



SHOALHAVEN STARCHES

Shoalhaven Starches Expansion Project DDG Palmer Cooler Emissions Odour Impact Assessment

Bomaderry, NSW

February 2010

THE ODOUR UNIT PTY LIMITED

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1 INTRODUCTION

In approving the Bomaderry plant expansion the Minister for Planning specified a number of odour-related conditions that needed to be met (included in MP 06_0228 Appendix 3 – Mandatory Odour Controls). The Ministerial Consent conditions that relate to the requirement for odour controls included the following condition that specified that the DDG product be pelletised before storage in the DDG Product Storage Shed:

“Pelletise DDG products and fit heavy curtains to openings in the DDG product storage shed and load-out tent”

Since obtaining the Ministerial Consent Shoalhaven Starches (SS) has found that the expected demand for a pelletised DDG product has not eventuated due to a customer preference for a ‘loose’ DDG product. As a result SS wrote to the Department of Planning (DoP) on 2 December 2009 seeking to have the Minister’s approval conditions modified, by way of deleting the above condition. This request was made on the understanding that the emissions from the pelletising of the DDG material would have minimal or no adverse impact on projected odour levels in the community adjacent to the plant. The request letter was accompanied by a supporting letter from The Odour Unit Pty Ltd (TOU), dated 30 November 2009.

In response to the SS request, in a letter dated 20 January 2010, DoP specified:

“a quantitative assessment of the predicted changes to odour emissions (from the plant and at receptors) as a result of the proposed modification that demonstrates that odour emissions would be compliant with Section 129 of the Protection of the Environment Act 1997, and also within the predications made for the approved product” and

“details of any additional management measures that may be required to ensure that the requirements relating to odour under the project approval and Environment Protection Licence are met”

This report contains the findings of a quantitative odour emissions and impact study that was carried out to satisfy the above requirements.

2 PROPOSED MODIFICATIONS TO THE DDG AIR EMISSIONS SYSTEM

2.1 PALMER COOLER STACK

The emission from the Palmer Cooler Stack is the only emission to atmosphere from the DDG processing line. This air stream currently vents to atmosphere through a 16m high stack. It is proposed to increase the stack height by 10m to 26m, as part of the plant expansion.

The plant-wide odour audit carried out by GHD in 2007 quantified all significant odour emissions from the factory and the Environmental Farm. The findings of the audit are contained in the GHD report 'Shoalhaven Starches Environmental Audit – Odour Sources, October 2007'. In that study the Palmer Cooler stack emission was found to have an odour concentration of 1,700 ou and an emission rate of 8,800 ou.m³/s. As part of this current investigation further testing of the stack emissions was undertaken by TOU in August and September 2009, to check the veracity of the single GHD testing result. Table 1 below summarises the three sets of testing results. Testing results sheets for the TOU testing are appended.

Table 1: Palmer Cooler Stack Odour Testing Results			
Testing	Date	Odour Concentration (ou)	Odour Emission Rate (ou.m³/s)
GHD/ ETC	2008	1,700	8,800
TOU	26/8/2009	10,100 (mean of 2 results)	52,300
TOU	24/9/2009	3,300 (mean of 2 results)	17,080
Mean Result		5,030	26,060

It can be seen from the above results that there is considerable variation in the odour emission concentrations and rates from the stack, reflecting changing processing conditions in the plant.

In the context of the total odour emissions from the Factory and Environmental Farm, prior to the current upgrade to the wastewater treatment and DDG biofilter systems, the Palmer Cooler Stack emissions represent a very small contribution. Table 2, derived from the GHD Odour Audit report, shows this very clearly. It will be shown below that the elevated nature of these emissions further diminishes their significance.

