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OD Hydrology

6 May 2014

Coolmore Australia
Denman Road
Jerry's Plains, NSW, 2330

Darley Australia
1030 Northwood Rd
Seymour, VIC, 3660

Re: Review of Anglo American "Drayton South Coal Project Consequential Environmental Impact Assessment for Retracted Mine Plan"

Dear Sirs,

As requested, the following provides advice in relation to those elements of the Drayton South Coal Project Consequential Environmental Impact Assessment for Retracted Mine Plan (Anglo American, 2014) ('Retracted Project EIA') that are relevant to surface water and groundwater assessment including long-term final void storage and salinity behaviour.

Of specific note, the findings of the Planning Assessment Commission (PAC) Independent Review Report (December, 2013) state that:

> *"Any new mine plan for the site would need to be further assessed to ensure the visual, blasting, noise and dust impacts could be managed to an acceptable level at the neighbouring stud properties and should take into account worst case scenarios"*

and with particular reference to water issues, that:

> *"Other impacts would need to be carefully considered … particularly in relation to the long term water impacts and final landform"*

Further detail is provided below, however in summary the information provided in the Retracted Project EIA is qualitative only and generally refers to outcomes of previous assessment undertaken for now outdated mine plans. There is no additional assessment of the issues referred to in the recommendations of the PAC.

Information provided in Retracted Project EIA

Information provided for the Retracted Project relevant to surface water and final void water issues is based on:

- Letter of advice from Australasian Groundwater and Environmental Consultants Pty Ltd (AGE, 2014) providing qualitative comment regarding change in groundwater conditions during and post-mining (including final void behaviour and impacts).
- Letter of advice from WRM Water & Environment Pty Lty (WRM, 2014) providing qualitative comment regarding change in surface water conditions during and post-mining.

Review of this information finds no additional modelling assessment has been undertaken for the changes in groundwater behaviour and impacts associated with the Retracted Project. In particular, no assessment has been undertaken or additional evidence provided of a well-founded understanding of the long-term impacts associated with the final void. Long-term water impacts are addressed (within AGE, 2014) by reference to assessment undertaken for the previous Preferred Project Report (PPR) mine plan "reshaped void" with the statement:

> *"At a high level the conclusions reached for the reshaped void are considered likely to apply to the void that will remain from the retracted mine footprint"*

With no additional information provided, our conclusions regarding concerns related to final void modelling and long-term impacts remain consistent with those described in our March 2014 review.

In regards surface water, again no additional quantitative assessment or updated modelling has been undertaken for the Retracted Project. A significant change in the overall water balance of the Project is recognised (in WRM, 2014):

> *"The retracted mine plan is expected to reduce both the inflows and outflows to be managed within the water management system"*

however no quantitative assessment of the potential magnitude or implications of this change on mine operation, management or impact has been undertaken. As with groundwater/final void outcomes, in lieu of any additional information our conclusions regarding concerns related to surface water assessment and impacts remain consistent with those described in our previous review, with the additional issue of a modified minesite water balance that has not been meaningfully assessed.

Conclusions

No surface or groundwater assessment or information has been provided in the Retracted Project EIA which could be considered to meet the PAC recommendation of further assessment and careful consideration of the impacts of any new mine plan. Information is qualitative in nature and refers generally to previous assessment and conclusions.

No additional information or evidence has been provided within the Retracted Project EIA in response to concerns/queries raised in our previous review in regards surface water and groundwater assessments (March 2014). Conclusions reached in the Retracted Project EIA regarding the level of impact are based generally on previous assessment based on previous mine plans and an assertion that this has been shown (in the opinion of the Proponent) to be acceptable and therefore that no additional assessment has been required.

In summary, our conclusions (including those previously reported) are:

Critical assumptions in the final void water and salt balance modelling:

- Do not appear based in science nor representative of real-world surface water/groundwater behaviour;
- Appear wholly subjective and are not consistent with, or supported by, any reported water movement behaviour between the final void and spoil;
- Imply an underlying imbalance in the assumed final void behaviour.

In regards assessment of compliance with the Aquifer Interference Policy:

- the highly simplified calculations (undertaken for the Hunter River only) reported do not provide meaningful assessment of likely salinity impacts on connected waters;
- reported outcomes show a significant and fundamental change in predicted long-term final void behaviour. Between the PPR and most recent round of modelling, predicted long-term salinity increased by some 500% from 800-1,300 mg/L to 3,600-6,700 mg/L;
- Estimate an ongoing and effectively continuous contribution of some 1,000 tonnes of salt per annum from the final void to the Hunter River over the long-term (> 1,000 years).
- Proposed an ongoing, uncontrolled discharge that would impact most significantly upon low flow salinity conditions within the Hunter River which the Hunter River Salinity Trading Scheme (HRSTS) was set up to improve and protect.
- any impacts would be uncontrolled, occur over the very long-term and be impractical, if not impossible, to mitigate once realised

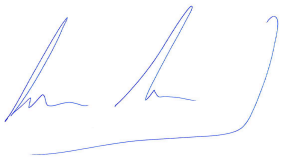
Regarding surface water assessment and impacts:

- The probabilistic values reported are not statistically valid and the forms of analyses are potentially misleading.

