

March 12, 2013

MEETING MINUTES

Minutes: Santos Community Committee – Narrabri Shire
Tuesday, March 12 2013
Narrabri Shire Council Chambers, Narrabri

Attendance: David Ross (Chair), Tony Pickard, Cate McMahon (Santos), Annie Alexander (Santos), Gerrit Nehrkorn, Cr Conrad Bolton, Cr John Tough, Ian Duffy, Rod Siller (Senior Drilling Engineer Santos) Cr Ken Flower, Victoria Hamilton.

Apologises: Michael Guest, Terry Hynch, Jon Maree Baker, Brendan Warnock, and Ron Campey.
Lisa Montgomery – *resigned from committee.*

	Discussion	Action/By Whom
1. Welcome and introductions	<p>The chair opened the meeting at: 5.36pm</p> <ul style="list-style-type: none"> - Chair welcomed committee and presenter. - Lisa Montgomery has resigned from the Committee due to family commitments and was thanked for her contribution. - Chair introduces Cr Conrad Bolton (briefly joining meeting for tonight) 	
2. Previous meeting's minutes	<p>List of actions from previous meetings was discussed and updated:</p> <ul style="list-style-type: none"> - Santos to give committee removal rates of membranes during the reverse osmosis process and compare this to different water guidelines. <i>Santos: 80% of the total dissolved solids are removed with the membrane. 20 % is by-product. Depending on what it will be used for, it falls under the different standards for example; Drinking standards come under Australian Drinking Guidelines, if it is for irrigation, it comes under the Australian and New Zealand Environmental Guidelines.</i> - Santos to follow up to see if they are obtaining a mining licence under the mining act in regarding to the mining of sodium. <i>Santos believes that no licence is required as sodium is a by-product. Discussion took place by Santos and</i> 	<p>Action: Committee member and Santos to both investigate Dept of Minerals Act further.</p>

March 12, 2013

MEETING MINUTES

Committee regarding if sodium is classified as a 'by product' or if it still comes under an act made by the Dept of Minerals, as it is being extracted during the process.

- **Santos to provide committee with a copy of Water Management Strategy for Santos Operations in the area.** *Santos has submitted this strategy to regulators, waiting for approval, once that is done the document will be online and brought to the attention of the committee.*
- **Santos / Chair to work with committee member to figure out a way forward. (Regarding identification of black substance on soil sample)** *Meeting with committee member and Santos representatives was held 7th March and minutes will be available soon. Questions can be taken regarding this topic next meeting.*
- **Doug Main to find out more about the rehabilitation at PEL 238 Culgoora and get back to Committee.** *Santos investigated that the site has undergone pasture and fertiliser in December 2012. Santos has forwarded pictures to Chair who will forward on.*

Committee accepted previous minutes.

3. An Introduction to Drilling - Rod Siller

*See Appendix 1 - Presentation Introduction to drilling
See Appendix 2 - Rod Siller Biography.*

Presentation Notes:

- Offshore operations more complex (when compared to coal seam gas activities), well design is the same, principles apply both on and off shore. Design and operating standards remain high regardless.
- In NSW codes of practice are the strictest in Australia.
- Core hole small diameter hole up to 8.5", mostly going to be around less than 100mm holes.
- There are restrictions on the number of wells allowed in one particular area. Areas

MEETING MINUTES

March 12, 2013

can be tested but they cannot have multiple pilot wells as that would be classified as production and a licence is needed for this.

- Water based drilling fluid, differs from air based. If you drill through an aquifer it can cause problems with air.
- Pilot wells all have sensors that monitor what is happening in real time, remotely.
- NSW Government regulations ensures that the cementing of abandoned wells is done correctly.

Questions:

Committee member asks about the impermeable layer, what percentage of that do you drill into before you seal it off with concrete. Santos responds we don't go down that far; we go into the Napperby formation and will go 30 to 50 metres into that before we stop. Sometimes go into the Purlewaugh. Depending on what the Geologists tell drillers about the soil generally Santos are looking at setting casing between 300 metres and the deepest is 450 metres for a pilot well.

Chair asks Committee to split into groups, in the aim to get more from discussions and to come up with group questions. Chair allows committee to have 15 minutes to discuss drilling, focussing on three questions:

- What are the key risks?
- Are they being managed effectively?
- Are there any gaps in the information you need to know?

What are the main risks (negative and positive)

- Main risks identified by committee groups were; cross contamination, well integrity, what happens to the water on the surface and similarly, broken gas and water pipes.