Table 2: Total Odour Emission Rate Contribution			
Source	Sub-source	OER (ou.m³/s)	Percent of Total OER
Environmental Farm		3,500,000	84
Starch Plant Overall		310,000	7.3
DDG Plant Overall		230,000	5.5
	<i>(Palmer Cooler Stack)</i>	<i>(8,800 – 52,300)</i> <i>mean 26,060</i>	<i>(0.2 – 1.25)</i> <i>(0.6)</i>
Ethanol Plant		120,000	2.9
Glucose Plant		8,900	0.2
Distillation Plant		1,900	<0.1
Total		4,170,800	100

2.1.1 DDG Product Storage Shed

The original plan for the DDG Product Storage Shed included the fitting of flexible heavy curtains to the access openings, as per the Ministerial Consent condition. During the detailed design of the DDG odour collection and biofilter system it was decided to fully enclose the shed and extract air from it and direct this airstream to the biofilter system. This biofilter system has now been installed and is currently being

commissioned. The airflow from the Storage Shed represents 37% of the total airflow treated in the biofilter (5,290 m³/hr in a total airflow of 14,272 m³/hr).

The new system of enclosing the Storage Shed and ventilating it to the biofilter system represents a significant improvement over the use of heavy curtains, and will result in a lower likelihood of fugitive odour releases from the Shed.

3 PREDICTED DDG PALMER COOLER STACK ODOUR IMPACTS

3.1 ODOUR EMISSIONS

It is difficult to assess the extent to which the pelletising of the DDG product, prior to the Palmer Cooler, would have affected the odours generated in that unit. As indicated in TOU's letter of 30 November 2009 (appended as Appendix B), the lower exposed surface area of the pelletised product compared to the powdery product could be expected to result in some lowering of the emissions, albeit from the very low base shown in Table 1. However given that the amount of moisture driven off in the Palmer Cooler would not change with either product, it could be argued that the mass of volatiles, including odour compounds, would be the same for both products.

While the odours released from the DDG product into the Storage Shed may also have been affected by the pelletising process, the move to the full enclosure and ventilation of the shed to the biofilter system renders any speculation superfluous.

3.2 DISPERSION MODELLING

The original odour dispersion modelling for the Plant Expansion project was carried out by GHD and documented in the report 'Shoalhaven Starches: Report on Ethanol Upgrade – Air Quality Assessment, June 2008'. Subsequent to that study GHD were asked by SS to re-run the dispersion model, focusing only on the predicted impacts from the Palmer Cooler Stack emissions. The purpose of this modelling was to determine the overall significance of the emission at ground level, as well as to quantify the improvements that could be expected if the stack height was increased. Because the modelling was carried out by GHD it is not possible to append the Ausplume model configuration and output files to this report. Advice from GHD is that the modelling was carried out using the identical model developed for and used in the previous major study.

The modelling examined a range of stack height and odour emission rate scenarios, and specifically focused on the predicted odour concentration levels at the four nearest sensitive receptors (referred to as R1, R2, R3 and R4, as per the previous

study). Stack height increases in 5m steps from the current 16m height were modelled, for odour emission rates of 8,800 ou.m³/s (the previously measured emission rate), 50,000 ou.m³/s and 100,000 ou.m³/s. For the purposes of this study the predicted results were interpolated for the mean emission rate of 26,060 ou.m³/s and the maximum rate of 50,300 ou.m³/s (from Table 1). The results of the modelling are shown in Table 3.

Table 3: Palmer Cooler Stack Emissions – Predicted Ground Level Odours					
Stack Height (m)	Odour Emission Rate (ou.m³/s)	Predicted Odour Concentration (ou)			
		R1	R2	R3	R4
16	8,800	0.06	0.05	0.10	0.10
16	50,000	0.33	0.30	0.55	0.55
16	100,000	0.65	0.60	1.10	1.10
21	8,800	0.06	0.05	0.07	0.04
21	50,000	0.35	0.30	0.38	0.24
21	100,000	0.70	0.60	0.75	0.48
26	8,800	0.05	0.04	0.05	0.03
26	50,000	0.28	0.25	0.30	0.18
26	100,000	0.55	0.50	0.60	0.35
31	8,800	0.04	0.04	0.04	0.03
31	50,000	0.25	0.23	0.23	0.18
31	100,000	0.50	0.45	0.45	0.35
36	8,800	0.04	0.04	0.03	0.03
36	50,000	0.23	0.23	0.18	0.15
36	100,000	0.45	0.45	0.35	0.30

It can be seen from Table 3 that significant reductions in ground level odour concentrations are predicted in the likely operating odour emission range (highlighted in blue) for the four sensitive receptors. It can also be seen that the magnitude of the predicted odour levels are all below odour threshold for that emission and substantially less than the DECCW Odour Guideline concentration of 2ou.

