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13 November 2009

John Marshall
Executive Engineer
Macquarie Generation
34 Griffiths Road
LAMBTON NSW 2299

Re: Bayswater B Power Station (Concept Plan Application MP 09_0118) – Submissions Report – Response to Department of Planning

Dear Mr Marshall,

Katestone Environmental has reviewed the New South Wales Government Planning Department submission in relation to air quality issues associated with the Bayswater B Power Station Concept Approval Application. The issues in relation to air quality have been reproduced below and a response has been prepared.

Air quality:

- Sections 3.1.1, 3.1.2, 3.3 and 3.4 (points 2, 3 and 4) and associated recommendations of the Heggies Report – further justification and clarification of the modelling approach implemented considering the issues identified by Heggies.
- Section 3.4 (point 1) – further clarification of likely Hydrogen Fluoride impacts considering contributions from the Redbank Power Station; and
- Section 3.4 (point 5) – further clarification of likely cumulative PM_{10} impacts at relevant receivers including the township of Denman.

Section 3.1.1 Selection of Representative Meteorology

The selection of multiple periods to model ensured that all conditions experienced at the proposed Bayswater B site were considered in the assessment. This includes selection of average periods, odd periods and periods where abnormal events occur. The process by which the final three periods were selected for the assessment occurred in the following stages:

- Stage 1: Probability distribution frequency (PDF) analysis of the wind speed and wind direction for all periods within the data set provided (15 years).
- Stage 2: Regression analysis to compare the wind speed and wind direction observations for each period compared against the data set average.
- Stage 3: Comparison of the PDF and regression analysis results from each site in order to select the periods that show the best representation of average (or normal), odd (or non-normal) and peak conditions.

- Stage 4: Investigation into pollution concentrations for each of the selected periods compared against the analysis of the whole data set, ensuring that peak pollution events occur within the selected periods.
- Stage 5: Final selection resulted in five representative periods for potential use in the dispersion modelling assessment.
- Stage 6: Discussion with local personnel (Macquarie generation staff) to ensure final periods selected did not include any unusual events such as excessive drought or bushfires and that the Power Stations were operating normally (i.e Power Stations were not shut down for maintenance).

The periods identified in Stage 5 were:

- March 1999 – February 2000 (normal)
- March 2000 – February 2001 (normal)
- March 2001 – February 2002 (normal)
- March 2006 – February 2007 (non-normal)
- March 2007 – February 2008 (non-normal)

Of these periods all represented a wide range of meteorological conditions. The non-normal years are simply years where the distribution of wind directions and speeds are different. The R^2 regressions of individual years to the mean tends to be 0.97 or higher indicating little difference between the 'normal' years, with the 'non-normal' years being between 0.85 – 0.90. This shows there is not a large difference in wind conditions over the 15 years. However, some attempt has been made to discern some changes in the overall meteorological conditions during this time.

The final selection needed to incorporate at least one non-normal period and two normal. From the five possible periods to model March 2006 – February 2007 was ruled out due to significant drought conditions prevalent for that period as well as low data recovery rates for some of the ambient monitoring stations. Therefore March 2007 – February 2008 was selected to represent a non-normal period. From the three normal periods, March 2000-February 2001 was selected as this was the period coinciding with the period modelled in the model validation study. The final period, March 1999 – February 2000 was chosen as the highest number of exceedences of the 1-hour average SO_2 criteria were recorded at Lake Liddell for this period.

Section 3.1.2 TAPM Meteorological Modelling

The TAPM meteorological modelling undertaken for the impact assessment of Bayswater B Power Station did not include local observational data to "nudge" the model predictions. The reasons for not including the data are as follows:

- TAPM performed well without local data assimilation (or "nudging") particularly for the upper level wind stations
- The quality of data available varies between years with significant periods of missing observations

Given the good performance of TAPM at simulating the local meteorological conditions and the varied quality and availability of data for assimilation the justification to not included local data assimilation in the model is valid.

Section 3.3 Emissions

The air quality assessment has been conducted based on a combination of manufacturer's specifications, POEO (Clean Air) Regulation limits, emission factors derived from existing operating power stations and expected coal quality.

Manufacturer's specifications are normally available for oxides of nitrogen, solid particles and carbon monoxide emissions from a coal-fired power station. Manufacturer's specifications are normally available for oxides of nitrogen and carbon monoxide emissions from a gas-turbine. Whilst there are a significant number of other air pollutants for which DECCW has specified regulatory limits for power stations, manufacturer's are unlikely to provide performance guarantees for these pollutants because they are either unlikely to be produced in power stations due to the nature of combustion and the fuels, because they are dependent on the levels of the contaminants in the fuel (eg. fluorine, chloride or heavy metals) or a combination of both (eg. dioxins, furans or volatile organic compounds).

Where manufacturer's specifications were not available, either the POEO (Clean Air) Regulation limits were used or emission factors. Table 1 and Table 2 show the emission limits (or standards of concentration) that were used to calculate emission rates.

The proponent will obtain manufacturer's typical specifications for the plant and equipment that will be installed. For other air pollutants, the proponent will determine appropriate emission limits based on the air quality assessment conducted, any future assessment required to secure Project Approval and in negotiation with the DECCW.

