



# Petroleum Act compliance report 2006

Petroleum and Geothermal Group



**Government of South Australia**  
Primary Industries and Resources SA

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## COVER

A Mirage 3D Vibroseis survey in the Cooper Basin. (Photo 405147)

OD&E Rig 20 drilling Stimpee 1 petroleum well SSE of Moomba in the Cooper Basin. (Photo 406298)

Construction of the South East Australia Gas Pty Ltd (SEA Gas) pipeline to transport offshore Otway gas from the Iona gas facility in Victoria to Adelaide. (Photo 049537)

Moomba at sunset, Cooper Basin. (Courtesy of Santos Ltd; Photo 043362)

## INTRODUCTION

The *Petroleum Act 2000* covers all exploration and production activities for petroleum, gas storage and geothermal resources for onshore South Australia, as well as the technical regulation of gas transmission pipelines. In summary, the key objects of the Petroleum Act include:

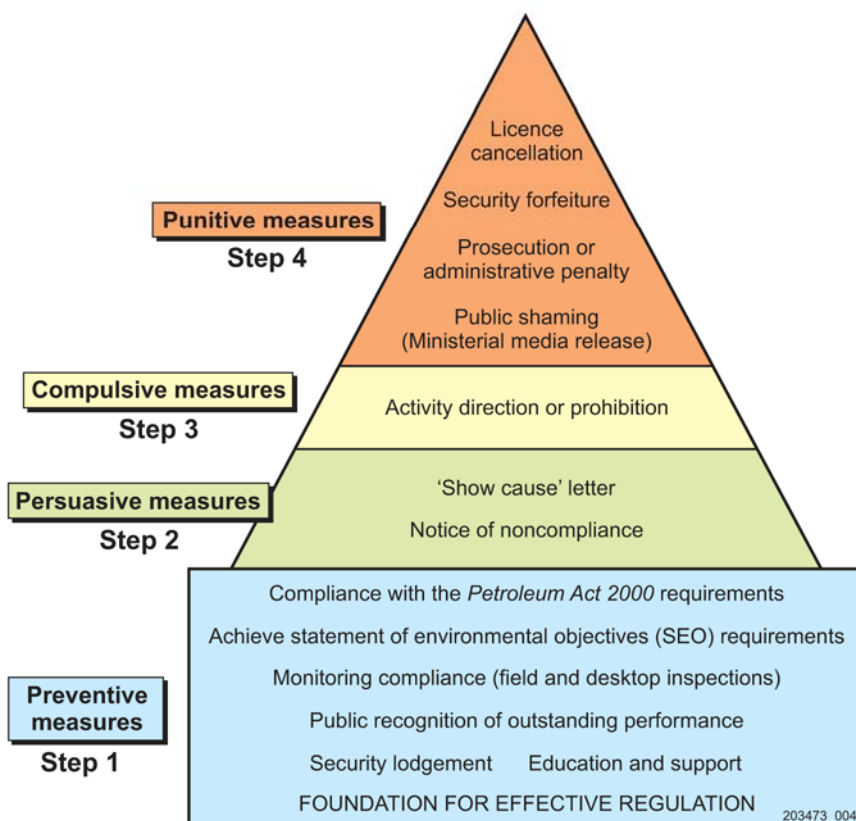
- providing security of tenure to licensees for the resources covered by the Petroleum Act
- protecting the environment and public from the inherent risks associated with the activities undertaken to exploit these resources
- where relevant, ensuring appropriate levels of security of natural gas supply are provided for
- promoting and facilitating competitive development of the state's petroleum, gas storage and geothermal resources through the acquisition and release of relevant geotechnical and engineering data and information.

It is the pursuit of these objectives that drive the compliance and enforcement priorities of the Petroleum and Geothermal Group of PIRSA. This report covers the year 2006 and its purpose is to:

- outline PIRSA's regulatory activities in administering the Petroleum Act
- provide a summary of the regulatory performance of the industries covered by the Petroleum Act.

## COMPLIANCE AND ENFORCEMENT

Compliance of the industries regulated under the Petroleum Act is presented in the context of the compliance and enforcement pyramid (Fig. 1) adopted by PIRSA for monitoring and enforcing compliance.



**Figure 1** PIRSA Petroleum and Geothermal Group compliance and enforcement pyramid.

The pyramid details a series of steps and measures available to PIRSA for facilitating, monitoring and, where necessary, enforcing compliance. PIRSA aims to maintain its regulatory activities at 'Step 1: Preventative measures', shown as the base of the pyramid in Figure 1. In cases where industry fails to adequately and appropriately respond to detected noncompliance, 'Step 2: Persuasive measures' is instigated. Only in extreme and exceptional cases would PIRSA expect to utilise Steps 3 and 4, 'Compulsive' and 'Punitive' measures, respectively, to enforce compliance and achieve acceptable environmental or administrative outcomes.

The balance of this annual report on regulation pursuant to the Petroleum Act is divided into five overall sections as follows:

- Step 1: Preventative measures
- Step 2: Persuasive measures
- Step 3: Compulsive measures
- Step 4: Punitive measures
- Compliance statistics.

## Step 1: Preventative measures

These measures include:

- Maintaining an effective and efficient regulatory regime through one-window for all co-regulation pursuant to all state (such as the Environmental Protection Act 1993, etc.) and Commonwealth Acts (such as the Native Title Act) — with PIRSA having stewardship responsibility to manage that one-window for co-regulation.
- Implementing approval and compliance requirements of the Petroleum Act.
- Monitoring regulatory compliance, both by licensees and PIRSA, through audits and inspections (both field and desktop).
- Working collaboratively with licensees, industry and stakeholders to clarify and advise on regulatory requirements and expectations.
- Undertaking, as required, detailed reviews and studies to establish better assurances of regulatory compliance.
- Addressing stakeholder interests and requirements through the statements of environmental objectives (SEOs) and so establishing and maintaining their trust.

During 2006 the main preventative measure activities carried out by both PIRSA and industry are discussed below.

### ***Preventative measures enabled through the Petroleum Act***

An effective and efficient regulatory framework is critical to establishing a commercially and environmentally sustainable industry that achieves standards of environmental, safety and social performance acceptable to the community. Such a framework also needs to elicit community confidence in the performance of both the industry and the government agency regulating the industry. It is widely recognised that the Petroleum Act and its associated Regulations deliver such a framework. The Act focuses regulation on the practical achievement of outcomes that meet both investor and community expectations, and was established on the basis of five key principles: (1) certainty, (2) openness, (3) transparency, (4) flexibility and (5) efficiency.

