21 September 2018

John Studdert
Manildra Group
Quality Assurance & Environmental Coordinator
PO Box 123
Nowra NSW 2541

Our ref: 2127188-40782
Your ref:

Dear John

MOD2018 Air Quality Assessment
New boiler summary of best practice

1 Introduction

GHD was engaged by Shoalhaven Starches Pty Ltd to address matters raised by EPA in regards to the Proposed modification application to MP 06_0228 Shoalhaven Starches Expansion Project, Proposed new speciality processing facility, new gluten dryer and other associated works at 22, 24 and 171 Bolong Rd, Bomaderry, NSW Air Quality Assessment (GHD, May 2018).

This letter provides response to the matters that EPA has stated in their email to Shoalhaven Starches dated 26 July 2018.

2 Summary of EPA requirements

An initial review by the EPA's Air Technical Advice Unit identified that the following matters need to be addressed/detailed in the air quality impact assessment:

- Provide manufactures' design specifications or performance guarantees for new discharge points, specifically the coal fired boiler;
- Demonstrate the discharge points (specifically the coal fired boiler) will comply with emission discharge concentrations contained in the Protection of the Environment Operations (Clean Air) Regulation 2010;
- Benchmark the proposed new discharge points (specifically the coal fired boiler), against Best Management Practice to demonstrate all reasonable and feasible emission controls are proposed. The Benchmarking should consider, but not be limited to:
  - Proposed combustion equipment;
  - Proposed fuel quality; and
  - Proposed pollution control equipment.

3 Manufacturer's performance guarantee

Manildra has engaged the services of Boiler and Power Plant Services Pty Ltd (B&PPS) to provide consultant advice on the selection of the coal fired boiler associated with the proposed modification application to Shoalhaven Starches Project Approval 06_0228. This company specialises solely in boilers and power plants and has completed many similar projects around Australia. B&PPS has provided a letter to Shoalhaven Starches dated 6 August 2018 (and provided in Attachment A). B&PPS has advised that at the "completion of the boiler contract, performance guarantee tests will be performed to ensure compliance with these concentrations. The boiler will not be accepted until the boiler meets the guarantees." The concentrations that B&PPS refer to are the lower of:

- *Protection of the Environment Operations (Clean Air) Regulation 2010*
- Emission limits described in the letter from EPA to Ms Deanna Burn dated 28 November 2017 titled Modification 13 – MP06_0228 – Shoalhaven Starches Ethanol Expansion Project – Modification of Boilers No's 2, 4 and 6, Attachment 1: EPA recommended conditions of approval Modification 13 – Major Project Approval 06_0228

A table of the emission limits from these documents is provided below in Section 4.

4 Emission concentration limits

GHD has reviewed the relevant emission limits from the *Protection of the Environment Operations (Clean Air) Regulation 2010* and Attachment 1: EPA recommended conditions of approval Modification 13 – Major Project Approval 06_0228. The new boiler will meet these requirements as per details in Section 3 and Attachment A. A summary of the emission limits for the new coal fired boiler is presented in Table 1.

The EPA has a condition for a maximum coal sulfur content limit of 0.4%. Recent coal supply at the site has a coal content less than 0.4% however this coal supply cannot be guaranteed. Shoalhaven has made provisions (duct sorbent injection (DSI)) in order to meet SO_2 criteria at all times (even with higher sulfur coal). DSI is highly reliable, and has a SO_2 reduction rate of up to 80%. This has other added benefits as DSI is used in the treatment of pollutants such as hydrogen chloride (HCl), hydrogen fluoride (HF), sulfur trioxide (SO_3), and dust.