Are they being managed? And managed effectively?

- Chair asks if the committee and the community think that the drilling is being managed effectively? Committee member comments that it is not and is

March 12, 2013

MEETING MINUTES

disappointed expert could not answer some questions, as they were unaware of documents like the Namoi water study. Another committee member explains that Santos representative was explaining that the Namoi water study has scenario's and you can't have one answer for a number of scenarios. Committee member argues that the Government have used these scenarios to okay each progressive step. Committee member's concern is that the Namoi Water Study states that there is no such thing as an aquitard, in the drilling process the coal seam is drawn down therefore a lower pressured area is created, water pushes its way through the strata above, as the Namoi water study claims there are no Aquitards, and back into the coal seam. Therefore, there is a chance of lowering the level of water on the GAB.

- Chair asks committee if they believe cross contamination has been managed? Committee member says that it might be now but does not believe it was managed in the past. Committee member does not believe that it is being managed effectively, one gap that was identified was the effect that SRB will have on the steel pipes' and the cementing as they are harmful to steel and cement, so should this product be used? Santos explains that plastic was experimented with years ago but was abandoned.
- Committee member asks if you are going to directional drill into the coal seam and then depressurise it, the opening will not be cased. Santos explains that the opening will not be cased but is only a 6" hole no matter how deep. We are drilling perpendicular to the coal fractures. Committee member asks how do the fractures in the seam occur? Santos responds through geological occurrences like the ground moving, lateral stresses, volcano coming up etc.
- Committee member asks, where does the water that is initially in the coal come from? Santos representative explains it was trapped there when the coal seam was sealed off from above during the coal formation and may even have entered during a geological change to the coal strata. Committee member asks when the water is drawn out do you know if it could replenish itself? Santos responds that this is out of his field and you would have to ask those kinds of questions to a

Action: further investigation on the integrity and effect of SRB has on steel.

March 12, 2013

MEETING MINUTES

- hydrologist.
- Committee member asks about the fractures, how big are the fractures? Santos representative does not know he hasn't seen them before.
 - Committee member asks once you are drilling the hole, when you come across an aquifer have you got the aquifer sealing material in your drilling fluid while you're drilling? Santos responds yes it is there all the time.
 - Questions through the chair from absent member, can you describe to us the monitoring processes, ie the "who, what and how" once a hole has been drilled? Santos responds once a well is drilled there are pressure gauges that send real time data back to the server. Monitoring wellhead pressure, and flow rate are measured. Committee member suggests that this form of monitoring has nothing to do with environmental factors and is purely for Santos production benefit. Santos explains that the deep aquifer-monitoring bores are monitored purely for environmental purposes as they are pressure sensitive and will record the decrease or increase of the pressures of the aquifers, they are strategically set so that they are monitored on a regional basis. Committee member explains about a case known to them in QLD where a cattle producer's stock water has been lowered, Santos surrounds them but does not believe they have anything to do with the problem. Santos responds in order for the gas to flow, water is a by product, in order for the gas to flow we need to release the pressure in the coal seams. If we have interaction from up above into the casing the gas won't flow which means we don't have a viable commodity. Santos asks committee member if they are happy to provide name of property so that further investigation could be conducted to get a clearer answer.
 - Committee member asks what is the calibration in ft? Santos responds 0.4 PSI per ft, roughly 1 PSI per metre.
 - Committee member asks what is the difference between a vertical pilot hole and a vertical and a horizontal hole? Santos responds that we do a pilot set because we have to intercept those fractures from the information obtained by ESG which noted that the fractures were vertical. In QLD the coals are more forgiving,

Action: Committee member to provide details to Chair

March 12, 2013

MEETING MINUTES

here they are harder. The slow flow of water from the vertical well as apposed to the well head at the horizontal end can cause a pressure difference on the coal seam that effects the effective release of the Methane, to overcome this problem Santos is changing both its drilling technique and making tighter turns into the coal seam as well as putting electric water pumps down the horizontal wells.