Since the promulgation of the Act in September 2000, PIRSA continues to review the effectiveness of the Act to ensure it continues to facilitate acceptable industry behaviour and performance in relation to environmental protection, public safety, security of gas supply, and protection of other land user rights.

### **Statement of environmental objectives — approvals and reviews**

In the context of the Petroleum Act, the legal standards set for the protection of natural, social, heritage and economic environments are agreed through a robust, open and transparent research and consultation process that culminates in licence operators owning and abiding by SEOs. Associated environmental impact reports are developed by licensees from robust, transparent consultation with relevant stakeholders. Environmental impact reports must detail potential impacts of proposed operations on the natural, social, heritage and economic environment. SEOs are a means to enable PIRSA to act as a one-stop shop on behalf of co-regulatory agencies, following an open process for the development of both environmental impact reports and SEOs.

This enables regulatory agencies, in addition to PIRSA, to embed environmental objectives and standards for outcomes in SEOs — and in doing so — a breach of standards set in Acts other than the Petroleum Act, becomes a breach of the SEOs pursuant to the Petroleum Act, too. Government's approval of SEOs brings into force area- and operation-specific criteria to measure licensees' compliance with environmental objectives and outcomes.

Five regional SEOs have been developed for: airborne geophysics in South Australia; seismic surveys in the South Australian Cooper Basin; seismic surveys in the South Australian Otway Basin; drilling in the South Australian Cooper Basin; and work-over and production operations in the Cooper Basin. A sixth regional SEO is being developed for non-seismic on-ground operations (such as geochemical, gravity and magnetic surveys) within South Australia. Regional SEOs can cover a range of landforms and activities with varying levels of impact risk. This variability is reflected in the SEOs, and specific local issues for individual work programs are addressed one-by-one when applications to undertake activities are lodged.

All other SEOs are operator-, operation- and area-specific. Pursuant to the Petroleum Act, exploration and production licensees are required to report on their performance against SEOs and, following the principle of transparency, these reports are available to the public from the [Environmental Register](#) on the Petroleum Channel of the PIRSA website<sup>1</sup>. Embedding the objectives and standards of co-regulatory regimes (in addition to the Petroleum Act) in SEOs fosters mutual trust between government agencies charged with the co-regulation of resource exploration and production operations. Formal memorandums of understanding and administrative arrangements agreed by co-regulatory agencies can explicate mutual expectations and underpin both the efficiency and effectiveness of co-regulation. Trust engendered with SEOs is very much reflected with the memorandums of understanding and administrative arrangements established between PIRSA's Petroleum and Geothermal Group and key co-regulatory agencies, including South Australia's Department for Environment and Heritage, Environmental Protection Agency and Planning SA.

Effective preventative measures can only be established if the regulatory objectives for regulated activities are relevant to the risks associated with such activities and satisfy stakeholders' interests and concerns. Through adherence to the principles of certainty, openness and transparency, the Act, through its stakeholder consultation provisions, seeks to establish such objectives. A key requirement of the Act is that achievement of these objectives is measurable, to allow industry to report its performance against agreed criteria. These objectives and associated measurement criteria identified through this process are documented in SEOs. Under the Act, no activity can be undertaken unless it is covered by an approved SEO. Approved SEOs become project-specific regulations that are gazetted and made publicly available on the Environmental Register.

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<sup>1</sup>[www.petroleum.pir.sa.gov.au](http://www.petroleum.pir.sa.gov.au). Go to Environment & Land Access, Environmental Register.

During 2006, SEO consultation processes covered:

- *Eagle Bay Resources' Coongie Lakes Control Zone (Western PEL 182) drilling and well operations SEO, and PEL 182 extended production testing SEO.* An extensive stakeholder consultation process commenced in October 2005 involving a number of workshops between the licensee and various stakeholder groups. As a result of this process, the *Eagle Bay Resources' drilling and well operations SEO*, covering activities within the Coongie Lakes Control Zone, and *Eagle Bay Resources' extended production testing SEO*, covering activities within all of PEL182, were approved and gazetted on 24 August 2006.
- *Eden Energy's geothermal exploration drilling SEO.* An SEO for geothermal exploration drilling activities in the Cooper Basin (and in particular inside the boundary of the Lake Torrens National Park) was approved and gazetted on 16 February 2006, following approval from the Minister for Environment and Conservation.
- *BHP Billiton's Olympic Dam gas pipeline SEO.* Preparation of an SEO for the proposed gas pipeline connecting BHP Billiton's existing Olympic Dam operations to gas from the Moomba Plant commenced in September 2006. A government consultation session to discuss this project has been held, and public consultation on the draft SEO is expected to be conducted early in 2007.
- *Santos's Pipeline Licence (PL) 2 SEO review.* A review of the Moomba to Port Bonython Liquids Pipeline SEO was initiated in 2004, following a stakeholder consultation session held by the pipeline operator, Epic Energy. The review process has been ongoing since this time, with government consultation on the draft SEO undertaken by PIRSA during 2006. It is expected that the revised PL 2 SEO will be approved and gazetted in early 2007.
- *Heathgate Resources' PL 12 SEO review.* A review of the SEO for the lateral pipeline connecting Heathgate's Beverley uranium mine to the Moomba to Adelaide gas pipeline was undertaken during 2006. It is expected that the revised SEO will be approved and gazetted in early 2007.
- *Australian Pipeline Trust's PL 7 SEO review.* A review of the SEO for the South Australian section of the Moomba to Sydney gas pipeline was undertaken during 2006. It is expected that the revised SEO will be approved and gazetted in early 2007.
- *South Australian Cooper Basin Joint Venture's production and processing operations SEO.* A review of the SEO for production and processing activities in the Cooper Basin was initiated in late 2006, and will be progressed by Santos during 2007. The revised SEO will incorporate Santos's licensed pipelines (PLs 5, 9, 15), which currently have their own approved SEOs.
- *Seismic operations in the Otway Basin, South Australia, SEO review.* A review of the SEO for seismic operations in the Otway Basin was commenced in mid 2006. The revised SEO will be approved and gazetted in early 2007.
- *State-wide airborne geophysical operations.* A new generic environmental impact report and SEO have been developed for airborne geophysical and geochemical survey operations. These documents cover the whole of the state and have been approved following a consultation process with relevant stakeholders.
- *Review of SEO for geophysical operations in the Cooper and Eromanga basins.* This SEO was originally prepared in 1998 to cover seismic operations and became due for a five-yearly review in 2003. That review identified a need to update this SEO through a formal assessment process. Following receipt of the resulting draft environmental impact report prepared by the operators in the Cooper Basin, PIRSA determined a public consultation process was required. That process concluded in 2005 and, with the final update of the SEO, was approved in June 2006. To assist stakeholders in assessing the environmental performance of the seismic data acquisition industry PIRSA published the *Field guide for the environmental assessment of recently completed seismic lines in the Cooper Basin, South Australia.*
- *Ground geophysical operations (non-seismic) in South Australia.* A new generic SEO covering all those non-seismic operations such as gravimetric and magnetic surveys is currently being prepared by PIRSA. This SEO and the attendant environmental impact report will be subjected to the appropriate consultation processes prior to the SEO being approved and subsequently gazetted in 2007.