Table 1 Emission limits for the new boiler

Group 6 emission standards	Group	Clean Air limits	EPA limits for Shoalhaven
Solid particles (total)	Group 6	50 mg/m^3	30 mg/m^3
Nitrogen dioxide (NO_2) or Nitric oxide (NO) or both, as NO_2 equivalent	Group 5 or 6	500 mg/m^3	500 mg/m^3
Sulfur dioxide (SO_2)	Group 6	1,000 mg/m^3	600 mg/m^3

Group 6 emission standards	Group	Clean Air limits	EPA limits for Shoalhaven
Sulfuric acid mist (H2SO4) or sulfur trioxide (SO_3) or both, as SO_3 equivalent	Group 2, 3, 4, 5 or 6	100 mg/m^3	-
Hydrogen sulfide (H2S) (see also clause 42)	Group 1, 2, 3, 4, 5 or 6	5 mg/m^3	-
Fluorine (F2) and any compound containing fluorine, as total fluoride (HF equivalent)	Group 2, 3, 4, 5 or 6	50 mg/m^3	-
Hydrogen Chloride (HCl)	Group 5 or 6	100 mg/m^3	-
Chlorine (Cl2)	Group 1, 2, 3, 4, 5 or 6	200 mg/m^3	-
Type 1 substances (in aggregate)	Group 5 or 6	-	-
Type 1 substances and Type 2 substances (in aggregate)	Group 6	1 mg/m^3	1 mg/m^3
Cadmium (Cd) or Mercury (Hg) individually	Group 6	0.2 mg/m^3	0.2 mg/m^3
Dioxins or furans	Group 6	0.1 ng/m^3	-
Volatile organic compounds (VOCs), as n-propane	Group 6	40 mg/m^3 or 125 mg/m^3 CO	40 mg/m^3
Smoke	Group 2, 3, 4, 5 or 6, in other circumstances	Ringelmann 1 or 20% opacity	20%
Maximum coal sulfur content	-	-	0.4%

5 Boiler benchmarking study

A benchmarking exercise has been undertaken in order to demonstrate the proposal has considered all reasonable and feasible emission controls. The following documents (as well as others) have been reviewed as part of this:

- NSW Environment Protection Authority Review of Coal Fired Power Stations Air Emissions and Monitoring (EPA, 2018)
- Guidance on best available techniques and best environmental practices Coal-fired power plants and coal-fired industrial boilers, Guidance on Best Available Techniques and Best Environmental

Practices to Control Mercury Emissions from Coal-fired Power Plants and Coal-fired Industrial Boilers (UN Environment, 2016)

- Best Available Techniques (BAT) Reference Document for Large Combustion Plants Industrial Emissions Directive 2010/75/EU (Integrated Pollution Prevention and Control) (Thierry Lecomte, José Félix Ferrería de la Fuente, Frederik Neuwahl, Michele Canova, Antoine Pinasseau, Ivan Jankov, Thomas Brinkmann, Serge Roudier, Luis Delgado Sancho; EUR 28836 EN; doi:10.2760/949)
- Available and Emerging Technologies for reducing greenhouse gas emissions from industrial, commercial and institutional boilers (US EPA, 2010)

The European Union Industrial Emissions Directive (IED) is the main EU instrument regulating pollutant emissions from industrial installations. The IED includes Best Available Techniques (BAT) for industrial processes, including large combustion plants to increase operate efficiency and reduce emissions. While the IED sets emission limits, it allows competent authorities to set less strict emission limit values. Shoalhaven Starches already has been provided emission limits for the new boiler so this review focuses on the technologies, management and mitigation at the site in relation to best management practice. Proposed emission limits and how these compare with limits from some of NSW coal power stations has been provided for reference. The benchmarking study is presented in Table 2 and Table 3.

Table 2 Summary of coal boiler benchmarking study – General requirements and overview

Pollutant/ control	Overview / Best practice	Shoalhaven starches
Proposed combustion equipment	Provides an overview, supplier documents, manuals, performance guarantee and specification	Information has been provided by B&PPS as discussed in Section 3. Additional data and the specifications will be designed around this performance guarantee. The specification for the boiler will be performance based and will not limit the type of boiler to be supplied. However, it is likely that the boiler will be a grate fired type of boiler. The design of this type of boiler has evolved to minimise emissions as follows and these will form part of the specification. Staged Combustion - Combustion takes place in two or more stages, firstly on the grate when it is burnt sub-stoichiometric, then in the furnace where secondary air is injected at one or more levels to complete the combustion. This has the effect of limiting combustion temperatures thus minimising the formation of oxides of nitrogen (NOx) and of creating turbulence thus promoting the combustion of volatile organic carbons (VOCs), carbon monoxide (CO) and fine particles (soot).