- This invalid statistical interpretation means that the design of the water management system is much more likely to be exceeded (i.e. 25% rather than 1%) than recognized or anticipated by the Proponent.
- The Retracted Project Mine Plan represents a significant change in the overall site water balance that has been recognised but not meaningfully assessed.

I trust the above is useful and if you wish to discuss any of the above of clarify anything further, please do not hesitate to call.

Yours sincerely,



Owen Droop

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OD Hydrology

3 March 2014

Hunter Thoroughbred Breeders Association
501 Rouchel Road
Aberdeen, NSW 2336

Attention: Hellen Georgopoulos

Re: Review of "Drayton South Coal Project Justification" from Anglo American

Dear Hellen,

As requested, the following provides advice in relation to those elements of the Drayton South Coal Project Justification (Anglo American, 2014) ('the Justification') that are relevant to surface water and groundwater assessment including long-term final void storage and salinity behaviour. As instructed, advice is provided in terms of:

- Whether any new evidence is provided supporting the Project not previously reported, presented or provided;
- The efficacy or otherwise of this new evidence (if any) in supporting or justifying the proposed Project; and,
- Re-statement and/or clarification of previous and/or current issues that remain unaddressed.

Apart from a further round of modelling undertaken for the final void, which yields long-term salinity estimates some 500% higher than reported in the Preferred Project Report (PPR), there is no additional information or evidence within the Justification in response to concerns/queries previously raised in regards surface water and groundwater assessments.

In regards the latest final void modelling, no response has been provided regarding the apparent significant imbalance underlying the modelling approach, nor justification for the subjective and seemingly unrealistic assumptions adopted regarding water movement within the proposed final void system and connected waters.

In short, all previous concerns/queries remain unaddressed to any scientifically rigorous degree, and the latest round of final void modelling further illustrates the high degree of uncertainty and associated lack of confidence that can be placed in both previously and latest reported impact predictions.

The following provides further details of our evaluation and advice.

Previous advice:

Key surface water issues comprise:

- The probabilistic values reported are not statistically valid and the forms of analyses are potentially misleading. They do not support the interpretation of the results provided. For example, a 1% annual probability event (described as "extreme" within Proponent documentation) when considered in the context of a 27-year period has a cumulative likelihood of occurrence of approximately 25% at some stage during the Project life.
- This invalid statistical interpretation means that the design of the water management system is much more likely to be exceeded (i.e. 25% rather than 1%) than recognized or anticipated by the Proponent.

Groundwater issues:

- The groundwater modelling fails to adequately characterise ambient groundwater conditions including depressurisation, groundwater qualities and the quantification of leakage (both potential and actual) from the alluvial aquifers. Accordingly, it cannot be used for predictive purposes.
- Given that there are known cumulative impacts from existing operations, the groundwater model fails to acknowledge or assess the groundwater impacts resulting from the proposal, or that they are likely to be compounded by the impacts from the adjacent mining projects.

Regarding the modified final void approach/assessment reported in the Preferred Project Report (PPR), fundamental and critical assumptions in the PPR final void modelling:

- Do not appear based in science nor do they represent real-world behaviours over time
- critical reported outcomes appear unduly influenced by this wholly subjective and unsupported assumption
- Are not consistent with, or supported by, any reported groundwater/spoil water behaviour
- Have the effect of "flushing" salt from the open void without apparent physical basis for this behaviour

As such, the predicted long-term behaviour can not be relied upon as representative of reality.

New evidence

Apart from a further round of modelling of the final void system, no new evidence is provided within the Justification regarding assessment specific to surface water or groundwater assessments as previously reported in the Drayton South Coal Project Environmental Assessment (EA) and subsequent PPR.

In regards final void, further modelling has been undertaken by WRM Water & Environment Pty Ltd (WRM) and Australasian Groundwater and Environmental Consultants Pty Ltd (AGE) in response to concerns regarding deficiencies and/or inaccuracies in the estimation and representation of long-term final void behaviour raised and documented by the Mining and Petroleum Gateway Panel (December 2013). This latest modelling is documented in a letter report provided as Appendix 1 to Appendix B of the Justification.

The latest round of final void modelling has been undertaken with a change in one input assumption only, that of spoil water salinity. In all other respects modelling has been maintained consistent with previous assumptions and methods, as stated in the Justification:

> *"The modelling methodology and all other inputs (including the adopted gross inflow and outflow groundwater rates) remain unchanged from the work undertaken for the PPR.*"

No additional supporting information is provided regarding the water and salt balance modelling undertaken with the objective to provide predictive assessment of the long-term final void behaviour and characteristics. In particular, no justification or explanation of the apparent inflow/outflow imbalances and arbitrary subjectivity in key assumptions within final void modelling has been provided in any documentation associated with the proposed project to date.