- Committee member asks, other than physical barriers that are in place to avoid cross contamination what other barriers are in place? Santos responds that in a core hole the well is cemented inside and out and on a pilot well you have two layers of steel and cement. Committee member asks has Santos ever had a cross contamination issue? Santos representative responds that he cannot guarantee that, as he is not familiar with other aspects of the company as it is a large organisation Australia wide and international. Committee member says that in the drilling process there would have to be a percentage of exchange of fluids when you are drilling. Santos responds that this is the same with water bores and if Santos does drill through a permeable aquifer when they do cement some of the cement will go into that area in the formation around the casing, in amongst the grains of sand in sandstone aquifer, cement will migrate in and set hard, so there will be penetration into the permeable formation as well. Committee member asks is it a different kind of cement used? Santos responds it is high quality cement that follows API standards and is a more refined type of normal cement but with material added.
- Committee member asks why do you drill out the side of the casing when you are drilling horizontal; why don't you keep the horizontal casing going? Santos responds there is difficulty drilling the formations here as they are hard above and below coal seams, they had to hit the coal seam at the right angle, like the space shuttle re-entry, too shallow an angle you bounce off and too steep an angle you got right through the coal seam, so by drilling down we are drilling through all the coal seams so we know where it is and then we can plan where we have to cut a hole to get the right entry angle.

March 12, 2013

MEETING MINUTES

- Committee member asks Santos to explain why 3 wells in the pictures provided were not central to their outer casings as Santos has repeatedly stated and how can Santos guarantee that the inner well pipe is central to the outer pipe and thus cemented separated all the way around as your section shows when at the surface the inner pipe is obviously not central and one picture even shows that the cement is not all the way around between the inner and outer pipes, again at the surface, so again how can we believe that the cement is not missing in places between these two pipes at points below ground. Santos does not respond.

5. General Business

Santos Update: PEL 238 Update, *see appendix 3*.

- Committee question, is Bibblewindi 14 going to be decommissioned?
- Committee member asks about the Rehabilitation on Dewhurst 8, did Santos rehab this area back to what it was like prior to CSG? Santos responds that we have rehabilitated it to the wishes of the property owner. Committee member asks, so if a landowner has un-cleared land that is subject to the Native Veg Act, and Santos puts a well on that land and then rehabilitates the site, it goes back to what the owner wants and not to what it was. Santos has a Policy for rehabilitation that is public and that is that they Rehabilitate back to the way it was before Santos arrived. That is clearing by CSG Exploration. Santos replies we Rehabilitate back to the landowners wishes.

- Site Tour

Committee member explains to committee that they thought that the recent tour was informative and impressive to see the well presented areas Santos are working with. Another committee member recommends everyone should go out on a number of site tours to form their own opinion on rehabilitation and to see the progression. A discussion is held on who undertakes the drilling. Santos notes that it is generally industry practice for drilling to be sub-contracted out. Committee member asks who is responsible if something goes wrong. It is noted that under the Corporations Act, Santos would be responsible.

- Media

No Media to report

Next Meeting and issues to discuss: Wednesday the 24th April.

Action for Santos to find out if Bibblewindi 14 will be decommissioned.

Action: Committee to send questions on water contamination to Chair prior to next meeting.
Action: Committee member to find

March 12, 2013

MEETING MINUTES

Topics:

- SRB
- Surface water contamination

Question from committee, Does Narrabri Shire Council give permission for Seismic testing on roads?

out if there is a council policy about permission for seismic testing on council roads.

Meeting Closed: 7:50pm

March 12, 2013

MEETING MINUTES

Attachment 1. Actions

Action Raised	Date Raised	Progress Made
Organise an expert to respond to questions about Sulpha Bacteria, organise independent ex CSIRO Hydro geochemist to present at future meeting.	9 th October	Ongoing – Glenn Toogood
Santos to provide response to questions on Namoi Water Study	9 th October	Ongoing.
Santos to follow up to see if they are obtaining a mining licence under the mining act in regarding to the mining of sodium.	11th December	Ongoing <i>Committee member and Santos to investigate if this comes under the mining act of not.</i>
Santos to provide committee with a copy of Water Management Strategy.	11th December	Ongoing. <i>Submitted to regulators waiting for approval once that is done the document will be live online.</i>
Action for Santos to provide committee with full soil analysis including analysis of bacteria of the Leewood site next year when it is available. As well as providing regular soil checks to ensure no contamination is occurring.	11th December	
Specialist to answer questions on aquifer monitoring research that is being conducted.	11th December	Ongoing.
Santos to provide evaluation and commitment plan, Evaluation of water (full water analysis including bacteria but also escaped gases etc)	11th December	
Committee to read the presentation on land compensation and see if they are happy with the explanations.	11th December	Ongoing.
Santos to provide full bacterial analysis of 3 dams at Biblewindi.	11th December	Ongoing
Cate to check information on handout from Santos Info Session regarding incorrect information.	12 th February 2013	
Chair to contact committee member and get contact details for water specialist	12 th February 2013	
Committee member and Santos to both investigate Dept of Minerals Act further.	12 th March 2013	
Further investigation on the integrity and effect SRB has on steel casing.	12 th March 2013	
Santos to find out if Biblewindi 14 will be decommissioned.	12 th March 2013	

