

SANTOS COMMUNITY COMMITTEE  
NARRABRI SHIRE

December 11, 2012

MEETING MINUTES

**Minutes:** Santos Community Committee – Narrabri Shire  
Tuesday, December 11, 2012  
Narrabri Shire Council Chambers, Narrabri

**Attendance:** David Ross (Chair), Tony Pickard, Lisa Montgomery, Cr John Tough, Gerrit Nehrkorn, Brendan Warnock, Cate McMahon (Santos), Judy Simmonds, Andrew Shek (lead Process Engineer – Water at Santos Energy NSW), Victoria Hamilton, Ian Duffy, Glenn Toogood, Terry Hinch, Ron Campey, Mark Rodgers (Santos Land Access Team Leader)

**Apologises:** Ken Flower, Michael Guest, and Cr Cathy Redding

	Discussion	Action/By Whom
<b>1. Welcome and introductions</b>	The chair opened the meeting at: 5.36pm - Chair welcomed committee.	
<b>2. Previous Meeting Minutes</b>	Committee Member would like to make a correction to the last minutes. Previous Minutes correction. "From sulphha to sulphate" Minutes passed by committee with above changes. <b>Actions:</b> - <b>Santos to obtain analysis of the water in the three Biblewindi ponds.</b> Santos provides committee with copy of water analysis results. Glenn Toogood (Santos) briefly explains interpretation of analysis results. <i>(See appendix 1)</i> Total dissolved salt content, (if you imagine sea water to be at 33,000 ML that gives a comparative to how saline the waters are.) 17,000 is more what raw formation water would be from that field and 27,000 is a combination of formation water and brine. Committee comments that the levels of bacteria analysis is not included in results provided. Santos responds the Sulphate	

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reducing bacteria levels are outlined in the presentation that will be given tonight.

Committee Member asks what LOR is? Santos explains it stands for Level of Reporting. The level of reporting that the laboratory can detect too. Committee Member asks if there are recommended levels? Santos responds: there are levels if it is discharging for industrial use or levels for drinking water etc.

- **Update of the current REFS from Santos, to give the committee an update of what is to be expected from Santos in the New Year.** Santos explains that the current REFS that are working on are a core hole Kiandool and Leewood. Committee Member makes a suggestion that Santos need to include more detail in their maps that are to be submitted with their REFS. Question was put to Santos asking was the newly cleared area and road, located during fly over of November 29th 2012, situated 100 m to the East of my boundary fence, for a gas well or core hole? Santos reply was "No", that was put in by the Landowner.

Action: Santos to take that suggestion on board and make relevant people aware that the maps need to be more detailed.

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#### 4. Overview of Leewood property works Andrew Shek & Glenn Toogood

- Andrew Shek introduces his role within Energy NSW, it is clarified for the committee that Energy NSW is an organisational structure within Santos, to be clear it does not only include projects in NSW but also QLD.
- Overview of the Leewood Project and the reason behind some of the designs related to the pond construction.  
*(See Appendix 2 for entire presentation slides)*
- The new Leewood facility is a purpose built design with best practices, designed in two phases. Statutory body that approves dam design is NSW Dam Safety Committee. Santos is using a company called Golder Associates who are geotechnical engineers to undertake the design process of the dams.
- Santos uses both the NSW and QLD states guidelines and follows the more conservative restrictions of each guidelines.
- Dam safety committee are currently reviewing the proposal for Leewood.

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- The dam designers sign off on the design and then are required to be present during the construction of the dam to ensure that the dam is being built to the specifications of their drawings. (Quality assurance at every level of the constructions) after construction the DSC require reports, complete operations manual, dam safety emergency plan. On an annual basis the DSC require monitoring of the dam.
- The presenter notes that the Design overview layout slide page.6 diagram is incorrectly labelled. Reading from left to right first dam should read Brine pond and the second dam should be labelled product water pond.
- Diagram shows four compartments of dams, reason for this is: should any of the liners develop a leak the internal wall is lower and so half of the pond can be decommissioned while repairs are being made.
- Rainfall – gained information from the Bureau of Meteorology of historical rainfall data of the area. This data is then taken into consideration in the design of the ponds.
- Page: 12 slide explanation of acronyms used in diagram: DAF = Dissolved Air Floatation. UF = Ultra filtration. RO = Reverse Osmosis. BC = Brine Concentrator.
- Sulphate Reducing Bacteria (SRB) presented by Glenn Toogood: The reason that the SRB analysis was not in the initial results list provided when we discussed actions was because the ground water bores that we have sampled at lot of them are private bores and we would have to go through another process to get private results done. This slide is provided as a summary of the 32 bores Santos has sampled there is a range of SRB. This example shows the levels that are found in this environment and further testing is being carried out of other environments around the area. Santos offers that they can also provide an independent expert to speak on SRB further.

Action for Santos to provide a full Bacterial Analysis of the 3 dams at Biblewindi.

**Questions:**

Committee Member asks what the expected quality of the water would be post RO?

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Santos responds that the fresh water is basically very pure water after RO, there can be residual. Santos aim to meet the Australian Drinking Water Guidelines, that's how pure they make the water. They then have to treat the water for whatever beneficial uses it will be used for.

Committee Member asks how many people will be require to look after Leewood facility and will it be monitored by them 24/7? Santos responds daily inspections and online monitoring control systems. Details are currently being worked out in the operations plan. Most likely will be manned facility during the day and then remotely operated during the evenings.

Second question from committee member in reference to water over land, how deep does that water get? And is the area accessible all the time? That overland flow part is close to Bohena Creek but that is actually the start of the overland flow. From the data we have obtained you will still be able to drive through that water and the site will be accessible in those conditions.

Committee member refers to page 10 of the slide handouts (Design Overview storage levels) the diagram shows the embankment is the embankment key lined? Like they do with storage dams. Is the original soil taken away before the bank is put up? Santos responds yes. We clear the topsoil, the next layer is clay rich we make that uniformed then we use that graded material to make the embankments, the density of the embankments change to give it structural integrity.