- *South Australian Cooper Basin operators' drilling and well operations SEO*. An important feature of SEOs is the need for readily measurable assessment criteria for measuring the attainment of the various objectives detailed in the SEO. Also important is the need to ensure that any subjectivity in such assessment criteria is minimised and preferably avoided where possible. The potential for such a challenge exists in the development of site rehabilitation criteria, such as those developed and used by PIRSA for assessing the effectiveness of restoration practices on disturbed land (e.g. wellsites, access tracks and seismic lines). As part of dealing with this challenge, in 2006 PIRSA initiated an external review of the current assessment criteria used for restored abandoned wellsites and access tracks against the relevant objectives in the *Cooper Basin operators' drilling and well operations SEO*. External consultants Fatchen Environmental Pty Ltd and Woodburn and Associates who were extensively involved in the development of the current criteria are undertaking the review. The results of the review will be published upon completion and consulted on with other stakeholders during 2007, before being adopted in the next revision of the *Cooper Basin operators' drilling and well operations SEO*, currently scheduled for early 2008.
- *Study of induced seismicity associated with enhanced geothermal systems*. A key function of the SEO process is to assess proposed regulated activities, identify potential risks inherent in the relevant regulated activities, and set standards for compliance that either eliminates risks, or where it is not possible to eliminate, to minimise risks to an acceptable level, and implement management practices that reduce risks to 'as low as reasonably practicable' (ALARP). In doing so, operations are required to be managed (by licence holders) so that outcomes (from regulated activities) meet both legislated requirements and stakeholders' expectations. To this end, during 2006, an Adelaide University study was commissioned by PIRSA into potential risks associated with fracture stimulation in geothermal well bores in the Cooper Basin region. Following the current review process in mid 2007, the findings will be used in the development of an SEO for geothermal operations in the Cooper Basin.

#### **Activity notification — operator capability assessment**

Another preventative measure adopted by PIRSA is the requirement for licensees to demonstrate their capability to achieve the relevant SEO and regulatory requirements prior to gaining approval to commence their activities. The demonstration is required to address the effectiveness of licensees' management systems, competency and skills of licensees' human resources, and suitability of licensees' equipment (as per Regulation 16 operator assessment factors of the Petroleum Regulations).

In accordance with Regulations 18 and 19, licensees are required to notify PIRSA prior to commencing any regulated activity within a licence area. For low-level supervision operators, 21 days notice is required. For high-level supervision operators, 35 days notice is required. In the case of the latter, under Regulation 19 high-level supervision licensees are required to obtain approval before commencing their activities, where such approval is granted on the basis of licensees' demonstrated capability against the Regulation 16 operator assessment factors.

Low-level supervision status is granted on the grounds of a demonstrated and proven level of capability so that such operators are not required to demonstrate their capability for every activity proposal. Notification is simply provided under Regulation 18 to give PIRSA the required regulatory information, as per Regulation 20, and with an opportunity to ensure that the proposed activity is covered under the scope of the stated relevant approved SEO.

During 2006, 228 activity notifications were submitted to PIRSA. These included 119 notifications for drilling activities (28 for high-level supervision), 114 notifications for production activities (19 for high-level supervision) and 14 notifications for geophysical activities (7 were for high-level supervision). In the case of drilling activity notifications, 10% of these notifications related to geothermal operations.

### ***Quarterly compliance meetings***

PIRSA strives to work in a cooperative and educative manner with licensees so that regulatory compliance is proactively, rather than reactively, facilitated. A key component of this strategy is the quarterly compliance meetings between PIRSA and individual licensees, where key regulatory and compliance issues are discussed, reviewed and monitored. In the case of drilling operations, PIRSA also meets quarterly with individual drilling contractors to discuss compliance issues specific to drilling operations. In 2006 PIRSA continued to meet quarterly with: Santos, Beach Petroleum, Stuart Petroleum, Origin Energy Resources Ltd, Origin Energy Asset Management Ltd, Epic Energy SA Pty Ltd and South East Australia Gas Pty Ltd. PIRSA also meets biannually with the Australian Pipeline Trust.

PIRSA also attends a number of industry forums such as the Santos-facilitated wellsite forum. This quarterly forum brings all licensees and contractors together to discuss and review various safety and environmental matters. Through these forums PIRSA is able to monitor and contribute proactively in compliance initiatives.

### ***Fitness-for-purpose reviews***

In keeping with the preventative focus of Step 1 in the compliance pyramid, the Act requires licensees to ensure that their facilities are maintained to be fit for purpose. In line with best practice regulatory requirements, the focus is on eliminating any risks, or where it is not possible to eliminate, to minimise these risks to an acceptable level. Under Regulation 30, licensees are required to assess and report to PIRSA on the fitness for purpose of their respective facilities at least every five years. These assessments are required to address the physical condition of the facilities and the effectiveness of the management systems utilised for operating and maintaining them. By reviewing these reports, PIRSA seeks to assess the integrity of the conclusions reached by the licensee as a result of these assessments.

In 2006 PIRSA received Santos's Cooper Basin oil and gas processing facilities (including the Moomba Gas Plant, pipelines and wells) fitness-for-purpose assessment report, which is available on the [Petroleum Channel](#)<sup>2</sup>. PIRSA has commenced reviewing this report in consultation with other relevant agencies such as Safe Work SA, and external expert advice has been engaged on certain technical aspects. This review is expected to be completed during 2007 and the outcome will be reported in next year's annual report.