MEETING MINUTES

March 12, 2013

Committee to send questions on water contamination to Chair prior to next meeting.		
Committee member to find out if there is a council policy about permission for seismic testing on council roads.	12 th March 2013	

Appendix 1: Presentation – Introduction to Drilling

Appendix 2: Presenter Biography – Rod Siller

Appendix 3: Santos Update PEL 238 Update – Proposed upcoming work program – Narrabri area.

Appendix 4: Meeting Minutes – from Thursday 7th March Meeting with Tony Pickard and Santos

Rod Siller- Senior Drilling Engineer



Background –

Born and raised in Brisbane but family has always had cattle farms and grain farms from 1980. Spent most of my holidays on farms and most of my last year at university on the farm.

My hobbies- Gardening and bird keeping

Expertise/Knowledge-

Senior Drilling Engineer

Bachelor of Engineering in Mining and Petroleum – University of Queensland

25 years international experience (mostly offshore) in 20 countries

Consulting Engineer for 14 years

Has worked as a directional drilling consultant on offshore projects for major oil companies including, Agip, Chevron, Texaco, Shell, Santos, Total, Mobil, Japex, PTTEP and Total over the last 15 years.

SANTOS UPDATE MARCH 2013

Proposed upcoming work program – Narrabri area

- > The rig completed the decommissioning of Bibblewindi 13 last month and is currently working to decommission Bibblewindi 2 and then Bibblewindi 1. These three wells are all located in the Pilliga State Forest.
- > The rig will then decommission three wells in the Dewhurst region of the Forest later this month.
- > Rehabilitation of ponds and sumps on private property in the Dewhurst area is now complete.
- > Some of the soil treatment being carried out in the Pilliga was delayed due to wet weather, but is now back underway, along with drainage work, at the former Bibblewindi water treatment site.
- > The lease preparation/build for the Kiandool 1 core hole is scheduled to commence within the next week providing the weather is favourable and suitable machinery is available.
- > As a part of our facilities upgrade we will be relocating a flare from a private landholder's property at Tintsville to our Wilga Park site. The flare will be used to manage the gas produced by Santos' existing wells when they recommence operations.
- > Survey work for proposed flowlines is scheduled this month.
- > The rig team will move into the newly established drilling camp on McFarlane's Road.
- > We are working on plans to acquire seismic data towards the middle of the year. Vibroseis trucks will be used to conduct these surveys. The majority of our activity will be located south of Narrabri with some activity to the west of Wee Waa. We will be contacting relevant land owners and discussing the work in more detail when planning progresses.
- > In terms of community events, Santos team is sponsoring the Narrabri Cup again this year, on March 23.

Questions- Narrabri CCC March 2013

- 1) Explain in detail, the step by step process that is undertaken by SANTOS to commence and proceed to drill a test well. Including the application forms and to which government departments the applications must be made.

All companies must prepare a Review of Environmental Factors (REF) document several months before a well can be drilled and submit it to the Division of Resource and Energy (DRE) of the Department of Trade, Investment, Regional Infrastructure and Services. The information on the drilling of the well is included in the REF. The information includes a summary of the drilling operation and the complete details of the proposed well. The REF is posted on the Departments website when lodged. These REF documents can be over 200 pages in length. No site works can begin at the site until the REF is approved.

- 2) Is it a requirement of the Government or SANTOS, that the driller responsible for the drilling ie in charge of an INDIVIDUAL drill, views the hard copy of the government approval to drill a test well?

The driller is responsible for operating the drilling rig. Under NSW law, Santos is responsible for the drilling of the well. Santos is issued a letter of approval by the DRE. Santos also ensures that a copy of the approved REF is available at the drilling site at all times. There is a NSW Government website which lists the approvals given.

- 3) Is the written approval to allow a test well to commence, available to any member of the public to view upon request? If yes, where is it able to be viewed?

Yes, approval can be found on the Department's website
<http://www.resources.nsw.gov.au/environment/ref>

- 4) What depth is a test well drilled to, what determines the depth of the test well and what is the core reason for drilling a test well. Is the test well bored into the coal seam?