Committee member comments on rainfall data, and finds the maximum rainfall event in the presentation very interesting as they have personal experience from 2010/11 where Gwabegar experienced 8 inches in less than 12 hours. Santos responds that they were also surprised by the data, the method that they use is best practice and the data is obtained from Bureau of Meteorology as scientific data and we then use that data to make an allowance through a series of mathematical calculations. Committee member states that the information provided scientifically sounds correct, but points out that local knowledge can prove that information is not right. More rainfall information needs to be sourced. Santos asks committee if they know of other sources other than BOM they could check? Committee member

Provide more data of the calculations that happen from the data.

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suggests long term farming families might have records. The committee suggest a local family from Westport that may have historical rainfall records that they could compare with.

Committee member asks what is the base value for the SRB? Second committee member explains that there is no acceptable level of Australian Drinking Standards for SRB. Santos reiterates that bacteria specialists would possibly be best to speak about Sulphate reducing bacteria. A second committee members asks why don't people like SRB and what does it do? Santos replies that it is smelly and it can be corrosive to metal. Committee members ask how do you treat SRB? Santos responds that it can be treated with a chloride dosage. Action to get an independent specialist to present on SRB.

Committee Member asks what protection will be on the outside of dam walls to protect from erosion? And also with the spillway area do you have double bunting to catch any spills? Santos responds once the water is spilling it will spill there is nothing to catch it once it has passed the spillway. Spillways are designed to protect the dam from catastrophic failure, so it will spill in preference to the whole dam being destroyed and breaking. Committee member suggests that Santos should take on recommendations to incorporate a spillway that will catch a spill if it occurs to avoid similar problems to what they have had a Bibblewindi. Santos explains that around the dam perimeter there is a sedimentation collection trench, which is unlined. Committee member suggests that it should be lined.

Committee member asks about the re-injection of water back into the aquifers so you have to balance that water out some how and is that cost effective? Santos replies yes we do, it is essentially just adding some calcium, the water you put in has to match the water it is going into or at least be able to interact in a positive way.

A committee member asks does the sun have any effect on the storage? Santos explains that you get evaporation and heat transferring to the liner; the liner

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chemistry has carbon added to it, to make it durable for a lifetime in the sun.

Committee member asks how are elements removed in your water treatment processes? Are they naturally occurring in the water we drink? Santos responds that some elements like Beryllium are associated with coal deposits. The Reverse Osmosis membranes remove most of these elements.

Action for Santos to give committee removal rates of membranes during the reverse osmosis process and compare this to different water guidelines so that committee is comfortable with that process.

A committee member asks how many coal seams would be filling up 300 ML? Santos explains that the peak production that they have modelled from the reservoir engineering of water production rates is about 1.4ML, the volume sizing is based on the evaporative balance to the ponds prior to a water treatment starting and managing that level. Committee Member asks if the Leewood site is set up only for pilot productions? Santos responds that it is for pilot. Committee member asks if Santos is going to build another facility down the track once they go into full production. Santos responds that Leewood was only for the Pilot Productions already in use, including the treatment of already stored produced water and concentrate, less those to be decommissioned, as well as Dewhurst 8 when water and gas piping is connected, and for the 7 new pilots planed under the current program. A total of 11 Pilot Facilities. Leewood is not sized for any more

Committee Member states that any mining of a sodium product comes under the mining act it doesn't come under the Exploration Petroleum Act, so has Santos looked at obtaining a mining licence under the mining act? Santos responds that they are unsure and will follow up, but all of the work around this area is still in research stages.

Action for Santos to follow up to see if they are obtaining a mining licence under the mining act.

Chair asks question on behalf of absent committee member, Does Santos have a water management strategy? Santos responds yes they do. It is actually what they call a production water management plan, it is a broad plan, keeping in mind that they are still collecting water data, but it talks about Leewood plant and the other

Action for Santos to provide committee with a copy of Water Management Strategy.

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options, but states that these are options that require further investigation.

Committee member asks has soil-testing baseline being done at Leewood? Santos responds yes. Committee member requests copies of that testing. Santos explains that they are undertaking an agricultural assessment of the suitability of soils for water use, this report will be available in about February next year. "Committee member asks for soil-testing at Leewood, including full soil profile and Bacteria as a Baseline establishment for the future and that this testing be carried out regular (less than 12 monthly) the results be made public".

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.

Committee member asks how much water comes out of a well per day? Santos explains that it varies dramatically for where it is? Roughly about 2000 barrels at 159 litres per barrel.

Comment [DR1]: To be confirmed in the new year

**3. Santos' land compensation agreement**  
Mark Rodgers

Mark Rodgers introduces himself and provides committee with an overview of the land compensation agreement. *(See appendix 3. for full presentation)*

**Questions:**

Committee comments that the partnerships brochure is hard to understand. They are concerned about the land rate notice not representing the true land value. Santos agrees that it doesn't. The problem is that land value and production rate is a very variable figure, so to establish a fair value the land rate notice was used. In the big picture of the compensation that value is miniscule in comparison to the overall compensation. Service agreement that is entered into.

Committee member asks what legal obligations is the landholder taking on to obtain his annual \$30,000? Santos explains the obligations are an observation role, checking the area to make sure everything is ok, like weeds, infrastructure etc.

Committee member comments that infrastructure like roads can have a large impact on farming land. Santos agrees and explains that they aim to work with the landholder to come up with a solution to cause minimum impact to the area. Then

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are the end of the duration of their work on the site Santos has a commitment to rehabilitate the site to the landholders wishes. Sometime the infrastructure that has been built may end up being beneficial for the landholder in this case instead of removing the infrastructure we might extended it to make it a long term benefit for the landholder.

Committee member asks if once a site like a core hole is abandoned and rehabilitated will you every come back and use that site again? Santos responds that they would not, because a core hole is different from a production hole. A core hole is just to determine what is there. It could be on the same property but not the exact position.

Committee member uses as example of if a farmer has agrees to a core hole on their property, if the core hole is only there for six weeks do they receive the full \$30,000 from Santos? Santos responds that they will, the landholder gets the first year rate of \$30 000 irrespective of the time they are there. Committee member clarifies is there any legal liability on the landholder in return for that \$30,000. Santos explains that there is no legal liability, their only role is to be vigilant and keep an eye on the site and report any problems.