### ***Facility and pipeline inspections***

During 2006, as part of the ongoing preventative measures to ensure facilities and pipelines remain fit for purpose, a number of inspection programs were carried out by industry for such operations. These included shut downs of sections of the Moomba Plant to carry out internal inspections to monitor the effectiveness of various asset integrity programs, such as mercury removal. On occasions, representatives from PIRSA sat in as observers on risk assessments where the findings of the inspections were reviewed for the aim of deciding whether the risks to the plant integrity are being managed to as low as reasonably practicable.

For pipelines, a number of different inspection techniques are implemented by industry to monitor pipeline integrity. These techniques include in-line inspections, which are undertaken periodically by the licensee to assess the condition of the pipeline steel. During 2006 in-line inspections were carried out on two of the laterals from the Moomba to Adelaide main pipeline. Work was also undertaken to verify results obtained during inspections conducted in 2005 on the South East Pipeline System. The verification program confirmed the accuracy of data obtained, which indicated that no critical defects exist in the lines inspected. A repair program for the Moomba to Sydney gas pipeline was completed during 2006, following the identification of defects in the line during an in-line inspection undertaken in 2005.

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2 <[www.petroleum.pir.sa.gov.au](http://www.petroleum.pir.sa.gov.au)>. Go to Environment & Land Access, Environmental Register, Fitness for Purpose Assessments.

### ***Company internal management system audits***

Effective internal auditing of company systems and processes is an important preventative measure (as demonstrated by the drilling rig fitness for purpose review discussed below). During 2006 a number of licensees undertook company audits of their systems, using external third parties to monitor their effectiveness and identify areas of improvement where required.

In all these cases PIRSA was satisfied that the audits carried out made genuine attempts to identify areas for improvement in the licensees' management systems, consistent with the requirements of the operator assessment factors under Regulation 16.

### ***Geophysical operation inspections***

Cooper Basin licence operators undertaking geophysical field operations during 2006 exhibited an excellent culture of compliance. The example of the high standard of seismic line preparation achieved by Beach Petroleum during the Neritus 3D Seismic Survey was particularly singled out in a commendation letter from PIRSA to Beach Petroleum.

### ***Geophysical operator audit reports***

To conform to the requirements of the appropriate SEO, 12 environmental audit reports for geophysical survey field operations were submitted to PIRSA.

### ***Annual reports***

Under Regulation 33, licensees are required to submit (to PIRSA) annual reports detailing and declaring their level of compliance with the Act and any relevant SEOs. The main purpose of this is to ensure licensees assess and review their performance at least annually, and through this process proactively take corrective actions, where required to rectify any identified deficiencies, and improve their performance on a continuous basis. The intention is that, by making company performance a matter of public record, appropriate compliant behaviour is encouraged, as poor performance is subject to public scrutiny.

PIRSA utilises annual reports to assist in identifying the forthcoming year's inspection targets and themes.

In 2006 a total of 64 annual reports were received and 47 have been reviewed for compliance with Regulation 33 of the Petroleum Act, with the remainder to be reviewed in 2007. All annual reports submitted to PIRSA under the Act are made publicly available on the Environmental Register.

### ***Emergency response exercises***

Another key component of the preventative measures is to ensure appropriate plans and contingencies are in place for emergency incidents. Under the Act, measures must, in particular, focus on the prevention of environmental, public safety, and security of gas supply incidents. Regulation 31 requires that licensees maintain effective response procedures to be followed in the event of such emergencies. It also requires that these plans be tested for their effectiveness at least once every two years, and that a report into the findings of the exercise be prepared and provided to PIRSA.

A number of emergency response drills were carried out in 2006 by Santos, Beach Petroleum, Stuart Petroleum, Epic Energy SA Ltd, Origin Energy Asset Management, South East Australia Gas and Agility Management Pty Ltd. These included exercises relating to production and drilling operations, addressing the effectiveness of emergency response plans to potential:

- spill and fire incidents during typical tanker loading operations

- vehicle accidents
- uncontrolled gas releases during plant and well operations
- serious injury to personnel operating single person remote facilities.

Emergency response drills conducted during 2006 for pipelines tested the effectiveness of emergency response plans in response to:

- unexpected gas/liquid release events during routine maintenance activities
- identified gas leak events at facility compounds
- unintended pipeline contact as a result of unauthorised activity on a pipeline easement
- total loss of gas supply to a pipeline.

The response exercises tested the effectiveness of fire fighting; spill containment and clean up; emergency evacuation of injured personnel; site evacuation and mustering procedures; and emergency coordination, communication procedures and protocols (including with external emergency response organisations). A number of these exercises stimulated corrective actions to important elements of response plans. These corrective actions include: implementing improved incident notification and communication standard operating procedures; improved availability of appropriate personal protective equipment; improvements to gas detection equipment; improved access to critical site layout drawings and plans; and improved facilities for drinking water at muster points.

Overall, PIRSA was satisfied that the response exercises carried out were of sufficient standard to address the effectiveness of the relevant emergency response procedures in relation to the risks targeted for management.

### **Field inspections**

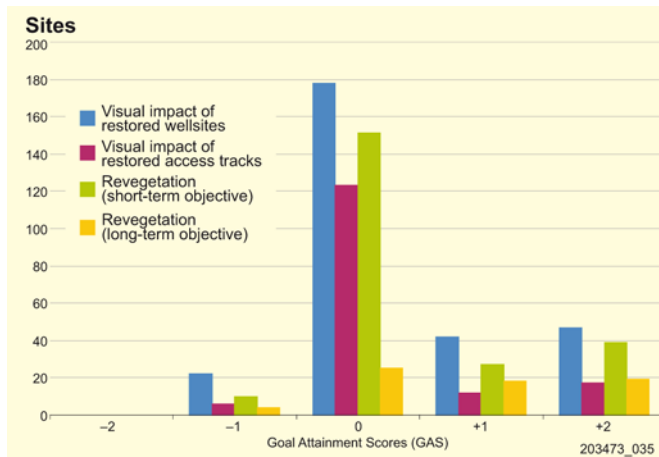
On a regular basis during the year, as part of an ongoing field inspection program, PIRSA identified and targeted a number of key areas or themes to monitor compliance. The main focus included geophysical operations, drilling operations, plant operations, work site restoration activities, water disposal, oil spill management and truck transport<sup>2</sup>. Inspections determine whether the outcomes attained match environmental objectives of no permanent impacts. Goal attainment scores are used to characterise post-activity impacts on the environment, over time, through a rehabilitation process. In most cases, inspections revealed that adequate compliance with relevant SEOs was achieved, and all detected breaches were of minor nature and promptly rectified by the responsible licensee to PIRSA's satisfaction.

