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Hon. Greg Hunt MP
Minister for the Environment
PO Box 274
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Dear Minister Hunt,

I have reviewed both Appendix 3 of the "Bibblewindi Gas Exploration Pilot Expansion EIS" of 9 July 2013 and the report "Referral of Proposed Action: Water Resource Assessment, Energy NSW Coal Seam Gas Exploration Program" of 7 June 2013, each prepared for Santos NSW (Eastern) Pty Ltd.

I am concerned that no basic hydrogeological or geological data has been provided and therefore it is not possible for any expert in these fields to make any meaningful comment as to whether the conclusions reached in the above mentioned reports are justifiable or not.

The following lists the nature of the information that should be required of the Federal Government, analyst or decision maker in order to make an assessment:

- Depth of coal seams (note, fig 4-4, the only geological map or cross-section, does not have either a horizontal or vertical scale and is stated to be "not to scale").
- Thickness of coal seams.
- Thickness, depth, lithological description, porosity and permeability characteristics of the coal seams and importantly those horizons considered to be aquifers, aquitards or aquicludes.
- Structure, isopach and possibly facies map of selected horizons.
- Representative electrical borehole logs.
- Core analyses, if available.
- Tectonic setting with specific reference to faults and their potential fluid transmissibility.
- Seismic or other geophysical data.

The significance of requiring basic data is best highlighted by reference to the report, eg:

- Section 4-2-1. The Clare Sandstone is up to 95m thick (one of only two references to the thickness of a stratigraphic unit), is considered a potential groundwater resource and is separated from the Hoskissons coal seam by the Benelebri Formation, stated to be a confining bed but with no supporting evidence. Figure 4-4 (no scale) shows the combined Clare Sandstone and Benelebri Formation thinning to zero over the Rocky Glen Ridge, but there is no information as to which of these beds thins. Should it be the Benelebri Formation the consequence would be that the Clare Sandstone, the potential aquifer, would be in direct contact with a targeted coal seam. De-watering

of the coal seam would predictably have an impact on this potential aquifer (note, the word "potential" is used in the report, not to imply the formation's characteristics may not meet the required standards, but rather as recognition that the presence of the shallow Pilliga Sandstone has to date provide sufficient ground water).

- Table 4-2 "Hydrostratigraphy of the Program Area". From the target coal seams to the surface not one confining bed has been positively identified. A number of beds are referred to as "probable hydraulic barriers" or as an "impedance to groundwater", but not one as a recognised barrier to groundwater movement.

The lack of supporting data or evidence leaves the following unanswered:

- On what basis is it estimated that 1.41GL would be extracted over 3 yrs from 6 pilot sites/42 wells? (note different start dates)
- On what basis is it claimed there would be no aquifer interference?
- On what is the predicted 2m decline in groundwater head based on?

I have noted that in respect of initial groundwater potentiometric heads, there is a lack of base data, as acknowledged by the authors. This increases the margins of error of the (not included) model.

At the end of pilot programme the Maules Creek Formation is predicted to achieve 80% recovery after ten yrs. This would appear to indicate hydraulic connectivity. Further Figures 4.1 and 4.5 show rapid recovery after drawdown in both the Hoskissons and Maules Creek coal seams, again appearing to indicate actual or potential hydraulic connectivity to aquifers. Note also that the Maules Creek formation is listed as being a "negligibly transmissive unit", an apparent contradiction to the rapid pressure recovery.

I would emphasise that the above simply provides a statement of the reasons I am unable at this time to either verify or dispute the findings and as well is an expression of some of my concerns. It is these concerns, exacerbated by an almost total lack of supporting data or evidence for the conclusions reached in the reports, that leaves me with no choice but to recommend that the Federal Government retracts its decision of 1 October 2013 and instead apply the "Water Trigger" to this project with the oversight of the Independent Expert Scientific Committee.

By way of qualifications, as a petroleum geologist I have some fifty years experience in the exploration and production of oil and gas and as well have authored various hydrogeological reports.

Yours sincerely,

Peter Lane

Petroleum Geologist