The depth of the well will depend on the area and the depths of the coal seam were the hole is being drilled. The depth of the core hole is determined by the depth of both the targeted coal seams and the basement (volcanic rocks). The core hole (test well) extracts a sample of all of the layers of rock including the coal seams. A pilot or appraisal well is drilled to measure the flow rates and composition of the gas and water and to test the commercial viability of producing gas.

- 5) Is a test well cased and if water or debris of any kind is produced from a test well where is it stored as it comes out of the ground and any disposal methods.

An exploration well will be cased in accordance with the procedures outlined in the slide presentation. Santos will be drilling the wells with a sufficient mud weight to prevent the production of water from the well during drilling operations. The drill cuttings will be sampled to ascertain whether they are reportable waste (or not).

The major chemical being used in the drilling mud is potassium sulphate which in fact is also commonly used as a fertilizer. Santos will sample the cuttings from the hole using an independent firm to monitor the chemical levels in the cuttings. Santos is seeking approval to mix, turn and bury the cuttings as part of the rehabilitation process.

- 6) Are any chemicals or proppants used in the drilling of a test well?

There are several chemicals used in the drilling of a well including some polymers which are biodegradable. The main component of the drilling mud will be potassium-sulphate. A list of the chemicals which may be used can be found in the REF on the website. There are no proppants used.

- 7) Explain in detail, the step by step process that is undertaken by SANTOS or an outside driller, to commence and proceed to drill a production CSG well, including the application forms and to which government departments the applications must be made.

If the question is referring to a pilot test well see answer for question 1. In addition, a detailed Well Program must be submitted to the DRE one month ahead of the commencement of drilling the well. The hydrologist at the Office of Water also has to be notified one month ahead of the drilling operation.

If the question refers to a production well then before any production wells can be drilled a Petroleum Production Licence (PPL) must be issued which requires a full planning approval under Part 4 of the NSW Environment and Planning Act which includes a full Environmental Impact Statement (EIS) process.

- 8) Is the written approval to allow a production CSG well to commence, available to any member of the public to view upon request. If yes, where is it able to be viewed?

Again if it is a pilot program consisting of several wells, then Santos receives a hard copy of the authorisation from DRE. Activity Approvals can be found on the DRE website.

If it is a production well scenario, then the EIS and the Government's approval will be available from the Department of Planning and Infrastructure's website.

- 9) What qualifications are **required by law** for a driller to drill a) a test CSG well b) a production CSG well.

Neither Santos nor the drilling contractor would have a driller on site if he or she were not suitably experienced. Santos as operator of the site is legally responsible for the work. The Santos Onsite Company Representatives (OCR) generally have in excess of 15 to 20 years experience in the oil and gas industries. All operations on site are supervised by Santos. Industry practice requires that a driller needs to have a Well Control Certificate to be able to operate the controls to shut in a well if required as do the Santos OCR's.

- 10) Does a landholder have the legal right to know of any driller's qualifications or experience of drilling before any commencement of drilling on any piece of land.

There is no legal requirement for this, however Santos ensures all our staff and contractors are competent and qualified to ensure the job is done according to regulations and Santos' high standards. If a particular landholder had concerns we would discuss the drilling company's experience with them and also introduce them to the drillers on the site prior to work commencing.

- 11) Does the local government council of Narrabri require information as to the onset, qualifications of any or all drillers and drilling operations in any local government area including Narrabri Shire.

No. As with any industrial work, the company undertaking the work, in this case Santos, is responsible for ensuring its staff and contractors are properly trained and is legally responsible and would be held liable if this were found not to be the case. We also have stringent pre-qualification procedures in place before companies are cleared to supply goods or services to us. It is in our best interest, as well as that of the community to ensure our staff and contractors carry out work safely, efficiently and to the highest standard.

- 12) Does a driller require a license to drill. See answer to 9.

- 13) If a drill 'goes wrong' who is held responsible for it 'going wrong'. What is the procedure of identifying the cause and effect and who holds legal responsibility of anything 'going wrong'.

Santos is the operator and is legally liable for anything related to the wellsite. We conduct extensive risk management assessments and planning so that operations go according to plan. Santos has engineering procedure manuals for the design of all aspects of the well.

- 14) Who has the legal 'burden of proof' when an undesired outcome of drilling occurs. a) if a SANTOS driller is used with an outside hired drilling rig, or b) a contracted by SANTOS outside drilling rig is used.

All of the drilling rigs used by Santos are owned by contractors. As per the answer to question 13 Santos is legally liable for anything related to the well site. Santos company representatives will be on site 24 hours a day.