Figure 2 shows goal attainment scores of all inspection results over the term 1993 to 2006 of restored wellsites and access tracks in the South Australian sector of the Cooper Basin inspected by PIRSA for the purpose of assessing the level of compliance achieved against relevant restoration objectives. The criteria used to assess against these objectives are detailed in the PIRSA *Field guide for the environmental assessment of abandoned petroleum well sites in the Cooper Basin, 2002* (available on the [Petroleum Channel](#)<sup>3</sup>). Restored wellsites and their associated access tracks are inspected against two key objectives, 'minimisation of visual impact' and 're-establishment of indigenous vegetation'. In the case of the latter, due to the time and rainfall dependency of achieving re-vegetation, the sites are inspected against two sets of criteria — a time frame for less than five years since the completion of the restoration work, and a time frame for greater than five years.

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2 Inspection of road transport operations was coordinated with South Australia Police, with the police taking the lead role.

3 <[www.petroleum.pir.sa.gov.au](http://www.petroleum.pir.sa.gov.au)>. Go to Environment & Land Access, Environmental Regulation, Goal Attainment Scaling, Field Guides.



**Figure 2** Compliance of wellsite and access track restoration activities.

The goal attainment scores criteria currently utilised are currently being reviewed through the work of Fatchen and Woodburn. In summary, scores of –2 and –1 represent unacceptable restoration outcomes as observed and assessed against the criteria, whereas 0, +1 and +2 represent acceptable outcomes expected at various time frames since the completion of the restoration work on the wellsites and access tracks.

The inspection results to date show that, in general, wellsite and access track restoration activities have been successful in attaining desired restoration objectives.

In the case of visual impact objectives, a goal attainment score of –1 is the result of past practices (no longer utilised) where excessive foreign material was brought in to construct access tracks and wellsites. In many cases the colour of such material has resulted in a visual impact in contrast to the surrounding soil.

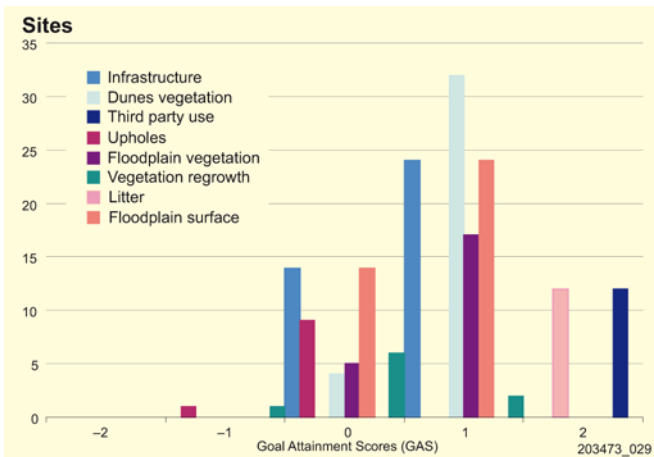
In the case of the revegetation objective, a –1 score is a result of past restoration practices (now discontinued) where sites were not ripped to facilitate re-vegetation. In all these cases, it is expected that the impacts will naturally remediate, however over a longer period of time than if current restoration practices were adopted at the time.

Figure 3 shows goal attainment scores for a selection of seismic surveys recorded during 2006. Particularly noteworthy is the number of observations in the +1 and +2 ranges for various criteria. These results provide a further example of the high standard achieved by licensees undertaking geophysical field operations during 2006.

In 2006 inspection activities also included visits to operations in Queensland to assess and review rig operations in anticipation of rigs in question being used in South Australia. These inspections were conducted in collaboration with the Queensland Department of Natural Resources Petroleum Inspectorate and assisted in proactively avoiding noncompliant activities in South Australia by addressing foreseeable nonconforming drilling equipment prior to commencing any operations in the state.

### **Development of airborne video monitoring and surveillance system**

A new high-resolution aerial camera was installed as part of PIRSA's airborne video monitoring and surveillance system. This camera provides PIRSA with the ability to acquire higher definition imagery of linear features (e.g. seismic lines and pipeline routes), and point features (e.g. wellsites). It was successfully trialled in acquiring imagery along a proposed pipeline route for Santos in its production areas in the Cooper Basin.



**Figure 3** Compliance of seismic line preparation activities with the relevant SEO.

The camera was also used in an extensive aerial survey flown to monitor the processes of natural rehabilitation on a selection of petroleum exploration wellsites and seismic lines in the remote Officer Basin and Eringa Trough areas of the north of South Australia.

**Legacy issues**

Santos and its joint venture partners, as licensees of the now expired PELs 5 and 6, have set aside funds to offset the residual environmental effects of their seismic exploration activities in the Merninie Range, to the north of Innamincka. The funds are administered under a formal deed of arrangement between Santos and the Minister for Mineral Resources Development, and are dedicated for projects that are to provide a tangible benefit to the environmental assets of the Innamincka Regional Reserve. The Department for Environment and Heritage, as the manager of the reserve, is submitting a list of projects that fit the requirements contained in the deed of arrangement.

**Serious incidents**

Section 85 of the Act defines a serious incident as an incident arising from activities conducted under a licence in which:

- (a) a person is seriously injured or killed
- (b) an imminent risk to public health or safety arises
- (c) serious environmental damage occurs or an imminent risk of serious environmental damage arises
- (d) security of natural gas supply is prejudiced or an imminent risk of prejudice security of natural gas supply arises.

Furthermore, pursuant to Regulation 12, more specific definitions of events which constitute a serious incident under the broad definition in s. 85 are provided in respective SEOs.

Any serious incident must be reported to PIRSA immediately and then followed up by a detailed report explaining the root cause and corrective actions taken to prevent its re-occurrence. The Act requires licensees to take appropriate action to ensure that any long-term damage is avoided (i.e. breach to relevant SEO), and that adequate corrective action is taken to minimise the likelihood of the re-occurrence of such an incident. Therefore one of the purposes of requiring licensees to prepare and submit detailed reports into the cause of such incidents and the proposed corrective actions to prevent their reoccurrence is to ascertain whether a breach has occurred and warrants further enforcement action.