A set of calculations has also been undertaken aimed at estimating the potential increase in salinity of the Hunter River due to ongoing seepage from the final void over the long-term, with reference to meeting the Aquifer Interference Policy minimum impact requirements. The Aquifer interference policy allows 1% increase in the salinity of connected waters per activity and the Justification reports results from assessment aimed at illustrating compliance with this requirement. General comments regarding the calculations and reported outcomes/conclusions include:

- Reasons for, and appropriateness of, the highly simplified methodology for mixing calculations (including an assumption of concurrent inflow and outflow from the alluvial aquifer) are not immediately apparent. In particular the assumptions/methodology adopted to represent mixing between void seepage, the alluvial aquifer and the Hunter River is overly-simplified and does not appropriately represent the real-world processes being assessed. Movement of water between the alluvial aquifer and the Hunter River will occur in one direction or the other dependent on flow conditions within the Hunter River and long-term impact of seepage from the final void into the aquifer and Hunter River will be an ongoing cumulative effect which requires assessment via appropriate methods to provide confidence in the predicted increase.
- As a point of note, and notwithstanding the limitations associated with the methodology adopted, the reported values equate to an ongoing and continuous contribution of some 1,000 tonnes of salt per annum from the final void to the Hunter River over the long-term. Noting that this would add to,

without potential for management under, total salts loads affecting the Hunter River Salinity Trading Scheme (HRSTS). Further, this ongoing uncontrolled discharge would impact most significantly upon low flow salinity conditions which the HRSTS was set up to improve and protect.

- Further to issues with the calculation methodology, any assessment of impact has been limited to Hunter River only with no comment provided regarding potential increases within the connected waters of other local watercourses (e.g. Saddlers Creek) or groundwater.

In summary, the calculations as reported are highly simplified, do not address potential impact on connected waters other than the Hunter River, and are unlikely to provide a meaningful estimation of real-world salinity impacts over the long-term as required by the Aquifer Interference Policy.

Conclusions

No information to date, including EA, PPR and the Justification, has adequately addressed the issues raised regarding inadequacies in surface water assessment and interpretation, or groundwater assessment issues including an assessment of the cumulative impact of the proposal in light of existing (and potential future) Projects.

With regards to final void assessment, no response has been provided to the key concern of the subjective and unsupported assumption and apparent inflow/outflow imbalance adopted within long-term final void water and salt balance modelling.

Critical assumptions in the final void water and salt balance modelling:

- Do not appear based in science nor representative of real-world surface water/groundwater behaviours;
- Appear wholly subjective and are not consistent with, or supported by, any reported water movement behaviour between the final void and spoil;
- Imply an underlying imbalance in the assumed final void behaviour.

In regards assessment of compliance with the Aquifer Interfere Policy, the highly simplified calculations (undertaken for the Hunter River only) reported in the Justification do not provide meaningful assessment of likely salinity impacts on connected waters.

Notwithstanding the: apparent imbalance in the final void water balance modelling; subjective (and unsupported) assumptions regarding ongoing cyclical mixing between the final void and the spoil in addition to “flow through”, and; overly-simplified “mixing calculations” for the Hunter River, reported outcomes from the latest set of modelling:

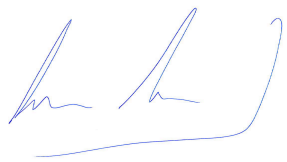
- Represent another significant and fundamental change in predicted long-term final void behaviour. Between the PPR and latest round of modelling, predicted long-term salinity has increased by some 500% from 800-1,300 mg/L to 3,600-6,700 mg/L;

- Illustrate the significant sensitivity of simulated outcomes to changes in input assumptions, and the consequent importance of fully- and scientifically-justified assumptions as opposed to subjective or arbitrarily selected values;
- Estimate an ongoing and effectively continuous contribution of some 1,000 tonnes of salt per annum from the final void to the Hunter River over the long-term (> 1,000 years).
- Proposed an ongoing, uncontrolled discharge that would impact most significantly upon low flow salinity conditions within the Hunter River which the HRSTS was set up to improve and protect.

In summary, final voids represent potentially significant long-term legacy issues for the State. For a final void/spoil approach as proposed for Drayton South, in which the final void is perched above the surrounding connected waters, any impacts would be uncontrolled, occur over the very long-term and be impractical, if not impossible, to mitigate once realised. The ongoing changes in modelling assumptions and magnitude of difference in each set of results at this advanced stage of Project assessment indicate significant uncertainty around the predicted long-term final void behaviour, with consequent significant uncertainty regarding the conclusions reached regarding the real-world impacts.

I trust the above is useful and if you wish to discuss any of the above of clarify anything further, please do not hesitate to call.

Yours sincerely,



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