4 ODOUR MANAGEMENT

It is recommended that the emission from the Palmer Cooler Stack be monitored for odour concentration and emission rate, as part of SS's environmental monitoring program.

5 CONCLUSIONS

This study has found that the measured odour emissions from the existing DDG Palmer Cooler stack are most unlikely to impact adversely at ground level at the four discrete receptors previously identified by GHD and that the ground level odour concentrations will further decrease when the stack is extended by 10m to a height of 26m.

The study has been unable to conclusively determine whether the decision not to pelletise the DDG product will affect the odour emission rate from the Palmer Cooler Stack but the above finding of no significant adverse impact renders the pelletising issue practically superfluous.

The decision to replace the proposed heavy curtains on the openings in the Storage Shed with full enclosure and ventilation to the biofilter is almost certain to result in lower potential for fugitive odour releases from the shed.

APPENDIX A

ODOUR TESTING RESULTS SHEETS

PALMER COOLER STACK

APPENDIX B

THE ODOUR UNIT'S LETTER OF 30 NOVEMBER 2009

Mr Brian Hanley
Shoalhaven Starches Pty Ltd
36 Bolong Rd
Bomaderry NSW 2541

30 November 2009

DDG PELLETISING ODOURS

Dear Brian,

As requested I have examined the likely odour generation and emission implications arising from your company's decision to not proceed with the pelletising of the DDG product. I understand that the original decision to install a pelletiser on the DDG line was based on the expectation that the market would be less inclined to purchase a non-pelletised product, and that you have found this not to be the case. I also understand that the pelletised DDG product was thought at the time to be a positive factor in reducing odours from both the Palmer Cooler vent and the Product Storage Shed, to the extent that the Minister's Consent specifies, as a Mandatory Odour Control measure, that the DDG product be pelletised. The Consent also requires that heavy curtains be fitted to openings in the Product Storage Shed and Load-out Tent. I will address the Palmer Cooler vent emission and the Storage Shed separately in this letter.

The Palmer Cooler vent was found by GHD to emit odour at a rate of 8,800 ou.m³/s, at a concentration of 1,700 ou. At this emission rate the vent contributed only 7% of the total odour emitted from the DDG plant and less than one percent of the total factory emissions of 670,800 ou.m³/s. In my opinion it is difficult to speculate on whether pelletising the DDG product would reduce odour emissions from the vent to any significant extent. On balance the lower exposed surface area of a pelletised product compared to a powdered product would most likely lead to some odour emission reduction but from a very low base of 8,800 ou.m³/s. I note that follow-up odour dispersion modelling carried out recently by GHD has shown that, even at the measured odour emission rate, the Palmer Cooler vent emission at the existing stack height of 16 metres was predicted to contribute only 0.06 ou to the odour at the nearest receptor. I also understand that it is proposed to increase the height of this stack by 10m to 26 m. Given the above, I have concluded that the decision to delete the proposed pelletiser from the DDG process will not impact on off-site odours.

The likely odour implications of storing un-pelletised DDG product in the Storage Shed will, in my opinion, be influenced more by your decision to enclose the shed and ventilate it to the biofilter system than the decision to do this in preference to fitting the heavy curtains, as a means of reducing fugitive odour releases. This revised approach will virtually prevent an odour emission from the shed when the doors are closed, and minimise the frequency and magnitude of fugitive odour releases during the short periods when the doors are opened.

In summary, it is my judgement that there will be no significant adverse consequences arising from the decision to not pelletise the DDG product. I trust that

the content of this letter will be sufficient to enable the Consent's requirement for a pelletiser to be used to be waived.

Please contact me if further information in support of this position is needed.

Yours sincerely

Terry Schulz

Managing Director