During 2006, four serious incidents were reported:

- *Moomba Plant gas supply outage incidents.* One of these incidents was a 17 hour gas supply reduction from the Moomba Plant on 11 July 2006. This incident was a result of an unforeseeable problem with the instrument air control system causing a 2.5 hour outage of air supply to instrumentation in the plant and leading to an unavoidable shut down of the gas processing plant. The detailed report into this incident was submitted to PIRSA by Santos on 10 October 2006. After reviewing the report, with the assistance of an external expert in this field, PIRSA was satisfied that Santos had responded appropriately to the cause and that the corrective actions taken have reduced the risk of a recurrence of such an incident to as low as reasonably practicable.
- *Pipeline incidents.* The remaining three serious incidents in 2006 involved unintentional contact with high-pressure gas pipelines during excavation work by contractors to the Santos-operated gas production joint venture in the Cooper Basin region. The first of these occurred in May 2006 with the remaining two on 3 and 18 November 2006, respectively. In all cases no damage to the integrity of the pipelines occurred. The subsequent preliminary and taproot investigations into these incidents identified failure in the procedures and work practices for locating and excavating adjacent to high-pressured buried pipelines as the root cause. In response to the 18 November incident, PIRSA immediately issued a formal show cause letter requesting the operator to give reason for not having their low level official supervision status revoked, pursuant to s. 74 of the Act with respect to all excavation activities in the Cooper Basin. Santos, as the relevant licence operator, advised that it had suspended all excavation work and subsequently provided a detailed action plan to rectify this problem to PIRSA's satisfaction. The progress of this action plan will be followed through at forthcoming quarterly compliance meetings with the operator until it is closed out to PIRSA's satisfaction.

### **Education and support initiatives**

A key component to any preventative measure is the need for regulators to effectively educate and advise industry on regulatory requirements to support their efforts in achieving compliance. An effective means for providing such education and support initiatives is through various regulatory and industry forums where PIRSA's regulatory requirements and philosophy can be communicated effectively and efficiently to industry representatives. Initiatives undertaken in 2006 are discussed below.

**Drilling rig internal audit tool.** In 2005 PIRSA initiated a major review into the fitness for purpose of drilling rigs operating in South Australia. As a result of the outcome of this review, PIRSA identified that drilling operators needed to develop an audit tool to more effectively and consistently demonstrate the level of health, safety and environment compliance achieved by drilling rig operations, not only in South Australia but also across all jurisdictions. The scope of the tool is to cover the extent to which rig equipment, personnel competencies and management, and maintenance systems are fit for purpose and effective. The benefits of adopting such an audit tool were presented by PIRSA at the APPEA National Safety Conference in March 2006. Industry and other government regulators agreed that a need for such an audit tool exists. PIRSA subsequently facilitated meetings with state, territory and federal regulators in 2006 to progress the development of such a tool. These multi-jurisdiction discussions resulted in the publication of a discussion paper (detailing the key elements and features of such an audit tool) that was distributed to all licensees and drilling contractors for comments in 2006. Industry's suggestions and recommendations for such a tool are now being considered. It is anticipated that during 2007 a tool will be developed and adopted by the drilling industry.

**Stakeholder consultation principles.** In line with the Petroleum Act principles of transparency and openness, PIRSA has taken an active role in promoting the need for effective stakeholder consultation in the resources industry. As part of this role, in 2004, PIRSA chaired a working group established by the Ministerial Council on Mineral and Petroleum Resources to develop a set of principles for the resources

industries to adopt for community and stakeholder engagement. These principles have been widely recognised and adopted by both industry and government and are available on the [Petroleum Channel](#)<sup>4</sup>.

In 2006, PIRSA, as the chair of this working group, was invited to present and promote these principles to the industry and other government sectors. These included presentations at the National Regulatory Reform Conference on 25 October and the APPEA Environment Conference on 21 November.

**Australian Standard AS 2885 for high-pressure pipelines.** The Petroleum Act requires compliance with the AS 2885 series of standards for high-pressure pipelines. PIRSA plays an active role in the formulation and promulgation of the standard. PIRSA has formal membership of the ME38 committee responsible for the standard, and also sits on the sub-committees responsible for the revisions to AS 2885.1 *Design and construction*, and AS 2885.3 *Operations and maintenance*. In 2006 PIRSA was invited by the Australian Pipeline Industry Association (APIA) to present papers at two pipeline industry seminars. A paper entitled 'Meeting the requirements of AS2885' was presented at the May APIA seminar (Commercial Challenges, Realities and Responsibilities Across the Pipeline Industry), and 'A regulator's view of AS 2885' was presented at the August APIA Seminar (AS 2885 Compliance).

**Offshore issues — Commonwealth Petroleum Submerged Lands Act.** PIRSA is the Australian Government's South Australian Designated Authority for the administration of the Commonwealth *Petroleum Submerged Lands Act 1967*. And as the Designated Authority, PIRSA assessed and approved the survey applications and environmental plans for two offshore seismic surveys.

In the case of Woodside Petroleum's EPP 29 Trim 3D Seismic Survey, officers from PIRSA attended the start up induction for the survey and also conducted an environmental audit of the *M/V Ramform Victory* — the seismic data acquisition vessel contracted for the survey.

In accordance with the mantra of building trust with stakeholders, PIRSA initiated the formation of a group whose membership included PIRSA, Santos and the South Australian Museum. The function of the group is to focus on studies relating to any possible relationship between cetacean behaviour and offshore seismic surveying operations.

The projects currently being progressed include:

- a web-based literature review into current research
- research into any potential relationship between whale strandings and offshore seismic surveys
- collation of reports on observations of whale behaviours and offshore seismic surveys
- the standardisation of whale observation reporting forms.

## Step 2: Persuasive measures

In the case where noncompliance with the Act or reportable or serious incidents are not responded to appropriately, or adequately, by the licensee, Step 2 on the compliance and enforcement pyramid (Fig. 1) is triggered. The purpose of such measures is to instigate urgent corrective action from the licensee through formal expression of concern from the regulator regarding the licensee's compliance and the threat of more punitive action.

In 2006 there were two Step 2 cases (persuasive measures). Both of these related to the formal 'notice of noncompliance' and the formal 'show cause' letters for 3 and 18 November pipeline incidents, respectively,

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4 <[www.petroleum.pir.sa.gov.au](http://www.petroleum.pir.sa.gov.au)>. Go to Environment & Land Access, Environmental Regulation, Consultation Requirements.

discussed above. In light of the response given, PIRSA was satisfied and saw no reason to pursue more punitive measures to elicit compliant behaviour.

