Santos

Southern Margins Seismic Program 2006
T/32P, T/33P, T40P, VIC/P50
& EPP27

Summary

Environment Plan

May 2006

Introduction

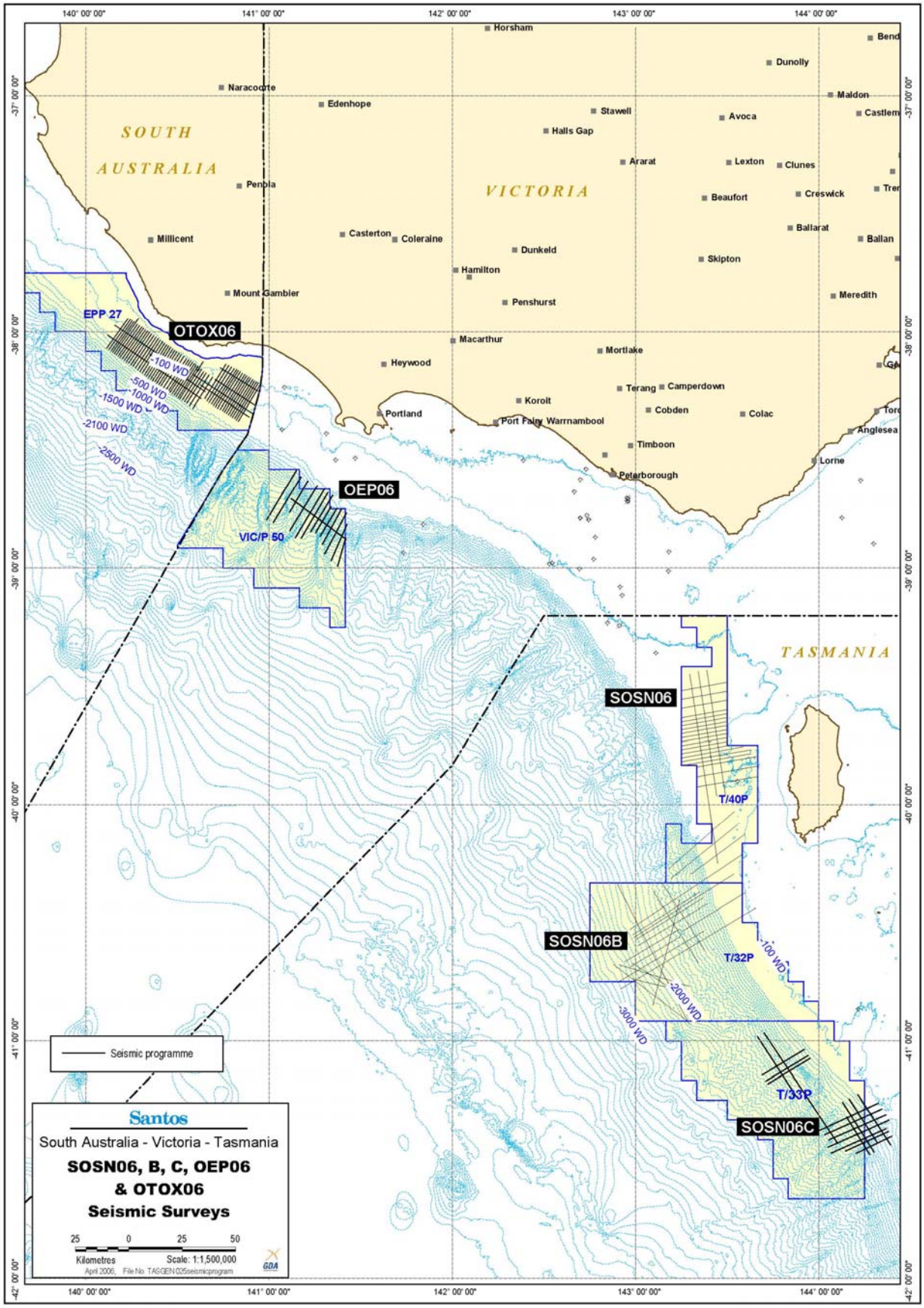
This is a summary of the Environment Plan prepared by Santos Ltd (Santos) for the 2006 Southern Margins Seismic Program.