Pollutant/ control	Overview / Best practice	Shoalhaven starches
		The size and shape of the furnace will be such that it provides sufficient residence time at high temperatures to achieve low VOCs, CO and good burnout of fine particles. The flue gas velocities in the furnace are also kept low to minimise carry-over of fine solids. The fine solids which are carried over are mainly collected in a bag-house fitted in the flue gas stream.
Proposed fuel quality	Coal lower in sulfur will have lower SO_2 emissions. A review of concentration limits at NSW power stations show coal sulfur content limit (% weight) range from no limit up to 1.0%	Proposed coal quality will be similar to the existing coal used apart from sulfur as discussed below. Coal sulfur used at Shoalhaven Starches between May 2016 and April 2017 ranged from about 0.31 to 0.37%. Other sources of coal Shoalhaven may use (or a mix) range up to a Sulfur content of 0.68%. As discussed below, the design includes Flue gas desulfurisation FGD to ensure SO_2 emissions meet the criteria for the proposal discussed in Section 4.
Proposed pollution control equipment.	See sections below	See sections below
NOx	The principal oxides of nitrogen emitted during the combustion of fossil fuels are nitric oxide (NO), nitrogen dioxide (NO_2), and nitrous oxide (N_2O). The first two of these form the mixture known as NOx, which accounts for the great majority of the oxides of nitrogen in the main types of large combustion installations. Techniques that are generally used to prevent and/or reduce emissions of nitrogen oxides are divided into primary and secondary techniques. Primary techniques allow the control of NOx formation and/or reduction in	Shoalhaven Starches will employ Flue gas re-circulation (FGR) in their boiler. This leads to a reduction in NOx emissions and this method has high operational experience (commonly used around the world).

Pollutant/ control	Overview / Best practice	Shoalhaven starches
	the combustion chamber, whereas secondary techniques are end of-pipe techniques to reduce NOx emissions Minimum best practice requirements based on IED 2010/75/EU are listed below in Table 3.	
SOx	Emissions of sulfur oxides result mainly from the presence of sulfur in the fuel. Fossil fuel contains sulfur as inorganic sulphides or organic compounds. Minimum best practice requirements based on IED 2010/75/EU are listed below in Table 3.	Shoalhaven Starches will employ the technique of Direct Sorbent Injection (DSI), where hydrated lime is injected into flue gas stream prior to baghouse. As discussed in Section 4, DSI is highly reliable, and will have an SO_2 reduction rate of up to 80%.
PM	During the combustion of fuels, the mineral matter (inorganic impurities) converts to ash and part of it leaves the boiler as fly ash along with the flue-gas. The particulates suspended in the flue-gas as fly ash constitute the primary particulate matter entering the dust control device Different techniques, such as electrostatic precipitators (ESPs), bag filters and wet scrubbers, are commonly used to remove dust from the flue-gas. Bags should be regularly maintained, including inspections, repairs and replacements.	Shoalhaven Starches will have a bag house. Fabric filtration is a method to remove particles (especially fly ash) from the flue-gas of industrial combustion plants. Bag filters have a range of removal efficiencies depending on particle sizes however documentation (IED 2010/75/EU) shows this ranges from 99.6% for less than 1 μm to greater than 99.95% for greater than 10 μm.
VOC	The emission sources of volatile organic compounds due to industrial activities are numerous, but the combustion of fuels is one of the most significant. Thermal oxidation systems can achieve very high levels of VOC destruction when a number of VOC destruction parameters are met. The parameters that define these optimum conditions are: time in the furnace hot zone, temperature in the furnace hot zone, turbulence in the hot zone and excess oxygen in the	The proposed boiler will be designed in order to encourage high destruction of VOCs as per the proposed combustion equipment in this table above.

