

Santos Ltd
ABN 80 007 550 923
Santos Centre
Level 16, 40 Creek Street
Brisbane Queensland 4000
GPO Box 1010
Brisbane Queensland 4001
Telephone: 61 7 3838 3000
Direct: 61 7 3838 3435
www.santos.com

Santos
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Mr Chris Rudens
Principal Operations Officer
Office of Coal Seam Gas
NSW Trade and Investment
Level 3, 84 Crown Street
Wollongong NSW 2500

Delivery: via email

Dear Mr Rudens

Supplementary REF Recommencement of Tintsfeld Pilot and flare: additional information

I refer to the request for further information in relation to the Recommencement of Tintsfeld Pilot and flare project under assessment by the Office of Coal Seam Gas (OCSG) during the telephone discussion between OCSG and Santos on 27 September 2013.

Attached is the further information for OCSG's consideration in response to matters raised during the telephone discussion.

We trust that this information is sufficient for your purposes. Should you wish to discuss, please do not hesitate to contact Ms Cassie Hay, on telephone (07) 3838 5822 or email Cassie.Hay@santos.com.

Yours sincerely


Alan Feely
**Manager, Environment and Water, Energy NSW
Santos Limited**

Attachment – Further information - Tintsfeld Supplementary REF

Additional information – Tintsville Supplementary REF

Produced water management

The management of water is described in Section 2.6.2.2 of the REF with further details provided below.

There are two produced water ponds, Tintsville Pond 1 and Pond 2 located on Santos owned land, that may be used to manage water produced from the Tintsville Pilot. Santos is currently undertaking maintenance work at Tintsville Pond 1 including cleaning of the liner and integrity checks and any liner repairs required. Tintsville Pond 2 contains brine from previous operations that will be transferred to the new Leewood Produced Water Facility (approved March 2013) when it is commissioned. Once the brine is removed integrity assessments and any necessary repairs will be conducted.

Tintsville Pond 1 has a maximum operating level (MOL) of 15.3 ML. Modelling has indicated that this will support operation of the Tintsville pilot for between six and 16 months. If the MOL of Tintsville Pond 1 is reached before critical reservoir data is collected from the operation of the pilot, produced water would be stored within Tintsville Pond 2, once integrity checks and any maintenance work has been completed, or would be transferred directly to the Leewood ponds (subject to approvals). The pilot may also be 'shut in' if required.

An amendment to the PEL 238 Produced Water Management Plan is currently under preparation for the transfer of produced water / brine from Tintsville Pond 2 to Leewood through the existing gas pipeline either directly to Leewood (subject to approvals and infrastructure installation) or via the Bibblewindi Water Transfer Facility.

Options for visual impact mitigation

As described in Section 2.3.2 of the Supplementary REF, the six nearest sensitive receivers (within 1.2 kilometres) and residents that utilise the access road adjacent to the flare (a further seven landowners) were contacted prior to submission of the supplementary REF to discuss potential impacts and additional mitigation measures if required. None of those contacted raised any concerns of potential visual impacts.

Several design considerations were considered in order to minimise impacts to sensitive receivers. This included alternative flare locations or other design options such as horizontal or enclosed ground flares. Horizontal flares are not preferred as they present a greater bushfire risk and may impact soil quality in the vicinity of the flare. Enclosed ground flares require a larger footprint and therefore greater land disturbance as well as additional electrical and control equipment. The intensity of the expected gas flow rates were also a consideration. Reservoir modelling suggests that the size of flare could reach a maximum of 0.6 metres, but is more likely to be 0.3 metres or less.

The selection of the location for the flare and its proposed design was considered the best option to minimise any environmental and social impacts.

Regardless, Santos is committed to working with any affected residents and has an established complaints management protocol (refer Section 2.3.5 of the Supplementary REF). Should a complaint related to visual impact be received, Santos would investigate the concern and all reasonable and feasible measures to address visual impact would be considered.

Options that would be available to reduce any visual impacts of the flare include:

- Installation of a shroud around the flare

- Installation of temporary barriers such as shipping containers to obscure the flare
- Mitigation measures at the sensitive receiver/dwelling, developed in consultation the landowner

Decommissioning and Rehabilitation

The establishment of the Tintsville pilot well lease areas and gathering system corridors were described in the *Review of Environmental Factors (REF) Tintsville CSG Pilot Narrabri Coal Seam Gas Project PEL 238 November 2009* and approved in February 2010. The supplementary REF does not propose to increase or change the size or location of the well lease areas and therefore rehabilitation could be expected to occur in accordance with the existing approval.

The REF (ESG, 2009) included details of decommissioning and rehabilitation of the Tintsville Pilot as follows:

Section 4.2.5 Plugging and Abandonment Procedures:

Prior to the cessation of production operations and the initiation of plugging and abandonment procedures, a notification of the plan of abandonment will be provided to the DII-Minerals for approval.

As per standard oil field practice, a dry hole marker or such surface preparations indicating the well location will be installed in the final stages of abandonment in a manner which is appropriate for both the local land uses and in accordance with department regulations.