Committee member asks is the money paid per wellhead or per set? Santos explains that it is paid per project (operation) committee member asks if Santos comes onto a property that doesn't have cleared land, when they go to rehabilitate the land back, what is stopping the farmer from telling Santos that this land was always cleared to keep it cleared for their own purposes. What does Santos use as the benchmark for rehabilitation? Santos explains that we would return the land back to the requirement of the farmer, however we would always take environmental impacts into consideration, we are guided by the REF as well as the landholder. There is also a responsibility on the landholder to be truthful.

Committee member asks does the agreement force confidentiality? Santos responds that it does not, it is in the contract but it is not enforced if the landholder doesn't want it in the contract.



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Committee member asks as part of the signing of the compensation agreement, does Santos look into the impact of the contract on farmers insurance? Santos replies that yes they do, everything that is done on the landholders land is totally the responsibility of Santos. There is no deterrent to the landholder.

Committee member asks what happens if Santos starts drilling and they are lowering the aquifer and some bodies bore next door drops 30 foot? Santos responds that they have an obligation to make good. Committee member questions how do the neighbours prove that so that Santos will make good? Santos responds that they are currently working at the moment and installing deep aquifer monitoring systems to prove that they are not impacting on the water. Committee member asks how close are the monitoring wells to the actual wells? The monitoring wells will be able to supply us with data if there are any changes or effects on the aquifers. Santos presenter suggests that a specialist in this area would be better to explain these details.

Action Santos suggests that a specialist may be able to answer future questions on aquifer monitoring research that is being conducted.

Committee member asks about the monitoring of the ground water and the impact of the drilling and would like to see this information in a clear plan, to explain exactly what Santos is doing. Committee would also like to know what sort of a plan / commitments are based on the results from the monitoring. (If Santos was to see a pressure change in the aquifer or effects what are the actions that Santos is committed to?) Santos responds that if there is a change in those pressures work will stop immediately until they can find out what is causing the changes.

Action: Santos to provide evaluation and commitment plan (Evaluation of water (full water analysis including bacteria but also escaped gases etc)

Committee member would like to come back to the compensation and partnerships brochure and make Santos realise that the brochures is unclear and would like Santos to consider committee members comments and change the brochure to make it clearer. Santos explains that those comments have been taken into consideration and they have outlined points further in the presentation for committee consideration.

Action on committee to read the presentation and see if they are happy with the changes.

Committee member questions Santos, that the information states that a production

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well has a average life of 20 to 30 years, what production wells are these because current wells are running out in approximately 7 years so therefore Santos is misrepresenting to landholders who envisage that they will be receiving the long term compensation benefits of this timeframe. Santos replies that Santos hasn't been operating for that long in the area that so they are not up to this timeframe yet.

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### 5. General Business

#### Site trips feedback from committee members that attended.

- Refreshing to see the rehabilitation that Santos is undertaking.
- They have a long way to go because the area doesn't rehabilitate easily.
- Committee member thought that the information the tour provided was good, but he was disappointed to see changes to the area since the tour. Santos has begun to dig out the entire area between dam no.1 and the RO plant, store it on a lined facility, the soil was black from the tar like deposits, the soil is sterile. Santos told committee on that tour that they could clean up with gypsum and other methods, why is that soil completely dug up in that area for removal? Santos responds that this soil is not classified as contaminated and soil and will be used for the bunding area of the tanks that will be built on the site. Santos disagrees that the soil is oozing black tar and suggests getting confirmation of why the soil has only been dug up from the spill site only.

Action: to get Doug from Santos to come to meeting to speak on soil from contaminated site ( Biblewindi treatment facility, the are between pond2 and old RO plant)

**Media:** Media release was distributed and ABC New England North West interviewed Chair, to give listeners an understanding on what the committee had seen over the site tour.

#### Feedback to the chair – How can the chair improve the meetings?

##### Committee feedback

- To be able to ask all questions.
- Suggestion for slides to be reduced in size.

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- Committee members should bring proof to meetings when there is contention.
- Not learning what is going on, because some committee members have a greater knowledge and it is hard to keep up with technical conversations.
- Meetings should be kept to timeframes. 2.5 hours maximum.
- The meetings need to move forward from what ESG has done and focus on Santos operations.
- Don't dwell on things. Stop discussing the same issues every meeting. Move forward.
- Committee needs to be clear on their scope of work. Have some direction and a goal / focus.

**Other Business:**

- Santos explains that at Dewhurst a rig is arriving in the next week, in the new year the committee may be able to get an opportunity to see a drill rig in action.
- Committee member asks Santos about a fire that has occurred since last Saturday, what has happened? Santos replies that it was a small fire from lightning.
- Committee would still like to see a presentation on drilling.

Next meeting Tuesday the 12<sup>th</sup> of February 2013

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**Meeting Closed:** 8.20pm

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**Attachment 1. Actions**

<b>Action Raised</b>	<b>Date Raised</b>	<b>Progress Made</b>
Chair to obtain list of the committee members questions that could not be answered by Santos representative and get Santos to respond to them.	11 <sup>th</sup> September	In Progress
Santos to organise a driller to present at future meeting	11 <sup>th</sup> September	In progress
Organise an expert to respond to questions about Sulpha Bacteria, organise independent ex CSIRO Hydro geochemist to present at future meeting.	9 <sup>th</sup> October	Ongoing – Glenn Toogood
Santos to provide response to questions on Namoi Water Study	9 <sup>th</sup> October	Ongoing – Glenn Toogood
Santos to find out for Peter whom the most senior executive at community meetings when ESG staff retention was discussed before Santos take over.	14 <sup>th</sup> November	On going – this information will be discussed with John Tough
Santos to take that suggestion on board and make relevant people aware that the maps need to be more detailed.	11 <sup>th</sup> December	
Santos to provide more data of the calculations that happen from rainfall data	11 <sup>th</sup> December	
Santos to give committee removal rates of membranes during the reverse osmosis process and compare this to different water guidelines so that committee is comfortable with the process.	11 <sup>th</sup> December	
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	
Santos to provide committee with a copy of Water Management Strategy.	11th December	
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	
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	
Doug from Santos to come to meeting to speak on soil removal from contaminated site	11th December	