Pollutant/ control	Overview / Best practice	Shoalhaven starches
	combustion product gas. A minimum 1 second retention time is generally required for 99.99% destruction efficiency of VOCs (Design of thermal Oxidation Systems for Volatile Organic Compounds, David A. Lewandowski).	
Metals	The emission of metals results from their presence as natural substances in fuels. Most of the metals considered (As, Cd, Cr, Cu, Hg, Ni, Pb, Se, Zn, V) are normally released as compounds (e.g. oxides, chlorides) in association with particulates Minimum best practice requirements based on IED 2010/75/EU are listed below in Table 3.	See below
Plant efficiency	Net total fuel utilisation (%) 75–97 (see below)	Shoalhaven Starches will have a total energy output (net total fuel utilisation) (%) of approximately 80%
Energy efficiency	The document Available and Emerging Technologies for reducing greenhouse gas emissions from industrial, commercial and institutional boilers (US EPA, 2010) includes various energy efficiency improvements in regards to operating and maintenance practices. These include new burner/upgrades and improved combustion measures such as tuning, optimisation and instrumentation and controls.	As per the combustion equipment above Shoalhaven propose to install a new efficient boiler. Shoalhaven Starches will have a Licensed boiler attendant, PLC SCADA monitoring & control, continuous oxygen & opacity monitoring. The boiler will have automatic tuning of air/gas ratios and continuous oxygen monitoring.
Plant monitoring	CEMS, regular monitoring	Shoalhaven Starches will have a Licensed boiler attendant, PLC SCADA monitoring & control, continuous oxygen & opacity monitoring.
Tuning/opti misation		Shoalhaven Starches will have automatic tuning of air/gas ratios and continuous oxygen monitoring.

Table 3 Minimum best practice requirements based on IED 2010/75/EU

Pollutant/control	Overview / Best practice	Shoalhaven starches
Integrated combustion process ensuring high boiler efficiency and including primary techniques for NOX reduction (e.g. air staging, fuel staging, low-NOX burners (LNB) and/or flue-gas recirculation)	Combustion processes such as pulverised combustion, fluidised bed combustion or moving grate firing allow this integration	The proposed boiler will likely be moving grate type. The boiler with have a staged combustion process and offer a suitable residence time for destruction of VOCs, CO and particles while limiting formation of NOx Flue-gas recirculation is described more below.
Dry bottom ash handling	Dry hot bottom ash falls from the furnace onto a mechanical conveyor system and, after redirection to the furnace for reburning, is cooled down by ambient air. Useful energy is recovered from both the ash reburning and ash cooling	There will be no re-circulation of ash of the proposed boiler at Shoalhaven Starches.
BAT-associated energy efficiency levels (BAT-AEELs) for coal and/or lignite combustion Coal-fired, < 1 000 MWth	Net electrical efficiency (%) 36.5–41.5 Net total fuel utilisation (%) 75–97	Shoalhaven Starches will have a net total fuel utilisation (%) of approximately 80%
In order to prevent or reduce NOx emissions to air while limiting CO and N2O emissions to air from the combustion of coal and/or lignite, BAT is to use one or a combination of the techniques given below.	a) Combustion optimisation b) Combination of other primary techniques for NOX reduction (e.g. air staging, fuel staging, flue-gas recirculation, low NOX burners (LNB)) c) Selective non-catalytic reduction (SNCR) d) Selective catalytic reduction (SCR) e) Combined techniques for NOX and SOX reduction	Shoalhaven Starches will have flue –gas recirculation as well as combined techniques for NOx and SOx reduction (a, b and e)

