outlined in Section 4 of the OMP,

- Twice yearly external odour monitoring of factory odour control systems, including Biofilter;
- Twice yearly checking of Biofilter odour destruction efficiency;
- Regular internal checking and monitoring of the Biofilter operation, as outlined in Table 3.1.6, including monthly inspections of media;
- Routine internal testing of the performance of the WWTP (not specified in OMP but reference to Section 9.0 of ADI Operations Manual); and
- Weekly field odour intensity testing of the irrigation system by the Farm Manager.

The monitoring outlined in the OMP is considered appropriate and sufficient, although does not provide for testing of the storage ponds. Shoalhaven Starches are currently required to undertake quarterly testing of the Ponds as part of their EPL, so updates to the OMP are not considered necessary in this regard.

7.3 Recommendations for OMP

The OMP for the most part satisfies the requirements of Condition 4 in Schedule 3 of the Project Approval, however it would benefit from the inclusion of the following:

- The OMP is a live document and should be updated on an annual basis or as required;
- The OMP (dated May 2010) retains reference to the treatment of odour emissions from the DDG dryers by combustion in the boiler. There have been recent changes to these odour control options and the OMP should reflect these changes when next updated.

- The OMP should be updated to reflect additional odour controls, if required, following an assessment of the effectiveness of the Mandatory Odour Controls. The effectiveness of the mandatory odour controls have been assessed during this audit and will be re-assessed on the basis of odour complaints in the community over the course of Summer 2010/2011.

8 CONCLUSIONS & RECOMMENDATIONS

Shoalhaven Starches have complied with the requirements in their Project Approval, subject to continued implementation of outstanding odour controls. Mandatory Odour Controls have been installed in accordance with the Project Approval, with the following comments:

- The DDG dryer bleed air, cyclones and odour recovery are directed to the boilers for destruction. All new extraction goes under the grate to boiler #5. This achieves good odour destruction efficiency (84%– 93%);
- The Palmer Cooler stack was originally proposed to be increased in height, however it is now proposed to direct to the boilers for destruction, with an expected destruction efficiency similar to above;
- The DDG load out awning is not proposed to be fully enclosed with air directed to the Biofilter. Instead, it is proposed to install a DDG load out device with local air extraction ducted to the biofilter. This is in lieu of the proposed palletising of the DDG product;
- During the site visit, good housekeeping around the DDG storage shed, tent and load out facility was observed. It is recommended that once the additional odour controls are installed on the load out facility, housekeeping around this area is maintained.

The alternative odour control solutions (installed and proposed) are considered either equivalent or better than those proposed in the Mandatory Odour Controls and should be effective for odour control. The implementation of additional controls (taking the air from the Palmer Cooler Stack to the boilers and controls on the DDG load out) should be completed by mid 2011.

The biofilter is performing well in terms of odour reduction efficiency, however based on the most recent testing it may be operating outside of the design specifications to achieve an outlet odour concentration of a few hundred odour units (OU). It is recommended that the operation of the biofilter is checked by a biofilter consultant to determine if the medium needs replacing or other adjustments are required, in accordance with requirements set out in the OMP. Regular testing of the inlet and outlet concentrations is conducted by Shoalhaven Starches, beyond that required by the OMP, however when the results exceed 500 OU they should be referred to the biofilter consultant for review and action.

Following commissioning of the WWTP, significant odour reductions have been achieved based on the monitoring conducted on the ponds.

The Odour Management Plan is a live document and recommendations are made for revisions to the OMP when it is next updated. The effectiveness of the existing and proposed odour controls are best measured by a drop in complaints from the community. The need to proceed to additional odour controls should not be made until the effectiveness of existing Mandatory Odour Controls in reducing complaints is better known. Due to the seasonal nature of complaints, prior to recommendations being made to proceed to additional odour control, if required, a review of odour complaints data should occur following the summer of 2010/2011. Early indications, however, indicate that additional odour controls may not be required at this stage. An ongoing review of odour complaint data should be undertaken, initially following April 2011, to ensure that the implemented odour controls are operating effectively in minimising complaints and to determine if any additional odour controls are required going forward.

9 REFERENCES

Cowman Stoddart Pty Ltd (2010) "Environmental Assessment: Application Pursuant to Section 75W of the Environmental Planning and Assessment Act 1979 – Shoalhaven Starches Proposed Amendment to Mandatory Odour Controls in Project Approval MP06-0228", March 2010

GHD (2007) "Shoalhaven Starches Environmental Audit – Odour Sources", October 2007.

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Holmes Air Sciencies (2008) "Shoalhaven Starches Ethanol Expansion Project - Independent Assessment of Odour Impacts", 27 November 2008.

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TOU (2010) "Shoalhaven Starches Expansion Project – Odour Management Plan", The Odour Unit, May 2010.