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(Biblewindi treatment facility)		
Santos to provide full bacterial analysis of 3 dams at Biblewindi.	11th December	

**Appendix 1: Water Analysis Results**

**Appendix 2: Presentation Overview of Leewood**

**Appendix 3: Presentation Land Compensation Agreements.**

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Environmental Division

## CERTIFICATE OF ANALYSIS

<p><b>Work Order</b> : <b>ES1224627</b></p> <p><b>Client</b> : <b>SANTOS LTD</b></p> <p><b>Contact</b> :</p> <p><b>Address</b> :</p> <p><b>E-mail</b> :</p> <p><b>Telephone</b> :</p> <p><b>Facsimile</b> : ---</p> <p><b>Project</b> : ENV FIELD OPERATIONS NARRABRI FIELD OPERATIONS</p> <p><b>Order number</b> : 879002-793</p> <p><b>C-O-C number</b> : ---</p> <p><b>Sampler</b> : JG,CR</p> <p><b>Site</b> : DEWHURST 879002-793</p> <p><b>Quote number</b> : BN/107/11 V5</p>	<p><b>Page</b> : 1 of 3</p> <p><b>Laboratory</b> : Environmental Division Sydney</p> <p><b>Contact</b> :</p> <p><b>Address</b> : 277-289 Woodpark Road Smithfield NSW Australia 2164</p> <p><b>E-mail</b> :</p> <p><b>Telephone</b> :</p> <p><b>Facsimile</b> :</p> <p><b>QC Level</b> : NEPM 1999 Schedule B(3) and ALS QCS3 requirement</p> <p><b>Date Samples Received</b> : 16-OCT-2012</p> <p><b>Issue Date</b> : 09-NOV-2012</p> <p><b>No. of samples received</b> : 1</p> <p><b>No. of samples analysed</b> : 1</p>
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This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results



NATA Accredited Laboratory 825  
 Accredited for compliance with  
 ISO/IEC 17025.

### *Signatories*

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Jacob Waugh	Laboratory Coordinator	WRG Subcontracting
Kim Phan	Sample Receipt Clerk	Sydney Sampling
Sarah Axisa	Microbiologist	Sydney Microbiology



## General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

- **Field Observations and Measurements submitted to the laboratory by external samplers and appearing in this report are not covered by ALS' NATA Accreditation.**
- **Microbiological Comment: HPC results are reported as approximate (~) when the count of colonies on the plate is outside the range of 10 - 300cfu, in accordance with ALS work instruction QWI-MIC/MW002. It may be informative to record this fact.**
- **Microbiological Comment: Membrane filtration results are reported as approximate (~) due to the growth of bacteria on the filter membrane being counted <10cfu and/or >100cfu. It may be informative to record this fact.**
- **MW002 is ALS's internal code and is equivalent to AS4276.3.1.**
- **MW006 is ALS's internal code and is equivalent to AS4276.7.**
- **Subcontracted analysis reported in this work order is conducted by Baseline. Baseline does not hold NATA Accreditation for these parameters.**
- **Subcontracted analysis reported in this work order is conducted by Environmental Isotopes. Environmental Isotopes does not hold NATA Accreditation for these parameters.**
- **Subcontracted analysis reported in this work order is conducted by QHSS Forensic & Scientific Services. QHSS Forensic & Scientific Services does not hold NATA Accreditation for these parameters.**
- **Subcontracted analysis reported in this work order is conducted by Soil Conservation Service. Soil Conservation Service does not hold NATA Accreditation for these parameters.**



## Analytical Results

Sub-Matrix: WATER

Client sample ID

NAR\_DWHPD1\_DAM\_  
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Client sampling date / time

15-OCT-2012 15:20

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Compound	CAS Number	LOR	Unit	ES1224627-001	----	----	----	----
<b>EN67: Field Tests</b>								
Electrical Conductivity (Non Compensated)	----	1	µS/cm	3586	----	----	----	----
pH	----	0.01	pH Unit	8.28	----	----	----	----
Redox Potential	----	0.1	mV	97.2	----	----	----	----
Temperature	----	0.1	°C	25.3	----	----	----	----
Field Dissolved Oxygen	----	0.1	mg/L	7.47	----	----	----	----
<b>MM654: Sulphate Reducing Bacteria by MPN</b>								
Sulphate Reducing Bacteria	----	3	orgs/mL	460	----	----	----	----
<b>MW002: Heterotrophic Plate Count</b>								
Heterotrophic Plate Count (22°C)	----	1	CFU/mL	1300	----	----	----	----
Heterotrophic Plate Count (36°C)	----	1	CFU/mL	~4800	----	----	----	----
<b>MW006: Faecal Coliforms &amp; E.coli by MF</b>								
Faecal Coliforms	----	1	CFU/100mL	~18	----	----	----	----



Environmental Division

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<p><b>Work Order</b> : <b>ES1224625</b></p> <p><b>Client</b> : <b>SANTOS LTD</b></p> <p><b>Contact</b> :</p> <p><b>Address</b> :</p> <p><b>E-mail</b> :</p> <p><b>Telephone</b> :</p> <p><b>Facsimile</b> : ----</p> <p><b>Project</b> : ENV FIELD OPERATIONS NARRABRI FIELD OPERATIONS</p> <p><b>Order number</b> : 879002-793</p> <p><b>C-O-C number</b> : ----</p> <p><b>Sampler</b> : JG,CR</p> <p><b>Site</b> : BIBBLEWINDI WTF 879002-793</p> <p><b>Quote number</b> : BN/107/11 V5</p>	<p><b>Page</b> : 1 of 3</p> <p><b>Laboratory</b> : Environmental Division Sydney</p> <p><b>Contact</b> :</p> <p><b>Address</b> : 277-289 Woodpark Road Smithfield NSW Australia 2164</p> <p><b>E-mail</b> :</p> <p><b>Telephone</b> :</p> <p><b>Facsimile</b> :</p> <p><b>QC Level</b> : NEPM 1999 Schedule B(3) and ALS QCS3 requirement</p> <p><b>Date Samples Received</b> : 16-OCT-2012</p> <p><b>Issue Date</b> : 09-NOV-2012</p> <p><b>No. of samples received</b> : 3</p> <p><b>No. of samples analysed</b> : 3</p>
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Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