Pollutant/control	Overview / Best practice	Shoalhaven starches
BAT 21. In order to prevent or reduce SOx, HCl and HF emissions to air from the combustion of coal and/or lignite, BAT is to use one or a combination of the techniques given below.	a) Boiler sorbent injection (in-furnace or in-bed) b) Duct sorbent injection (DSI) c) Spray dry absorber (SDA) d) Circulating fluidised bed (CFB) dry scrubber e) Wet scrubbing f) Wet flue-gas desulphurisation (wet FGD) g) Seawater FGD h) Combined techniques for NOX and SOX reduction i) Replacement or removal of the gas-gas heater located downstream of the wet FGD j) Fuel choice	Shoalhaven Starches will have duct sorbent injection (DSI) as well as combined techniques for NOx and SOx reduction (b and h) DSI has high operational experience. SO_2 removal efficiencies up to 65 % in BFB boilers, up to 80 % in duct injection or other furnace injection systems and up to 95 % in CFB boilers
BAT 22. In order to reduce dust and particulate-bound metal emissions to air from the combustion of coal and/or lignite, BAT is to use one or a combination of the techniques given below.	a) Electrostatic precipitator (ESP) b) Bag filter c) Boiler sorbent injection (in-furnace or in-bed) d) Dry or semi-dry FGD system e) Wet flue-gas desulphurisation (wet FGD)	Shoalhaven Starches will have a bag filter (b) and d) dry FGD capable of achieving the emission limits for particulates and metals
BAT 23. In order to prevent or reduce mercury emissions to air from the combustion of coal and/or lignite, BAT is to use one or a combination of the techniques given below.	a) Electrostatic precipitator (ESP) b) Bag filter c) Dry or semi-dry FGD system d) Wet flue-gas desulphurisation (wet FGD)	A to E Co-benefit from techniques primarily used to reduce emissions of other pollutants. Shoalhaven Starches will have a bag filter b) and c) dry FGD capable of achieving the emission limits for mercury emissions

Pollutant/control	Overview / Best practice	Shoalhaven starches
	e) Selective catalytic reduction (SCR) f) Carbon sorbent (e.g. activated carbon or halogenated activated carbon) injection in the flue-gas g) Use of halogenated additives in the fuel or injected in the furnace h) Fuel pre-treatment i) Fuel choice	

Recent data (EPA, 2018) exists showing the licence limits and maximum reported values from coal power stations in NSW. Although different to the proposed coal boiler at Shoalhaven Starches, they do show that the proposed limits are lower or equal to limits applied at these coal powered facilities. The sites use baghouse filters similar to what is proposed at Shoalhaven Starches and findings of the EPA study are that pollution control equipment is being operated and maintained in a proper and efficient manner and achieving greater than 99% control efficiency.

Table 4 Summary of EPA coal power station emission limits, mg/m^3

	Solid particles	**Total Fluoride**	**SO_3**	**Mercury**	**NO_2**	**Hydrogen chloride**	**Chloride**	**SO_2[1]**
Bayswater	100	50	100	1	1500	100	200	1760
Liddell	100	50	100	1	1500	100	200	1760
Mount Piper	50	50	100	0.2	1500	100	200	1760
Eraring	50	50	100	0.2	1100	100	200	1760
Vales Point	100	50	100	1	1500	100	200	1760
Proposed boiler	**30**	**50**	**100**	**0.2**	**500**	**100**	**200**	**600**

1 – This is a reporting limit

6 Conclusion

GHD has prepared a response to EPA's matters raised in their email to Shoalhaven Starches dated 26 July 2018. GHD has provided the proposed boiler manufacturer's performance guarantee and the limits which they will achieve that are equal to or below the concentrations contained in the Protection of the Environment Operations (Clean Air) Regulation 2010. GHD has also reviewed relevant best practice requirements from IED 2010/75/EU and how these are being incorporated by Shoalhaven Starches.

Based on this review GHD finds that all reasonable and feasible emission controls are included in this proposal.

Sincerely
GHD

Evan Smith
Senior Environmental Engineer - Air and Noise Assessments
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Attachment A – performance guarantee from B&PPS

Attachment B – coal data sheets

Boiler & Power Plant Services Pty Ltd
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Mr. Brian Hanley
Energy & Sustainability Manager
Manildra Group
36 Bolong Rd
Bomaderry, NSW 2541

Date:6 August 2018

Dear Brian,

In response to your request for assistance in replying to NSW EPA email dated 26 July 2018 concerning the Air Quality Impact Assessment for MOD 16 coal fired boiler, we have prepared the following:

Boiler & Power Plant Services Pty Ltd (B&PPS) has been engaged by the Manildra Group to act as a consultant on the MOD 16 coal fired boiler. Our business is solely boilers and power plants in which we have extensive experience, please refer to further details below.