In addition Santos would ensure that decommissioning of the wells will be in accordance with the NSW *Code of Practice for Coal Seam Gas Well Integrity* (DTIRIS, 2012). This includes:

- sealing the wells from bottom to top by plugging with cement in approximately 200 metre increments
- pressure testing the cement plug across the surface casing shoe to ensure the wells are sealed
- removing the well heads and casing at a depth of greater than 1.5 metres below surface and installing a well head marker.

Surface infrastructure will be removed. Buried surface infrastructure, including the gathering systems and flowlines, will be flushed, capped at each end and left in-situ in accordance with legislative requirements. The surface will be rehabilitated, through natural regeneration and if required the planting of suitable native perennial grasses and shrub species that will assist in the stabilisation of the soils as agreed with the landowner.

In regards to the Tintsville ponds, the REF (ESG, 2009) included the following description of rehabilitation:

Section 5.4.1 Pond Decommissioning

At the completion of the production testing program, the pond will be emptied of all production water and concentrates, the liner removed for disposal and the site rehabilitated.

Section 5.4.2 Concentrate disposal

It is envisaged that the disposal of the concentrated brine component will involve an additional treatment and handling off site before the liner can be removed. Details of a management plan

for concentrates are being developed and will be incorporated into all water and operations management plans upon completion.

Investigations into plant capable of concentrating the brine component to less than 1% of its initial volume are well advanced and will be discussed with DII with a view to incorporation into the project water and operations management plans.

Section 5.4.3 Liner Disposal

The HDPE will be removed from the evaporation pond and disposed of in a licensed disposal facility.

Section 5.4.4 Topsoil Redistribution

At the completion of the major earthworks to reinstall excavated subsoils, the redistribution of the stockpiled topsoils will commence.

Section 5.4.6 Site Rehabilitation Monitoring

The monitoring of the site will occur at least on a monthly basis during the 12 month period from the cessation of rehabilitation earthworks.

Aspects of the rehabilitation program that will be monitored for the duration of the operational period will include:

- *Any evidence of slumping within the area of the GGS trench;*
- *Any suggestion of excessive erosion or topsoil instability;*
- *Any issues with the adequate drainage of the corridor; and*
- *Weeds regrowth*

Remedial action will be taken where issues such as described or otherwise are evident. No time limits will be placed upon the duration of the monitoring and maintenance program. The success of the site rehabilitation will be assessed with the assistance of the landholder. After this initial 12 month period, the monitoring of the site will occur at least every three months or until such time as the rehabilitation is signed off by the landholder.

In addition to the rehabilitation activities described above, Santos would implement the following in the decommissioning and rehabilitation phase. This would be undertaken in consultation with the landowner.

Establishment of rehabilitation objectives

The proposed objectives for the rehabilitation program are to:

- stabilise the site to minimise erosion
- return the disturbed areas to self-sustaining conditions consistent with the surrounding area
- rehabilitate the disturbed areas to the satisfaction of the landholder
- facilitate natural re-vegetation, subject to advice from landholder.

Rehabilitation methodology

The proposed rehabilitation methodology will include:

- identifying reference sites to assist in monitoring success

- removing perimeter fencing and all other infrastructure
- replacing sub-soil across the well leases, contouring to the landscape and partially compacting
- placing top-soil uniformly across the well leases, and grading to natural levels
- revegetating well leases with native species from existing seed bank within top soil (subject to landholder advice)
- surface contouring, through ploughing and the creation of “hummock” and low relief features similar to the surrounding area
- controlling weeds
- ongoing monitoring of success through comparison to reference sites.

Rehabilitation completion criteria

Rehabilitation performance criteria have been developed based on tenure conditions and a final land use consistent with the surrounding area (currently grazing). These are summarised in Table 1.

Table 1 Rehabilitation performance criteria

Phase		Activity	Timing	Completion criteria
Decommissioning of site infrastructure	Lease area and flare	All plant, equipment, containers, waste materials and temporary buildings removed from the site. Fencing removed.	Within 6 months of abandonment	Site cleared
	Gathering system	Pipes flushed and capped each end.	Within 6 months of abandonment	Decommissioning in accordance with APIA Code of Practice, Upstream PE Gathering Networks – CSG Industry, Version 2.0
	Ponds	Produced water/brine removed and pond liners removed	Within 6 months of abandonment	Site cleared
Landform establishment		Site graded and reshaped to reinstate, as far as practicable, the original contour and drainage. Erosion and sediment control implemented to minimise runoff channelling/erosion	Within 6 months of abandonment	No areas of instability or slumping. No areas of active erosion. Site landform established that is suitable for final land use and compatible with surrounding landscape.
Weed management		Infestations of noxious weeds managed in accordance with requirements of <i>Noxious Weeds Act 1993</i> .	As required.	Weeds do not dominate after disturbance or after rain.
Monitoring and reporting		Report to be submitted to OCSG within DTIRIS following the completion of all rehabilitation activities (civil works, waste removal, etc.)	At completion of rehabilitation.	Report submitted