- **Field Observations and Measurements submitted to the laboratory by external samplers and appearing in this report are not covered by ALS' NATA Accreditation.**
- **Microbiological Comment: HPC results are reported as approximate (~) when the count of colonies on the plate is outside the range of 10 - 300cfu, in accordance with ALS work instruction QWI-MIC/MW002. It may be informative to record this fact.**
- **Microbiological Comment: According to ALS work instruction for membrane filtration, the suggested volume for filtration of non treated / non-drinking water starts from 50mL if the sample is turbid. A result of <2cfu/100mL is reported when there is no target organism growth from a volume of 50mL. It may be informative to record this fact.**
- **MW002 is ALS's internal code and is equivalent to AS4276.3.1.**
- **MW006 is ALS's internal code and is equivalent to AS4276.7.**
- **Subcontracted analysis reported in this work order is conducted by Baseline. Baseline does not hold NATA Accreditation for these parameters.**
- **Subcontracted analysis reported in this work order is conducted by Environmental Isotopes. Environmental Isotopes does not hold NATA Accreditation for these parameters.**
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## Analytical Results

Sub-Matrix: WATER

Client sample ID

Client sampling date / time

				NAR_BWDPD3_DAM_ W	NAR_BWDPD2_DAM_ W	NAR_BWDPD1_DAM_ W	----	----
				15-OCT-2012 11:30	15-OCT-2012 12:30	15-OCT-2012 13:15	----	----
Compound	CAS Number	LOR	Unit	ES1224625-001	ES1224625-002	ES1224625-003	----	----
<b>EN67: Field Tests</b>								
Electrical Conductivity (Non Compensated)	----	1	µS/cm	36795	14695	25658	----	----
pH	----	0.01	pH Unit	9.56	9.50	9.37	----	----
Redox Potential	----	0.1	mV	91.2	89.9	101.6	----	----
Temperature	----	0.1	°C	21.0	18.8	22.2	----	----
Field Dissolved Oxygen	----	0.1	mg/L	9.49	11.45	5.50	----	----
<b>MM654: Sulphate Reducing Bacteria by MPN</b>								
Sulphate Reducing Bacteria	----	3	orgs/mL	150	23	>1100	----	----
<b>MW002: Heterotrophic Plate Count</b>								
Heterotrophic Plate Count (22°C)	----	1	CFU/mL	~4300	~3000	~3600	----	----
Heterotrophic Plate Count (36°C)	----	1	CFU/mL	~7500	~4900	~8300	----	----
<b>MW006: Faecal Coliforms &amp; E.coli by MF</b>								
Faecal Coliforms	----	1	CFU/100mL	<2	<2	<2	----	----

Environmental Division

## CERTIFICATE OF ANALYSIS

<p><b>Work Order</b> : ES1224623</p> <p><b>Client</b> : SANTOS LTD</p> <p><b>Contact</b> :</p> <p><b>Address</b> :</p> <p><b>E-mail</b> :</p> <p><b>Telephone</b> :</p> <p><b>Facsimile</b> : ---</p> <p><b>Project</b> : ENV FIELD OPERATION NARRABRI FIELD OPERATION</p> <p><b>Order number</b> : 879002-793</p> <p><b>C-O-C number</b> : ---</p> <p><b>Sampler</b> : JG,CR</p> <p><b>Site</b> : BIBBLEWINDI WTF 879002-793</p> <p><b>Quote number</b> : BN/107/11 V5</p>	<p><b>Page</b> : 1 of 9</p> <p><b>Laboratory</b> : Environmental Division Sydney</p> <p><b>Contact</b> :</p> <p><b>Address</b> : 277-289 Woodpark Road Smithfield NSW Australia 2164</p> <p><b>E-mail</b> :</p> <p><b>Telephone</b> :</p> <p><b>Facsimile</b> :</p> <p><b>QC Level</b> : NEPM 1999 Schedule B(3) and ALS QCS3 requirement</p> <p><b>Date Samples Received</b> : 16-OCT-2012</p> <p><b>Issue Date</b> : 22-OCT-2012</p> <p><b>No. of samples received</b> : 4</p> <p><b>No. of samples analysed</b> : 4</p>
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This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits



NATA Accredited Laboratory 825

Accredited for compliance with  
ISO/IEC 17025.

### Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Ankit Joshi	Inorganic Chemist	Sydney Inorganics
Ashesh Patel	Inorganic Chemist	Sydney Inorganics
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics
Kim Phan	Sample Receipt Clerk	Sydney Sampling
Pabi Subba	Senior Organic Chemist	Sydney Organics
Sarah Millington	Senior Inorganic Chemist	Sydney Inorganics



## General Comments

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LOR = Limit of reporting

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- **EG020: It has been confirmed by re-digestion and re-analysis that total concentrations for some elements are less than dissolved for all samples.**
- **EG020A: Samples were diluted and reanalysed due to matrix interference (High TDS). LORs have been raised accordingly.**
- **EK055G: LOR raised for Ammonia due to sample matrix.**
- **EK059G/EK057G: LOR raised for NOx & Nitrite analysis on sample ID (NAR\_BWDPD2\_DAM\_W) due to sample matrix.**
- **EK071G: LOR raised for Reactive P analysis on sample ID(NAR\_BWDPD3\_DAM\_W, NAR\_BWDPD3\_DAM\_W and NAR\_BWDPD2\_DAM\_W) due to sample matrix.**
- **EN055 - PG: Ionic Balance out of acceptable limits for sample ID 'NAR\_BWDPD1\_DAM\_W' due to analytes not quantified in this report.**
- **EP002/EP005: Inorganic Carbon concentration for all of the samples in this work order is sufficiently high in order for Non-purgeable Organic Carbon to be determined.**
- **EP002: It has been noted that DOC is greater than TOC for sample ID 'NAR\_BWDPD3\_DAM\_W', however, this difference is within the limits of experimental variation.**
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## Analytical Results