We have been requested to respond to the three issues raised in the "Air Quality Impact Assessment" section of the EPA email. Our response is as follows.

1. Provide manufactures' design specifications or performance guarantees for new discharge points, specifically the coal fired boiler;

The contract specification for the boiler will contain performance guarantees on the emission discharge concentrations. These will comply with the EPA licence limits.

2. Demonstrate the discharge points (specifically the coal fired boiler) will comply with emission discharge concentrations contained in the *Protection of the Environment Operations (Clean Air) Regulation 2010;*

At the completion of the boiler contract, performance guarantee tests will be performed to ensure compliance with these concentrations. The boiler will not be accepted until the boiler meets the guarantees.

Furthermore, emission testing will then be conducted on a regular basis as determined by the EPA.

It is noted that the EPA licence limits for some of the emissions are lower than those specified in the Regulation. For clarity, the licence limits are given below and we have assumed these will apply to MOD 16.

Group 6 Emission Standards	**Group**	**Reg. Limits**	**EPA Licence Limits**
Solid particles (Total)	Group 6	50 mg/m^3	30
Nitrogen dioxide (NO2) or Nitric oxide (NO) or both, as NO2 equivalent	Group 5 or 6	500 mg/m^3	500
Sulfur dioxide (SO2)	Group 6	1,000 mg/m^3	600
Sulfuric acid mist (H2SO4) or sulfur trioxide (SO3) or both, as SO3 equivalent	Group 2, 3, 4, 5 or 6	100 mg/m^3	-
Hydrogen sulfide (H2S) (see also clause 42)	Group 1, 2, 3, 4, 5 or 6	5 mg/m^3	-

Fluorine (F2) and any compound containing fluorine, as total fluoride (HF equivalent)	Group 2, 3, 4, 5 or 6	50 mg/m^3	-
Hydrogen Chloride (HCl)	Group 5 or 6	100 mg/m^3	-
Chlorine (Cl2)	Group 1, 2, 3, 4, 5 or 6	200 mg/m^3	-
Type 1 substances (in aggregate)	Group 5 or 6	—	-
Type 1 substances and Type 2 substances (in aggregate)	Group 6	1 mg/m^3	1
Cadmium (Cd) or Mercury (Hg) individually	Group 6	0.2 mg/m^3	0.2
Dioxins or furans	Group 6	0.1 ng/m^3	-
Volatile organic compounds (VOCs), as n-propane	Group 6	40 mg/m^3 VOCs or 125 mg/m^3 CO	40
Smoke	Group 2, 3, 4, 5 or 6, in other circumstances	Ringelmann 1 or 20% opacity	20

Compliance with these limits will be obtained as explained in item 1 & 2, i.e. contract guarantees and testing.

3. Benchmark the proposed new discharge points (specifically the coal fired boiler), against Best Management Practice to demonstrate all reasonable and feasible emission controls are proposed. The Benchmarking should consider, but not be limited to:

    - Proposed combustion equipment;
    - Proposed fuel quality; and
    - Proposed pollution control equipment.

Proposed Combustion Equipment

The specification for the boiler will be performance based and will not limit the type of boiler to be supplied. However, it is likely that the boiler will be a grate fired type of boiler. The design of this type of boiler has evolved to minimise emissions as follows and these will form part of the specification.

Staged Combustion. Combustion takes place in two or more stages, firstly on the grate when it is burnt sub-stoichiometric, then in the furnace where secondary air is injected at one or more levels to complete the combustion. This has the effect of limiting combustion temperatures thus minimising the formation of oxides of nitrogen (NOx) and of creating turbulence thus promoting the combustion of volatile organic carbons (VOCs), carbon monoxide (CO) and fine particles (soot).