### Step 3: Compulsive measures

In the case where Step 2 measures fail to deliver the required compliant behaviour, ministerial directions or prohibitions under the Act are available. In 2006 no such measures were required.

### Step 4: Punitive measures

As a final measure, for extreme cases where noncompliant behaviour cannot be dealt with effectively through Steps 2 and 3, prosecution and ultimate licence cancellation measures are available. To date no such measures have been required to ensure compliance.

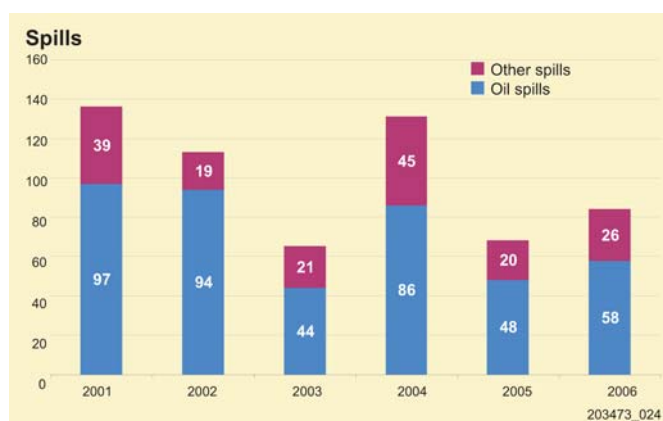
## COMPLIANCE STATISTICS

The following graphs provide a snapshot of the upstream petroleum and geothermal industries' performance in terms of incidents (both reportable and serious) and the findings of the root cause analysis into these incidents.

### Spill incidents

Under the Petroleum Act and, as defined specifically under the relevant SEOs, all incidents involving the uncontrolled release of hydrocarbon or other contaminants (including produced water) into or onto an area that has not been designed for the specific purpose of containing such a release, are deemed to be spills, regardless of the volume released. For example, if a tank containing oil ruptures and the contents released are contained inside the impervious bunded area surrounding the tank to prevent environmental damage, this is not deemed a spill and, hence, is not required to be reported as a spill. On the other hand, in the case of the same incident where a portion of the oil overflows the bund, then this is deemed a spill and must be reported in accordance with the regulatory requirements.

Figure 4 is a graph of all spills reported since 2001 to end of 2006 for the onshore petroleum and geothermal industries in South Australia. The graph shows the portion of these spills that are oil and other contaminants. The frequency and relative volume of spilled fluids in 2006 is shown in Figure 5.



**Figure 4** Annual regulated substance spills reported over five years.

The number of spill incidents shown in Figure 4 needs to be considered in the context of the severity (in terms of environmental consequence of the spills, and the volume of oil spilled; Fig. 5). Figure 6 shows that the oil spilled expressed as a percentage of total oil production is small and trending lower, from around 0.18% (805 m<sup>3</sup>) in 2001 to less than 0.01% (18 m<sup>3</sup>) in 2006. The relatively higher percentages in 2001 and

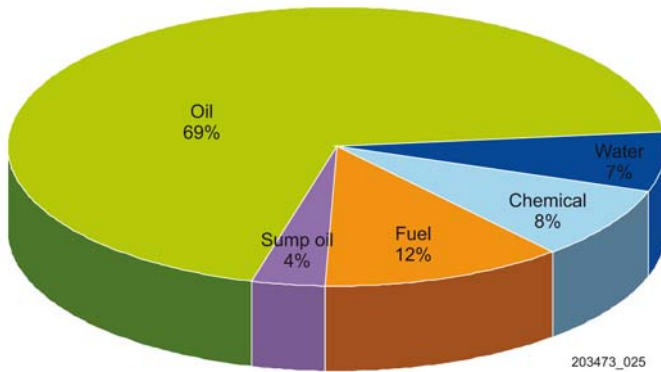


Figure 5 Category of regulated substance spills reported during 2006.

2002 represent two major spill incidents that occurred in those years — a pipeline leak in 2001 released 500 m<sup>3</sup> (more than half the total volume spilled in that year) and a breach in an oil interceptor pond wall in 2002 released 200 m<sup>3</sup> of oil (again more than half the total spill volume for that year). Between 2001 and 2006 only one incident (the 2001 pipeline leak of 500 m<sup>3</sup>) was deemed as having the potential to cause serious environmental harm and was hence treated as a serious incident under the Act. The decreasing trend shown in Figure 6, despite increases in the volumes of annual oil production over this period, reflects substantial improvement in the effectiveness of industry’s oil spill prevention and management contingencies.

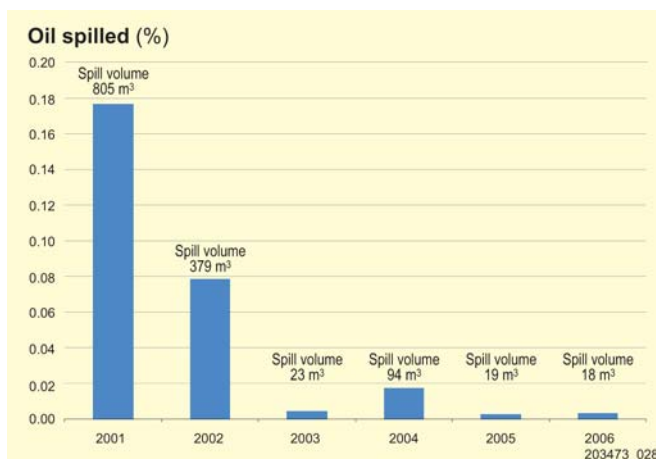
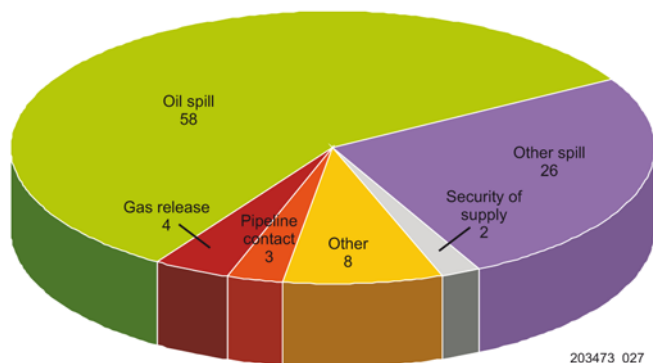


Figure 6 Percentage of volume of oil spilled to total oil produced.