The seismic exploration program will be undertaken over approximately 53 days total, commencing mid May 2006, in Petroleum Exploration Permits (PEP) T32/P, T33/P and T40/P located in Commonwealth waters off the west coast of Tasmania in the offshore Sorell Basin. Santos will also undertake seismic exploration in the Otway Basin on behalf of Essential Petroleum Pty Ltd (EPRL) in petroleum exploration permits VIC/P50 and on behalf of Oilex NL (Oilex) in petroleum exploration permit EPP27. The surveys will be undertaken sequentially and all are expected to be completed during the period from May to June 2006. The precise commencement date and timing of each of the survey phases will be dependent upon any changes to the seismic vessel schedule and weather. Multiwave Geophysical Company's 'Pacific Titan' seismic survey vessel has been contracted to undertake the seismic operations. The following table summarises the survey details and anticipated recoding order.

Licence	Surface Km	Streamer Length (M)	Waterdepth (M)	Approx survey duration	Distance from Coast
T/33P	500	6000	100-2000	7	100 km North west of Strahan
T/32P	804	6000	100-2900	11	200 km North west of Strahan
T/40P	883	6000	100-200	12	15 km west of King Island
VIC/P50	334	6000	200-2500	5	30 km South of Portland
EPP-27	1452	4950	50-500	18	7 km from port MacDonnell and 60 km from Beachport

Background

Seismic exploration is undertaken to map the subsurface geology of an area and enable identification of potential petroleum reservoir rocks, such as sandstones. During a seismic survey, an acoustic pulse is generated by the rapid release of compressed air from a signal source (air-gun array) towed behind the seismic vessel. This pulse is reflected from the boundaries separating the rock layers in the subsurface, and the reflected signals are recorded by many hydrophones towed in a cable several kilometres long. This is a key step in exploration for hydrocarbons and there is currently no other method that has sufficient resolution to identify rock structure beneath the surface.


SOUTH AUSTRALIA
VICTORIA
TASMANIA
Horsham
Dunolly
Naracoorte
Edenhope
Stawell
Avoca
Halls Gap
Ararat
Lexton
Clunes
Penola
Beaufort
Creswick
Millicent
Casterton
Coleraine
Dunkeld
Ballarat
Skipton
Hamilton
Mount Gambier
Penshurst
Meredith
Macarthur
Mortlake
Heywood
Terang
Camperdown
Portland
Koroit
Cobden
Colac
Port Fairy
Warrnambool
Timboon
Peterborough
Lorne
EPP 27
OTOX06
OEP06
VIC/P 50
SOSN06
T/40P
SOSN06B
T/32P
T/33P
SOSN06C
-100 WD
-500 WD
-1000 WD
-1500 WD
-2100 WD
-2500 WD
-2000 WD
-3000 WD
Seismic programme
Santos
South Australia - Victoria - Tasmania
SOSN06, B, C, OEP06
& OTOX06
Seismic Surveys
25 0 25 50
Kilometres
Scale: 1:1,500,000
April 2006, File No. TASGEN025seismicprogram
GDA
140° 00' 00"
141° 00' 00"
142° 00' 00"
143° 00' 00"
144° 00' 00"
-37° 00' 00"
-38° 00' 00"
-39° 00' 00"
-40° 00' 00"
-41° 00' 00"
-42° 00' 00"

Biological Environment

Marine Fauna

Fauna of national significance that may be encountered within the Southern Margins Seismic Program have been identified based on a search of the DEH EPBC Online Database (DEH, 2005). Complete details of the search results are contained within the Southern Margins Seismic Program Environment Plan, copies of which can be obtained from Santos.

Due to the potential to encounter cetacean species in oceanic waters DEH's guidelines for avoiding interference with larger cetaceans during seismic surveys (Environment Australia 2001) will be implemented.

Commercial Fisheries

A variety of marine species are commercially harvested from the Southern Margins Seismic Survey area. The commercial fisheries present within the survey areas have been identified and consulted with to address any issues they may have had. Complete details of the search results are contained within the Southern Margins Seismic Program Environment Plan, copies of which can be obtained from Santos.

Environmental Hazards, Management Approach and Controls

Santos is committed to conducting our operations in a manner that is compatible with the environmental and economic needs of all communities in which we operate. The seismic survey will be conducted in accordance with the Santos EHSMS and Santos Environmental Policy. Santos developed the EHSMS based on international standards and industry best practice for application to all Santos operations. The Santos EHSMS consists of two sets of standards; "management" and "hazard".