Sub-Matrix: WATER

Client sample ID

Client sampling date / time

				NAR_BWDPD3_DAM_ W	NAR_BWDPD3_DAM_ W	NAR_BWDPD2_DAM_ W	NAR_BWDPD1_DAM_ W	----
				14-OCT-2012 16:50	15-OCT-2012 10:30	15-OCT-2012 11:30	15-OCT-2012 12:15	----
Compound	CAS Number	LOR	Unit	ES1224623-001	ES1224623-002	ES1224623-003	ES1224623-004	----
<b>EA005P: pH by PC Titrator</b>								
pH Value	----	0.01	pH Unit	9.68	9.66	9.57	9.46	----
<b>EA006: Sodium Adsorption Ratio (SAR)</b>								
Sodium Adsorption Ratio	----	0.01	-	926	911	378	375	----
<b>EA010P: Conductivity by PC Titrator</b>								
Electrical Conductivity @ 25°C	----	1	µS/cm	40800	40600	17000	27500	----
<b>EA015: Total Dissolved Solids</b>								
Total Dissolved Solids @180°C	GIS-210-010	10	mg/L	30200	31800	11200	20800	----
<b>EA025: Suspended Solids</b>								
Suspended Solids (SS)	----	5	mg/L	24	30	12	10	----
<b>EA045: Turbidity</b>								
Turbidity	----	0.1	NTU	36.7	42.1	33.4	26.6	----
<b>EA071: Langeliers Index</b>								
Langelier Index	----	0.10	-	3.08	3.11	2.34	2.86	----
<b>EA161: Residual Alkali</b>								
Residual Alkali	----	0.01	meq/L	459	457	118	305	----
<b>ED037P: Alkalinity by PC Titrator</b>								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	13500	13600	3270	7450	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	9500	9340	3400	7870	----
Total Alkalinity as CaCO3	----	1	mg/L	23000	23000	6670	15300	----
<b>ED041G: Sulfate (Turbidimetric) as SO4 2- by DA</b>								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2470	2560	482	431	----
<b>ED045G: Chloride Discrete analyser</b>								
Chloride	16887-00-6	1	mg/L	5530	5580	2950	1580	----
<b>ED093F: Dissolved Major Cations</b>								
Calcium	7440-70-2	1	mg/L	4	4	3	5	----
Magnesium	7439-95-4	1	mg/L	8	8	6	8	----
Sodium	7440-23-5	1	mg/L	13700	13800	4810	5770	----
Potassium	7440-09-7	1	mg/L	1200	1100	1110	192	----
<b>EG020F: Dissolved Metals by ICP-MS</b>								
Aluminium	7429-90-5	0.01	mg/L	<0.10	<0.10	<0.10	<0.10	----
Arsenic	7440-38-2	0.001	mg/L	<0.010	<0.010	<0.010	<0.010	----
Beryllium	7440-41-7	0.001	mg/L	<0.010	<0.010	<0.010	<0.010	----
Barium	7440-39-3	0.001	mg/L	3.35	5.15	4.62	11.7	----



## Analytical Results

Sub-Matrix: WATER

Client sample ID

Client sampling date / time

				NAR_BWDPD3_DAM_ W	NAR_BWDPD3_DAM_ W	NAR_BWDPD2_DAM_ W	NAR_BWDPD1_DAM_ W	----
				14-OCT-2012 16:50	15-OCT-2012 10:30	15-OCT-2012 11:30	15-OCT-2012 12:15	----
Compound	CAS Number	LOR	Unit	ES1224623-001	ES1224623-002	ES1224623-003	ES1224623-004	----
<b>EG020F: Dissolved Metals by ICP-MS - Continued</b>								
Cadmium	7440-43-9	0.0001	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	----
Chromium	7440-47-3	0.001	mg/L	<0.010	<0.010	<0.010	<0.010	----
Cobalt	7440-48-4	0.001	mg/L	<0.010	<0.010	<0.010	<0.010	----
Copper	7440-50-8	0.001	mg/L	<0.010	<0.010	<0.010	<0.010	----
Lead	7439-92-1	0.001	mg/L	<0.010	<0.010	<0.010	<0.010	----
Lithium	7439-93-2	0.001	mg/L	11.8	12.1	1.24	3.66	----
Manganese	7439-96-5	0.001	mg/L	0.014	0.015	0.011	0.042	----
Molybdenum	7439-98-7	0.001	mg/L	0.026	0.028	0.018	<0.010	----
Nickel	7440-02-0	0.001	mg/L	<0.010	<0.010	<0.010	<0.010	----
Selenium	7782-49-2	0.01	mg/L	<0.10	<0.10	<0.10	<0.10	----
Silver	7440-22-4	0.001	mg/L	<0.010	<0.010	<0.010	<0.010	----
Strontium	7440-24-6	0.001	mg/L	0.800	1.31	1.02	2.23	----
Tin	7440-31-5	0.001	mg/L	<0.010	<0.010	<0.010	<0.010	----
Uranium	7440-61-1	0.001	mg/L	<0.010	<0.010	<0.010	<0.010	----
Vanadium	7440-62-2	0.01	mg/L	<0.10	<0.10	<0.10	<0.10	----
Zinc	7440-66-6	0.005	mg/L	<0.050	<0.050	<0.050	<0.050	----
Boron	7440-42-8	0.05	mg/L	4.56	4.55	0.65	1.22	----
Iron	7439-89-6	0.05	mg/L	<0.50	<0.50	<0.50	<0.50	----
<b>EG020T: Total Metals by ICP-MS</b>								
Aluminium	7429-90-5	0.01	mg/L	<0.10	<0.10	<0.10	1.21	----
Arsenic	7440-38-2	0.001	mg/L	<0.010	<0.010	<0.010	<0.010	----
Beryllium	7440-41-7	0.001	mg/L	<0.010	<0.010	<0.010	<0.010	----
Barium	7440-39-3	0.001	mg/L	11.0	11.5	6.12	11.8	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	----
Chromium	7440-47-3	0.001	mg/L	<0.010	<0.010	<0.010	<0.010	----
Cobalt	7440-48-4	0.001	mg/L	<0.010	<0.010	<0.010	<0.010	----
Copper	7440-50-8	0.001	mg/L	<0.010	<0.010	<0.010	<0.010	----
Lead	7439-92-1	0.001	mg/L	<0.010	<0.010	<0.010	<0.010	----
Lithium	7439-93-2	0.001	mg/L	9.34	9.18	1.22	3.78	----
Manganese	7439-96-5	0.001	mg/L	0.012	0.010	<0.010	0.042	----
Molybdenum	7439-98-7	0.001	mg/L	0.016	0.016	0.016	<0.010	----
Nickel	7440-02-0	0.001	mg/L	<0.010	<0.010	<0.010	<0.010	----
Selenium	7782-49-2	0.01	mg/L	<0.10	<0.10	<0.10	<0.10	----
Silver	7440-22-4	0.001	mg/L	<0.010	<0.010	<0.010	<0.010	----
Strontium	7440-24-6	0.001	mg/L	1.95	1.99	1.02	2.36	----