- 15) How does SANTOS legally prove they have (not) lowered the potable fresh aquifer levels of surrounding bores from their test or production wells?

Shallow aquifer monitoring bores will be put in place in strategic locations in the production areas, chosen by hydrologists. Some deep aquifer monitoring bores will also be installed in either exploration holes or wells that are to be abandoned. These aquifer monitoring bores provide real time data regarding pressure changes on aquifers. This allows Santos to gather baseline data on a regional basis prior to any production drilling commencing.

- 16) What are the different types of fraccing? Is fracturing the real term for fraccing? Is hydraulic fracturing the only type of fraccing there is.

The correct term is hydraulic fracturing and that is the only type of “fraccing”.

- 17) Where has SANTOS fraced over the world?

Santos has decades of experience using this technology in the Cooper Basin and in south-west Queensland

- 18) When and what type of cement is used in the process of well development at any stage.

The steel casing is cemented using a very high quality cement and silica (usually flyash) mix. We use a reputable cementing company that has strict quality control procedures and practices. Each batch of the cement blend is tested in a lab prior to being used in the field.

- 19) Explain in written detail the processes including PSI's, depths, what types of drills of used, ie sizes, layers drilled through ie sandstone, basalt, etc ,what fluids are used to drill including what type of casing is used in test wells and production wells and any chemicals or proppants including reasons for use of , amounts of , how much is returned to the outside, how much remains insitu, if it remains insitu how far can it travel through that seam. What comes out of a production well? How much? This is in regard to PEL 238.

The presentation showed the usual hole sizes and the geology through which we drill. The fluids used have been mentioned and are available on the website for REFs as mentioned in previous answers. The chemicals used in the drilling process operate in a closed loop cycle so they do not remain in situ. We are not planning to conduct fraccing and are not using any proppants.

- 20) Outline in detail what precautions and procedures SANTOS or outside contract drillers, whom SANTOS has contracted on their behalf, take, when drilling through aquifers that lie above and are used as drinking water , but are not connected to the targeted coal seam, to guarantee the quality of the fresh water within these aquifers is never contaminated by chemicals or bacteria by any drilling process they use.

Even water well drillers use some chemicals when drilling a water well. We use similar chemicals and additives, however our drilling muds are designed to minimise fluid loss. In addition we will have a mud engineer on site to monitor the properties of the mud to ensure it is minimising fluid losses. The well is drilled into impermeable layers below the aquifers and cased with steel and cement to prevent cross-connection between the surface aquifers and the formations below.

- 21) Explain in detail, the understanding of SANTOS and any outside driller they may contract to, on their behalf, has, to the integrity of steel casing, to rust in wet and high saline environments, also to the ability of steel to crack, degrade and allow interconnectivity of fresh to saline or reverse to occur thus causing potable drinking water to be unusable. Also the understanding of SANTOS and any outside contract driller they may contract on their behalf, as to the expected time period that the steel casings will rust through.

The casing is centralised in the well and then cemented around to prevent fluid or gas migration. This also seals off the casing from water. Rust requires oxygen and an oxidising environment. The environment is anaerobic. Calculations are conducted prior to designing the well to ensure the steel casing will retain its integrity and this is continually monitored during the life of the well.

- 23) Does SANTOS have an understanding or position on the structural integrity of the casing of their wells ' never breaking down' .

Santos designs the wells for the life of the project and when wells are decommissioned the procedure followed is according to the NSW Code of Practice. The casing and cement are engineered to match the makeup and strength of the surrounding rock formations.

- 24) Does SANTOS or any driller that SANTOS may contract to drill on their behalf, have any knowledge of any drilling process anywhere in the world, where the well integrity has been proven to have interconnected saline and potable aquifers, previously unconnected.

There are cases where it has happened, one example I am aware of is in Algeria where there is very little government regulation. It has only happened where the design or operations haven't met industry standards or Government regulations. The NSW Government has detailed regulations. The DRE gives approval to drilling the wells after a review process and issues conditions on a well-by-well basis. They may require amendments to the proposed well design to meet their standards. A final drilling program, including detailed casing and cementing programs are submitted to the DRE more than 30 days before the commencement of the well for final review and approval.

- 25) As a percentage, how many wells that have been drilled in the Pilliga or any part of PEL 238 by EASTERN STAR GAS, SANTOS or any outside driller, contracted by the aforementioned companies, pass through an aquifer that lies above the targeted coal seam.

All the holes drilled for exploration for coal, oil and gas drill through the shallow aquifers. So the answer is 100%.