Potential Environmental Hazards

The main environmental hazards (and main associated consequences) of the seismic program are:

- Discharge of high intensity sound.
  - Disturbance or injury to marine fauna.

- Physical presence of the vessel.
  - Disturbance or injury to marine fauna.
  - Interference with commercial shipping and fishing.
  - Collision with other vessels.

- Waste disposal (sewage, putrescible waste, chemicals and solid and hazardous wastes).
  - Increased nutrient levels.
  - Water contamination.
  - Low-level contamination of some fauna species.

- Hydrocarbon spills – spillage from the survey vessel or from the streamer.
  - Increased nutrient levels.

- Hull maintenance.
  - Low-level contamination of some fauna species.

Controls

The table below contains a brief summary of the key environmental risks associated with the survey and control measures implemented to reduce the risk to as low as practicable. A more detailed description is available in the Southern Margins Seismic Survey Environment Plan.

Risk Identification			Risk Treatment
Activity	**Hazard/Risk**	**Potential Consequence**	**Safeguards/Mitigation Measures**
Acoustic source discharge	Impacts to cetaceans.	Alteration of cetacean behaviour, interfering with normal activities such as breeding, feeding and migration, temporary threshold shift. interactions with blue or other species may occur. Survey areas are located significant distances from key whale aggregation areas but interactions may occur. Surveys are likely to evoke avoidance response in whales only, but unlikely to displace species from key habitat or migration paths.	• Each survey is of short duration (between 5 and 30 days). • Santos is proposing to undertake aerial surveys across the seismic survey areas prior to the commencement, subject to weather conditions in the survey area. The need to undertake repeat surveys will be made based on the results of the initial survey at each survey area. • DEH (2001) cetacean observation and seismic operations guidelines will be employed: • All whale and dolphin sightings will be reported to the DEH. •
	Impacts to pinnipeds (seals).	No direct effects known due to apparent tolerance to high intensity seismic. May effect prey species (see fish).	• Each survey is of short duration (between 5 and 30 days) and not within close proximity to critical breeding or feeding habitat.
	Impacts to plankton or planktonic larvae	Potential lethal or pathological effects in close proximity to air guns.	• Presence of any krill swarms will be noted.
	Impacts to divers.	Potential health effects for divers within close proximity to acoustic source. Temporary displacement of recreational or commercial diving activities.	• Surveys generally deeper than those used by recreational or commercial divers. • The recommended operating buffer of 1,500 m advised for diving (DMAC, 1979) will be enforced.
Physical presence of vessel	Impacts to commercial fisheries.	Reduction in fish catches or interference with fishing activities likely to be localised and short term.	• Industry and government guidelines available on the avoidance of conflict with commercial fisheries will be adhered to. • Consultation with the commercial fishing industry groups will take place prior to the seismic program to agree impact mitigation measures. • Liaison and communication with commercial fishers regarding daily schedules and work plans will occur during operations. • Planned compensation agreements for actual commercial loses with be negotiated with affected fishers (if necessary).
	Collision with large cetaceans.	Death or injury of large cetaceans.	• Program is over 50 kilometres from key whale migration and aggregation areas. • Seismic vessels move slowly permitting greater response time for evasive action by vessel and/or whale to avoid collision (i.e., risk is less than for normal commercial shipping). • DEH (2001) cetacean observation and seismic operations guidelines and initial aerial surveys will be employed (refer to first row of this table).