## Analytical Results

Sub-Matrix: WATER

Client sample ID

Client sampling date / time

				NAR_BWDPD3_DAM_ W	NAR_BWDPD3_DAM_ W	NAR_BWDPD2_DAM_ W	NAR_BWDPD1_DAM_ W	----
				14-OCT-2012 16:50	15-OCT-2012 10:30	15-OCT-2012 11:30	15-OCT-2012 12:15	----
Compound	CAS Number	LOR	Unit	ES1224623-001	ES1224623-002	ES1224623-003	ES1224623-004	----
<b>EG020T: Total Metals by ICP-MS - Continued</b>								
Tin	7440-31-5	0.001	mg/L	<0.010	<0.010	<0.010	<0.010	----
Uranium	7440-61-1	0.001	mg/L	<0.010	<0.010	<0.010	<0.010	----
Vanadium	7440-62-2	0.01	mg/L	<0.10	<0.10	<0.10	<0.10	----
Zinc	7440-66-6	0.005	mg/L	<0.052	<b>0.066</b>	<0.052	<0.052	----
Boron	7440-42-8	0.05	mg/L	<b>3.45</b>	<b>3.50</b>	<b>0.47</b>	<b>1.09</b>	----
Iron	7439-89-6	0.05	mg/L	<0.52	<0.52	<0.52	<b>0.88</b>	----
<b>EG035F: Dissolved Mercury by FIMS</b>								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	----
<b>EG035T: Total Recoverable Mercury by FIMS</b>								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	----
<b>EG052F: Dissolved Silica by ICPAES</b>								
Silica	7631-86-9	0.1	mg/L	<b>43.1</b>	<b>46.3</b>	<b>14.2</b>	<b>30.2</b>	----
<b>EK026SF: Total CN by Segmented Flow Analyser</b>								
Total Cyanide	57-12-5	0.004	mg/L	----	<0.004	<0.004	<0.004	----
<b>EK040P: Fluoride by PC Titrator</b>								
Fluoride	16984-48-8	0.1	mg/L	<b>12.8</b>	<b>12.9</b>	<b>4.4</b>	<b>11.4</b>	----
<b>EK055G: Ammonia as N by Discrete Analyser</b>								
Ammonia as N	7664-41-7	0.01	mg/L	<0.10	<0.10	<0.10	<0.10	----
<b>EK057G: Nitrite as N by Discrete Analyser</b>								
Nitrite as N	----	0.01	mg/L	<0.01	<b>0.02</b>	<0.10	<0.01	----
<b>EK058G: Nitrate as N by Discrete Analyser</b>								
Nitrate as N	14797-55-8	0.01	mg/L	<b>0.20</b>	<0.01	<0.10	<0.01	----
<b>EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser</b>								
Nitrite + Nitrate as N	----	0.01	mg/L	<b>0.20</b>	<b>0.02</b>	<0.10	<0.01	----
<b>EK061G: Total Kjeldahl Nitrogen By Discrete Analyser</b>								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<b>4.5</b>	<b>6.2</b>	<b>5.6</b>	<b>9.8</b>	----
<b>EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser</b>								
Total Nitrogen as N	----	0.1	mg/L	<b>4.7</b>	<b>6.2</b>	<b>5.6</b>	<b>9.8</b>	----
<b>EK067G: Total Phosphorus as P by Discrete Analyser</b>								
Total Phosphorus as P	----	0.01	mg/L	<b>1.34</b>	<b>1.62</b>	<b>0.82</b>	<b>1.87</b>	----
<b>EK071G: Reactive Phosphorus as P by discrete analyser</b>								
Reactive Phosphorus as P	----	0.01	mg/L	<0.10	<0.10	<0.10	<b>1.63</b>	----
<b>EN055: Ionic Balance</b>								
Total Anions	----	0.01	meq/L	<b>667</b>	<b>670</b>	<b>226</b>	<b>359</b>	----