The emission limits will be achieved by:

- Operating and maintaining plant and equipment in a proper and efficient manner, in accordance with the manufacturer's requirements to meet the manufacturer's specifications
- Using the fuels as specified in the approval documents and ensuring that the fuels are of high quality and low contaminant levels

Historical sampling and analysis of air pollutants in the stacks of the Bayswater and Liddell Power Stations demonstrate that concentrations of heavy metals, fluorine, chloride, sulfur trioxide, dioxins and furans and other air pollutants are very low compared with the POEO (Clean Air) Regulation.

Table 1 Emission concentrations and rates of criteria air pollutants for the proposed Bayswater B USCPC Coal-fired Power Station based on total emission from twin flue stack

Pollutant	Standard of concentration[1] (mg/m^3)
Oxides of nitrogen (as NO_2)	500
Solid particles (assume all PM_{10})	50
Carbon monoxide	125
Fluorine	50
Chloride	200
Hydrogen chloride	100
Dioxins and furans	0.1 ng/m^3

Table note:
[1] Reference conditions for Group 6 Activities in accordance with NSW Clean Air Regulation – Dry, 273 K. 101.3 kPa, 7% O_2. Dioxins and furans referenced to 11% O_2.

Table 2 Emission concentration limits from electricity generating plant, as specified in the Clean Air Regulation (2002)

Air impurity	Gas-fired standard of concentration (mg/m^3)
Oxides of nitrogen (as NO_2)	70
Carbon monoxide	125
Table note: Reference conditions for Group 6 Activities All air impurities for gas burning – Dry, 273 K. 101.3 kPa, 15% O_2	

3.4 (point 2) Impact Assessment

The TAPM validation study was undertaken to justify the use of a suitable model for assessing the impacts from a new development in the region of similar characteristics.

The impact assessment for Bayswater B did not include a modelled background for the existing power stations for the following reasons:

- A substantial data set of monitoring data is available for the region covering all population centres. This data set provides a good representation of potential impacts in the area for all meteorological conditions experienced at the site for 15 years.
- The monitoring date set includes all local sources of air pollution and not just the power stations (e.g. traffic and spontaneous combustion from local open cut mines)
- Representation of a full range of emission rates and loads from the existing power stations is complex and difficult to define
- Lack of monitoring stations to the west is not critical as the distance to the sensitive receptors are significant and impacts have been shown in the assessment to be well below levels predicted at the monitoring stations. The frequency of winds likely to transport the power station plumes into the south to westerly sector is very low.

Should further assessment of the background air quality be required this can be undertaken as part of the project approval.

3.4 (point 3) Impact Assessment

TAPM-GRS was not used to estimate the NO_2 concentrations in the region due to the addition of the Bayswater B Power Station for the following reasons:

- Inspection of the monitoring data at al monitoring sites indicates that sources other than the power stations have a significant contribution to the high concentrations of NO_x recorded (particularly at night).
- A detailed emissions inventory would be required to adequately assess NO_2 impacts using the TAPM-GRS model, which was not available in the time available to undertake the assessment.

3.4 (point 4) Impact Assessment

No background for CO was included in the assessment of Bayswater B Power Station, as the contribution from the power station is very minor and extremely unlikely to result in any significant impact or exceedence.

3.4 (point 1) Impact Assessment - further clarification of likely Hydrogen Fluoride impacts considering contributions from Redbank Power Station

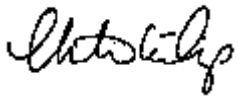
NPI emissions for Redbank for 2007 reporting year indicate 11,000 kg of fluoride compounds emitted from the power station. This compares to a total of 415,300 kg emitted from Bayswater and Liddell for the same reporting period. This indicates that Redbank is less than 3% of the emissions of Bayswater and Liddell and given the significant distance from the sensitive receptors the change in predicted HF impacts would be minor.

3.4 (point 5) Impact Assessment – further clarification of likely cumulative PM_{10} impacts at relevant receivers including the township of Denman

A cumulative assessment of PM_{10} was not undertaken for the air quality assessment of Bayswater B Power Station. The maximum 24-hour average PM_{10} concentration predicted at any sensitive receptor due to the addition of Bayswater B was 3.54 $\mu g/m^3$. Given the conservative assumption that 100% of all solid particulates emitted from the Bayswater B Power Station are in the PM_{10} fraction, the very small increment when compared to the air quality criteria of 50 $\mu g/m^3$ and the magnitude of other sources of dust in the region, the considerable additional work required to undertake a cumulative assessment was not considered warranted.

Denman is located on the western edge of our modelling domain. From inspection of the contour close to the town, the maximum 24 hour PM_{10} concentration due to Bayswater B Power Station is less than 2 $\mu g/m^3$ (< 4% of the criteria on the maximum day) and the annual less than 0.2 $\mu g/m^3$ (less than 1% of the criteria). Therefore the impacts are very minor and unlikely to be the source of any air quality exceedences at Denman.

Yours sincerely,



Christine Killip – Managing Director