## Other incidents

Spill incidents are reported and monitored due to their potential environmental risks, such as pollution and contamination of water and soil, the degradation of vegetation and/or the productive capacity of the land affected. The scope of the Petroleum Act however, also includes objectives pertaining to public safety, security of supply and the protection of interests of other land users and land owners. Therefore incidents reported to PIRSA from time to time include incidents that may impact on compliance with these other objectives. Figure 7 gives a breakdown of the total number of incidents for the year 2006 into the various categories recorded by PIRSA.

**Security of supply.** These incidents represent incidents relating to gas processing facilities or gas transmission pipelines, which have resulted in sufficiently long outage to warrant concern regarding a potential for interruption or restrictions to gas supply.



**Figure 7** Category of regulated substance incidents for 2006.

**Pipeline contact.** Such incidents relate to unintended contact or unauthorised third party interference with high-pressure pipelines that may have detrimental third party risk implications.

**Gas release** These incidents relate to uncontrolled and unintended releases at processing facilities and pipelines. Such incidents may be indications of equipment integrity issues that may have either or both security of supply and/or safety implications.

**Other.** These incidents include detected unauthorised third party pipeline easement encroachments, road incidents such as vehicle accidents involving personnel and vehicles associated with activities regulated under the Act, landowner issues, and heritage disturbance issues. Historically, these incidents have been rare and therefore had not warranted their own category. In 2006 these incidents were all related to pipeline easement encroachments

The security of gas supply incidents shown in Figure 7 include the instrument air outage incident on the 11 July at the Moomba Plant. This incident was reported and dealt with as a serious incident under the Act. The second such incident related to a minor disruption to steam supply that resulted in a brief reduction in gas plant production.

The three pipeline contact incidents in 2006 were reported and treated as serious incidents. None resulted in loss of containment. The remaining incidents shown on the chart in Figure 7 were all reported and treated as reportable incidents under the Act.

For all incidents in 2006, the licensee responses and preventative corrective actions satisfied the Act's and PIRSA's requirements.

## Road transport safety compliance

In the context of the Petroleum Act's public safety protection objective, PIRSA maintains a regulatory focus on public safety risks associated with various regulated activities. One such risk relates to road transport of heavy equipment such as drilling rigs and crude oil tanker transportation on public roads. A key strategy adopted by PIRSA in facilitating compliance with this objective is through a collaborative initiative with the South Australia Police (SAPOL) and the Department for Transport, Energy and Infrastructure (DTEI). Through this approach the industry is educated on the road transport regulatory requirements with respect to transporting oversize and heavy loads and is informed through PIRSA on SAPOL–DTEI detected road transport breaches. During 2006 PIRSA with SAPOL and DTEI have monitored the level of compliance and have jointly sought to resolve detected breaches through this education and information initiative.

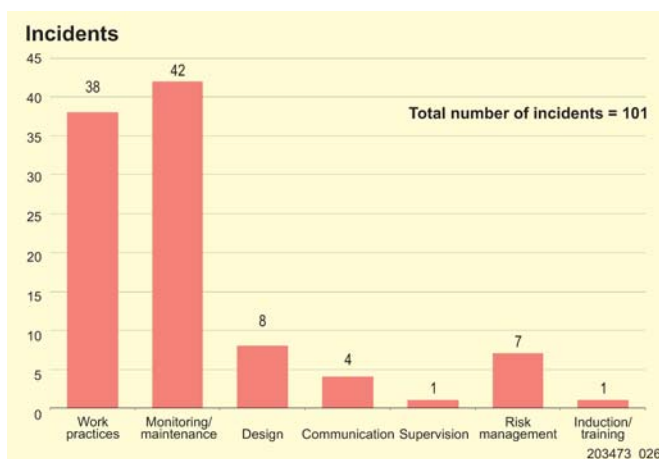
## Root cause analysis

As highlighted earlier, through the Regulation 16 operator assessment factors, the PIRSA focus is on licensees' capabilities to achieve SEO compliance in terms of personnel competency, fit-for-purpose equipment and management system effectiveness. Therefore PIRSA analyses the root cause of reported incidents to ascertain any potential shortcomings in these operator assessment factors. PIRSA analysis of root causes of reported incidents is carried out against the following causal factors that are the primary contributors to the cause of the incident:

- *Design.* The suitability and fitness for purpose of the equipment utilised in the activity.
- *Monitoring/maintenance.* Inadequate monitoring of and preventative maintenance on the equipment utilised in the activity.
- *Work practices.* Either unclear, incorrectly used or the absence altogether of written procedures.
- *Communication.* Absence or error in communication between personnel performing the activity.
- *Supervision.* Absence or inadequate support, oversight or supervision of those carrying out the activity by the person in charge (supervisor).
- *Risk management.* Inadequacy of the risk review or assessment of the activity (e.g. job hazard analysis (JHA), permit to work (PTW), hazard analysis (HAZAN)/hazard and operability (HAZOP)) carried out prior to the activity.
- *Induction/training.* Appropriateness of training, skills and/or induction of the personnel carrying out the activity.

Figure 8 summarises the findings of the PIRSA root cause analysis of reported incidents during 2006. These findings show that the majority of incidents in 2006 were a result of deficiencies in either work practices adopted or in the monitoring and maintenance of equipment. In all these cases PIRSA is satisfied that the relevant licensees took appropriate corrective action. For some of these cases PIRSA continues to monitor the progress of the corrective actions until they are satisfactorily implemented.

Furthermore, as a result of these findings the focus of PIRSA's inspection and review activities in 2007 will be on these aspects of licensee management systems.



**Figure 8** Summary of root causes of incidents in 2006.

## Data compliance

Explorers and producers of petroleum are required under the Petroleum Act to provide PIRSA with geotechnical and ancillary data relevant to operations. The types of data are defined in the Regulations. These data become a future asset for the state and are used to assist future explorers in investment opportunities. Guidelines for the format, timing and content of these data have been developed by PIRSA to

assist companies comply with these requirements. Due to the highly sophisticated and complex nature of the data involved in the petroleum and geothermal industry, some guidelines are particularly detailed, and many companies struggle to meet them, particularly in the first instance. PIRSA provides considerable assistance to new explorers in attempting to meet the guidelines. This assists in developing capacity to comply in the future, as well as facilitating the collation of state-wide assets for future use.