## Analytical Results

Sub-Matrix: WATER

Client sample ID

				NAR_BWDPD3_DAM_ W	NAR_BWDPD3_DAM_ W	NAR_BWDPD2_DAM_ W	NAR_BWDPD1_DAM_ W	----	
				14-OCT-2012 16:50	15-OCT-2012 10:30	15-OCT-2012 11:30	15-OCT-2012 12:15	----	
				ES1224623-001	ES1224623-002	ES1224623-003	ES1224623-004	----	
Compound	CAS Number	LOR	Unit						
<b>EN055: Ionic Balance - Continued</b>									
Total Cations	----	0.01	meq/L	627	629	238	257	----	
Ionic Balance	----	0.01	%	3.10	3.21	2.49	16.7	----	
<b>EN67: Field Tests</b>									
Electrical Conductivity (Non Compensated)	----	1	µS/cm	36856	36795	14695	25658	----	
pH	----	0.01	pH Unit	9.53	9.56	9.50	9.37	----	
Redox Potential	----	0.1	mV	61.3	91.2	89.9	101.6	----	
Temperature	----	0.1	°C	21.2	21.0	18.8	22.2	----	
Field Dissolved Oxygen	----	0.1	mg/L	13.3	9.49	11.45	5.50	----	
<b>EP002: Dissolved Organic Carbon (DOC)</b>									
Nonpurgeable Dissolved Organic Carbon	----	1	mg/L	52	55	43	43	----	
<b>EP005: Total Organic Carbon (TOC)</b>									
Nonpurgeable Organic Carbon	----	1	mg/L	50	63	44	43	----	
<b>EP025: Oxygen - Dissolved (DO)</b>									
Dissolved Oxygen	----	0.1	mg/L	11.4	11.8	12.0	5.3	----	
<b>EP030: Biochemical Oxygen Demand (BOD)</b>									
Biochemical Oxygen Demand	----	2	mg/L	16	20	12	13	----	
<b>EP066: Polychlorinated Biphenyls (PCB)</b>									
Aroclor 1016	12674-11-2	1	µg/L	<1	<1	<1	<1	----	
Aroclor 1221	11104-28-2	1	µg/L	<1	<1	<1	<1	----	
Aroclor 1232	11141-16-5	1	µg/L	<1	<1	<1	<1	----	
Aroclor 1242	53469-21-9	1	µg/L	<1	<1	<1	<1	----	
Aroclor 1248	12672-29-6	1	µg/L	<1	<1	<1	<1	----	
Aroclor 1254	11097-69-1	1	µg/L	<1	<1	<1	<1	----	
Aroclor 1260	11096-82-5	1	µg/L	<1	<1	<1	<1	----	
Aroclor 1262	37324-23-5	1	µg/L	<1	<1	<1	<1	----	
Total Polychlorinated biphenyls	----	1	µg/L	<1	<1	<1	<1	----	
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons</b>									
Naphthalene	91-20-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Acenaphthylene	208-96-8	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Acenaphthene	83-32-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Fluorene	86-73-7	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Phenanthrene	85-01-8	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Anthracene	120-12-7	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	
Fluoranthene	206-44-0	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----	



## Analytical Results

Sub-Matrix: WATER

Client sample ID

Client sampling date / time

				NAR_BWDPD3_DAM_ W	NAR_BWDPD3_DAM_ W	NAR_BWDPD2_DAM_ W	NAR_BWDPD1_DAM_ W	----
				14-OCT-2012 16:50	15-OCT-2012 10:30	15-OCT-2012 11:30	15-OCT-2012 12:15	----
Compound	CAS Number	LOR	Unit	ES1224623-001	ES1224623-002	ES1224623-003	ES1224623-004	----
<b>EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued</b>								
Pyrene	129-00-0	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----
Benz(a)anthracene	56-55-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----
Chrysene	218-01-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----
Benzo(b)fluoranthene	205-99-2	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----
Dibenz(a,h)anthracene	53-70-3	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----
Benzo(g,h,i)perylene	191-24-2	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	----
<b>EP080/071: Total Petroleum Hydrocarbons</b>								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	----
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	<50	----
C15 - C28 Fraction	----	100	µg/L	<100	<100	<100	<100	----
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	<50	<50	----
<b>EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft</b>								
C6 - C10 Fraction	----	20	µg/L	<20	<20	<20	<20	----
^ C6 - C10 Fraction minus BTEX (F1)	----	20	µg/L	<20	<20	<20	<20	----
>C10 - C16 Fraction	----	100	µg/L	<100	<100	<100	<100	----
>C16 - C34 Fraction	----	100	µg/L	<100	<100	<100	<100	----
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	<100	<100	<100	----
<b>EP080: BTEXN</b>								
Benzene	71-43-2	1	µg/L	<1	<1	<1	<1	----
Toluene	108-88-3	2	µg/L	<2	<2	<2	<2	----
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	<2	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	<2	----
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	<2	----
^ Total Xylenes	1330-20-7	2	µg/L	<2	<2	<2	<2	----
^ Sum of BTEX	----	1	µg/L	<1	<1	<1	<1	----
<b>SAMP02: Observations (performed by external sampler)</b>								
Santos Suite	----	-	--	Suite F	Suite F	Suite F	Suite F	----
<b>EP066S: PCB Surrogate</b>								
Decachlorobiphenyl	2051-24-3	0.1	%	82.5	60.4	91.5	64.2	----



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				NAR_BWDPD3_DAM_ W	NAR_BWDPD3_DAM_ W	NAR_BWDPD2_DAM_ W	NAR_BWDPD1_DAM_ W	----
				14-OCT-2012 16:50	15-OCT-2012 10:30	15-OCT-2012 11:30	15-OCT-2012 12:15	----
Compound	CAS Number	LOR	Unit	ES1224623-001	ES1224623-002	ES1224623-003	ES1224623-004	----
<b>EP075(SIM)S: Phenolic Compound Surrogates</b>								
Phenol-d6	13127-88-3	0.1	%	16.9	21.2	16.3	26.4	----
2-Chlorophenol-D4	93951-73-6	0.1	%	32.8	42.0	33.2	46.0	----
2,4,6-Tribromophenol	118-79-6	0.1	%	43.3	51.4	34.1	57.9	----
<b>EP075(SIM)T: PAH Surrogates</b>								
2-Fluorobiphenyl	321-60-8	0.1	%	51.1	58.1	45.8	61.7	----
Anthracene-d10	1719-06-8	0.1	%	64.1	77.5	54.5	71.8	----
4-Terphenyl-d14	1718-51-0	0.1	%	65.8	76.0	53.7	70.3	----
<b>EP080S: TPH(V)/BTEX Surrogates</b>								
1,2-Dichloroethane-D4	17060-07-0	0.1	%	108	115	117	113	----
Toluene-D8	2037-26-5	0.1	%	101	96.1	93.1	96.4	----
4-Bromofluorobenzene	460-00-4	0.1	%	100	101	97.6	97.8	----



## Surrogate Control Limits

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
<b>EP066S: PCB Surrogate</b>			
Decachlorobiphenyl	2051-24-3	14.1	151.8
<b>EP075(SIM)S: Phenolic Compound Surrogates</b>			
Phenol-d6	13127-88-3	10.0	64.1
2-Chlorophenol-D4	93951-73-6	11.3	122.9
2,4,6-Tribromophenol	118-79-6	11.7	144.0
<b>EP075(SIM)T: PAH Surrogates</b>			
2-Fluorobiphenyl	321-60-8	19.9	122.8
Anthracene-d10	1719-06-8	23.3	125.8
4-Terphenyl-d14	1718-51-0	20.3	134.5
<b>EP080S: TPH(V)/BTEX Surrogates</b>			
1,2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128