	Impacts to water based leisure craft recreation activities.	Temporary displacement of aquatic recreation activities and potential collision hazard.	• Seismic surveys undertaken in areas generally too far offshore for leisure boat activities. •
Waste discharge to sea	Localised increase in nutrient levels for short period. Pollution of habitat.	Changes in planktonic or benthic communities due to altered water quality levels. Injury or death from ingestion of solid wastes.	• No waste discharges to the marine environment in State waters . • Sewage will be treated prior to disposal offshore in accordance with MARPOL regulations (Annex IV). • Putrescible wastes will be macerated to a maximum particle size 25mm prior to being discharged to sea. • Solid wastes, hazardous wastes and liquids will be returned onshore for appropriate disposal.
Small volume hydrocarbon spill (e.g., from streamer cable rupture)	Reduced water quality.	Mortality of planktonic or benthic organisms due to hydrocarbon toxicity. Smothering of marine and coastal flora and fauna.	• Streamers (filled with light kerosene type petroleum, 95% of which evaporates or degrades (from light exposure) within 24 hours of spill) are segmented to limit potential spill volumes. • All necessary oil spill contingency plant and equipment will be functional and accessible. • No refuelling at-sea is planned for the short survey. • Ensure that port refuelling operations are monitored by either the vessel's Master or First Officer. • Ensure that equipment and procedures used for transferring fuel conform to the AMSA Code for the safe working of support vessels.
Moderate fuel spill (e.g., rupture of fuel tanks resulting)	Widespread water surface oil slick, toxic water quality.	Mortality of planktonic or benthic organisms due to hydrocarbon toxicity. Smothering of marine and coastal flora and fauna.	• All vessel operations will be conducted in compliance with the AMSA OSV Code (eg. radar monitoring, vessel communications). • The seismic contractor's Emergency Response Manual and OSCP will be applied to the operation. • Senior personnel on vessels are familiar with the contents of the Emergency Response Manual and OSCP such that the initial response to an oil spill is carried out efficiently. • All the necessary oil spill contingency plant and equipment will be functional and accessible. • Any fuel spill clean-up will be undertaken in consultation with the relevant regulatory authorities in each state.
Hull maintenance and ballast exchange	TBT leaching.	Toxic effects on epibenthic fauna and the food chain.	• The 'Code of Practice for Antifouling and In-water Hull Cleaning and Maintenance' will be applied. • Hull anti-fouling records will be inspected.
	Exotic pest species introductions.	Invasion of marine habitats.	• Seismic vessel will not undertake ballast exchange during surveys. Streamers carried on deck during surveys. • Hull anti-fouling treatment.

Consultation

Impact mitigation planning and implementation relies significantly upon consultation with key stakeholders. In the course of planning seismic, drilling and development programs within the offshore Sorell and Otway Basins over the past three years, Santos has undertaken extensive consultation with all relevant stakeholders in the region to identify regulatory processes, potential environmental issues and management requirements. There is ample precedent for identification of issues and procedures for communicating day-to-day seismic operations for timely consultation with the appropriate stakeholders to be followed, given the small scale of the project and the issues previously identified.

Stakeholders of relevance to the Southern Margins Seismic Program include:

- Tasmania:
  - Department of Primary Industries, Water and Environment (DPIWE)
  - Department of Infrastructure Energy and Resources (DIER)
  - Tasmanian Fishing Industry Council (TFIC)
  - Tasmanian Rock Lobster Fishermen's Association (TRLFA)

- Victoria:
  - Department of Primary Industries (DPI)
  - Seafood Industry Victoria (SIV)
  - Warrnambool Professional Fishermen's Association
  - Portland Professional Fishermen's Association
  - Port Campbell Professional Fishermen's Association
  - Apollo Bay Professional Fishermen's Association

- South Australia:
  - Primary Industries and Resources South Australia (PIRSA)
  - Tuna Boat Owners Association of South Australia
  - South Australian Rock Lobster Advisory Committee (SARLAC)
  - Port MacDonnell Fishermen's Association

- Commonwealth:
  - Department of Environment and Heritage (DEH)
  - Australian Fisheries Management Authority (AFMA)
  - Australian Maritime Safety Authority (AMSA)
  - Australian Marine Oil Spill Centre (AMOSC)

Consultation and information dissemination has been undertaken and will continue to be undertaken through a range of media including:

- Meetings with regulators.
- Meetings and correspondence with key stakeholders.
- Provision of information brochure.

- Invitation for public comment on the EPBC referrals via the DEH website.
- Provision of detailed survey maps.
- Daily schedule communications.
- Vessel communication systems with maritime traffic.

Contact Details:

All queries, comments or requests for a copy of the approved Southern Margins 2006 Environment Plan should be directed to:

John Hughes
Chief Operations Geophysicist
Santos Ltd
GPO Box 2319
ADELAIDE SA 5001

Telephone (08) 8224 7952

Nick Fox
Environmental Adviser
Santos Ltd
GPO Box 2319
ADELAIDE SA 5001

Telephone (08) 8218 5151