The size and shape of the furnace will be such that it provides sufficient residence time at high temperatures to achieve low VOCs, CO and good burnout of fine particles. The flue gas velocities in the furnace are also kept low to minimise carry-over of fine solids. The fine solids which are carried over are mainly collected in a bag-house fitted in the flue gas stream.

Although some of the sulphur in the coal is retained in the ash, most is emitted as sulphur dioxide with a small proportion as sulphur trioxide. In order to minimise the emissions of sulphur dioxide, it is therefore necessary to use a low sulphur coal as is currently used on the Bomaderry site. In the event that the sulphur content of the coal increases, then additional equipment will be required to remove the sulphur dioxide from the flue gas using a material such as lime. This equipment is commercially available but is not common in Australia.

The furnace is operated at a pressure just below atmospheric in order to minimise fugitive emissions

Proposed Fuel Quality

The fuel proposed to meet the air quality requirements is the same as that currently being fired in the existing boilers. These boilers meet the requirements. In particular, the sulphur content is low compared to other commercially available Australian coals but is needed to meet the stringent sulphur dioxide concentrations. Regular coal samples will be taken to confirm compliance with the coal purchase specification.

Proposed Emission Control Equipment

Control of the emissions is mainly achieved by careful design of the grate and furnace as per the boiler specification. The additional item of equipment required is for dust collection and this will be a bag house which removes solid particles from the flue gas before exiting the chimney.

About Boiler & Power Plant Services Pty Ltd (B&PPS) (www.bppsconsulting.com.au)

Boiler & Power Plant Services Pty Ltd (B&PPS) was founded in January 2011 to provide Engineering and Design consulting services for boiler and power plants. The senior consultants each have over 35 years of experience in the areas of process and mechanical design, project engineering, proposals project management and engineering for boilers and power plants using all types of fuel - coal, oil, gas, biomass and industrial & municipal waste.

Projects for coal & biomass fired boilers included (undertaken at Babcock Australia and its descendants ABB Power Plants Ltd, ABB ALSTOM Power Ltd, ALSTOM Power Ltd and Austrian Energy & Environment)

Maryborough Sugar (136 t/h),
CRS Ord River (55 t/h),
Broadwater (55 t/h),
Millaquin Sugar (65 t/h),
Tully Sugar (106 t/h),
Mourilyan Sugar (55 t/h),
Tableland (89 t/h),
Rocky Point (130 t/h, 30 MWe),
Mitr Phol Sugar in Vietnam (2 x 120 t/h, 1 x 37 MWe),
Savannah in Mauritius (2 x 185 t/h Bagasse, 150 t/h Coal),
Pioneer Sugar (130 t/h),
Redbank (2 x 261 t/h, 1 x 148 MWe)
Racecourse (150 t/h, 38 MWe)
Worsley (Two x (57 MWe & 175 t/h process steam, 315 t/h @ 159 Barg, 540°C)

B&PPS is currently active in the Australian boiler industry and has just completed a specification for a 40 t/h coal fired boiler and are acting as Owners engineer for co-generation power plants for Tableland and South Johnson Sugar mills.

Attached please find, B&PPS brochure, list of recent projects and resumes of the senior consultants.

B&PPS are also the Australian & NZ representative for the following companies and can utilise their extensive experience:

Detroit Stoker Company (www.detroitstoker.com) Combustion equipment for Coal and Biomass boilers
Greens Power Limited (www.greenspower.co.uk). Supplier of Steel "H" extended tube economisers and other related products
Power Systems Services Ltd (www.powersystemservices.co.uk) Supplier of airheater baskets and related equipment

We trust this meets your requirement, if you have any questions or require clarification, please contact the undersigned.

Signed for and on behalf of:

Boiler & Power Plant Services Pty Ltd

Graham Lowry

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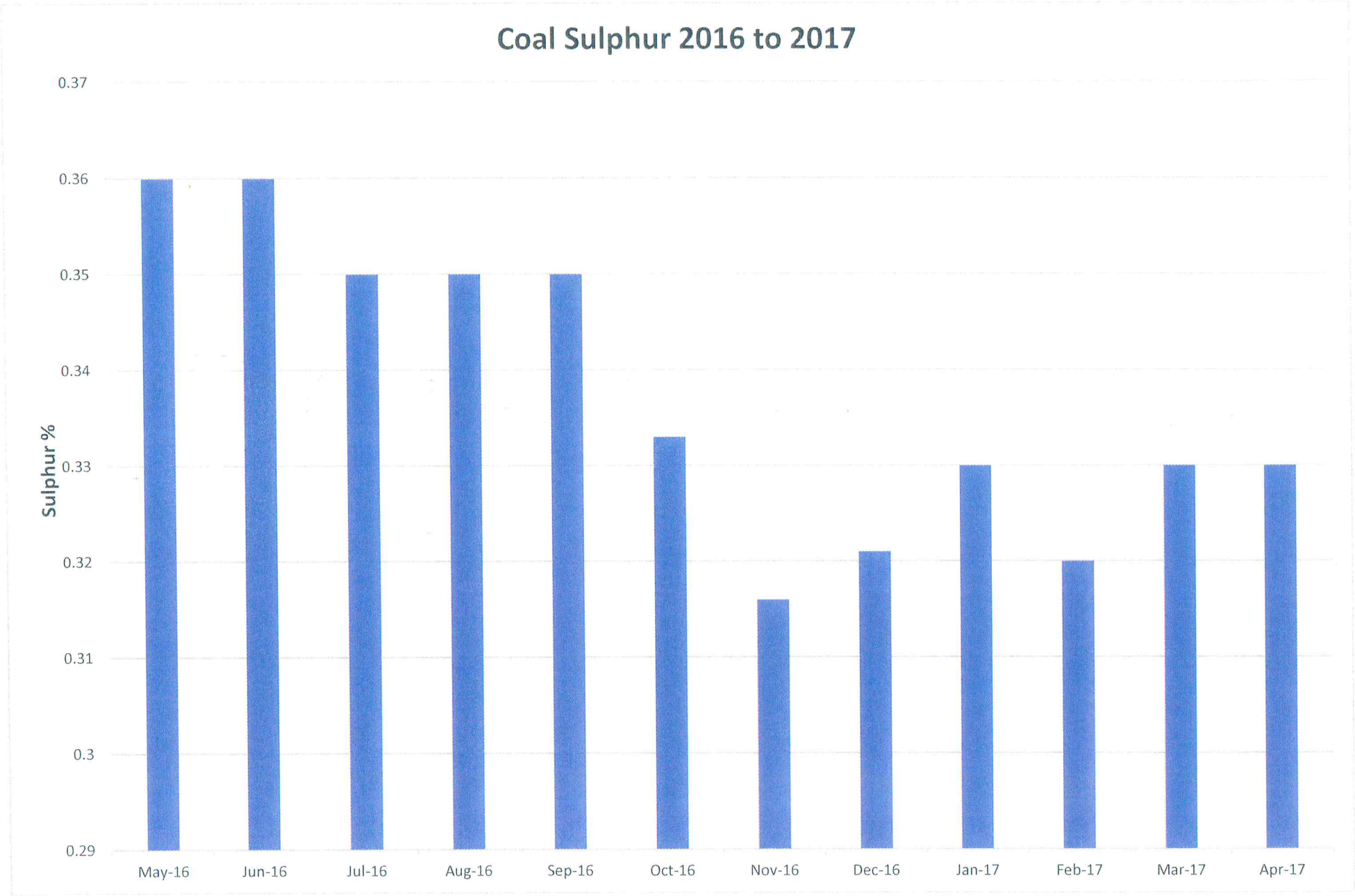
Coal Sulphur 2016 to 2017
Sulphur %
0.37
0.36
0.35
0.34
0.33
0.32
0.31
0.3
0.29
May-16
Jun-16
Jul-16
Aug-16
Sep-16
Oct-16
Nov-16
Dec-16
Jan-17
Feb-17
Mar-17
Apr-17