



**MONTARA:
A LESSON
LEARNED**



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MONTARA INCIDENT SUMMARY

- The Montara H1 ST1 well had an uncontrolled release on 21st August 2009.
- All 69 people on the West Atlas drilling rig were evacuated safely.
- About 400 barrels of oil per day spilled to the sea for 74 days.
- The oil spill response coordinated by Australian Maritime Safety Authority (AMSA) was successful - no oil reached the coastline of Australia or Indonesia. Natural dispersion was aided by the aerial application of limited oil dispersants, and skimming/recovery was used.
- The West Triton rig was mobilized and a relief well was safely drilled.
- The H1 ST1 well was brought under control on 3rd November 2009.
- The Australian Government set up a Commission of Inquiry which reported in November 2010.
- The Commission of Inquiry found that the main causes of the Montara Incident were failure to maintain verified well barriers, lack of personnel competence, failure to follow procedures and limited corporate oversight.
- The Commission of Inquiry made 105 recommendations for PTTEP Australasia (Ashmore Cartier) Pty Ltd., the Government and industry. One significant recommendation was for the Minister of Resources and Energy to review PTTEP AA's license to operate.





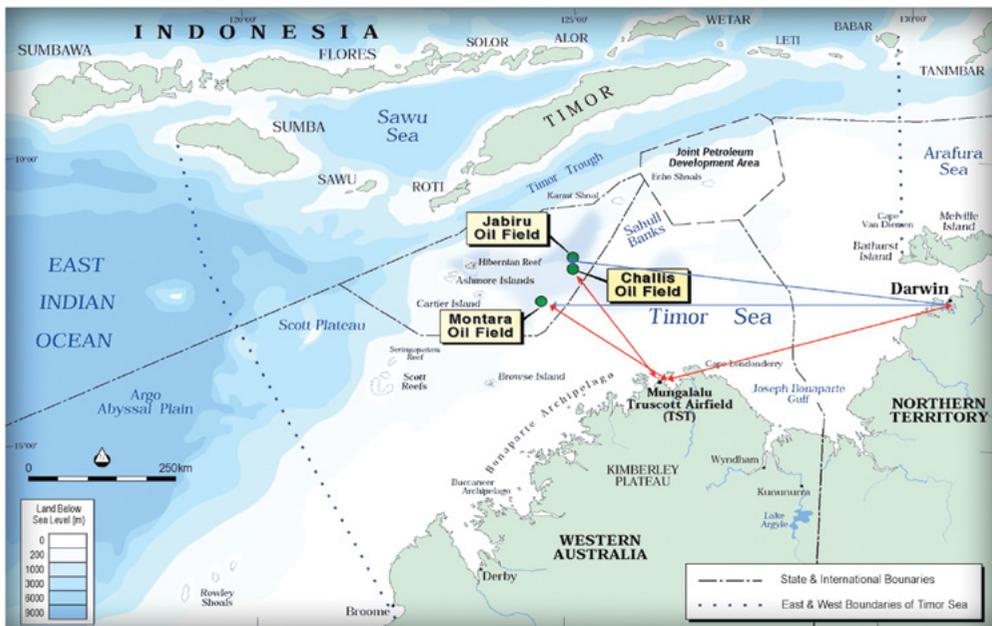


- Following an independent review by Noetic, the Government's auditors, the Australian Government decided not to withdraw PTTEP AA's license to operate, but imposed special title conditions.
- The Montara Action Plan was first developed before the inquiry and subsequently modified when the Commission Report was issued and Noetic did their first review. The company completed all actions under the Plan by the end of 2012.
- PTTEP AA operated under close Government scrutiny by a Deed of Agreement between February 2011 and June 2013, during which time there were five reviews by Noetic. On 21st June 2013, the Minister of Resources and Energy announced the satisfactory conclusion of the Deed and the special title conditions were lifted.
- A Corporate Lessons Learned (CLL) Plan was developed to make sure lessons learned were implemented at the PTTEP corporate level. This was completed in Q3/2012.
- PTTEP AA funded long term scientific monitoring by independent research institutions which had oversight from the Australian Government. All results are published on the Department of the Environment and Energy website.
- No lasting impacts on the health of any species or habitats were found.



BACKGROUND TO THE MONTARA INCIDENT

PTTEP acquired Coogee Resources Limited, a small independent Australian oil company, in February 2009. In addition to operating 16 permits and the Jabiru and Challis FPSO's, Coogee was also developing the Montara Oil Field in the Timor Sea, offshore North West Australia. The operating model adopted at that time was conducted in Australia with limited oversight from Bangkok.



Event Timeline

7th March 2009

Well cementing operations at Montara were completed and the West Atlas rig demobilized from site to allow for project construction works. The latent hazard of a wet shoe was not identified after cementing operations were completed on the H1 ST1 well 9 ⁵/₈ inch casing.

19th August 2009

The West Atlas rig returned to site to complete the wells.

21st August 2009

05:30

Well H1 ST1 “kicked” i.e. started flowing. Personnel went to muster stations. The well stopped flowing by itself soon after.

07:30

The well started to flow again, this time much more strongly than before. Personnel were mustered and evacuated from the rig using lifeboats.

Gas and oil flowed from the well. There was no ignition at this time. The oil flow was estimated at 400 barrels per day. Spill response operations were passed to the command and control of AMSA.

11th September 2009

The West Triton rig arrived at Montara after mobilization from Singapore and commenced drilling a relief well.

1st November 2009

The first attempt was made to pump heavy mud and kill the well flow. After initial appearances of success the well started to flow again. This time ignition occurred from an unknown source. Gas and oil burned for 2 days and flow to the sea stopped.

3rd November 2009

The second well kill operation was successful. The well stopped flowing after 74 days. Subsequent operations were performed to secure and make safe the well.



IMMEDIATE INCIDENT RESPONSE

The initial emergency response on the rig was carried out professionally and all 69 persons on board were safely transferred to a nearby construction vessel. Evacuation was done by lifeboat without incident. This highlights the importance of emergency plans, drills and exercises.



The following major actions were taken within 72 hours of the incident occurring.

- Emergency and Crisis Response Teams were established at PTTEP AA in Perth and PTTEP in Bangkok.

- Command and control of spill response passed to AMSA as per the National Oil Spill Response Plan. Specialist oil spill response support was mobilized to Australia by PTTEP. A Hercules aircraft was flown from Singapore to Darwin and began oil dispersant spraying operations.
- Well control experts were mobilized from Singapore to PTTEP AA in Perth and on site at Montara.
- A jack-up drilling rig (West Triton) was contracted to drill a relief well.

SPILL RESPONSE

Control of spill response strategy, planning and execution was handed to AMSA on the day of the uncontrolled release. PTTEP and PTTEP AA supported AMSA by providing logistics support and immediately offering to underwrite all costs related to spill response.

Valuable assistance was also provided by the Australian Marine Oil Spill Centre, which is the oil industry-funded spill response organization.



The primary objective was to prevent oil from reaching shore. Montara oil is quite light (34° API) along with high sea and air temperatures, therefore there was significant natural evaporation.

Limited amounts of dispersants were also applied by aircraft and boats. Skimming was also used to recover oil.

Overall the response to the Montara spill went well. No oil reached shore. The closest that oil came to making landfall was recorded at 35 km from the Australian coastline and 94 km from Indonesia coastline (West Timor).

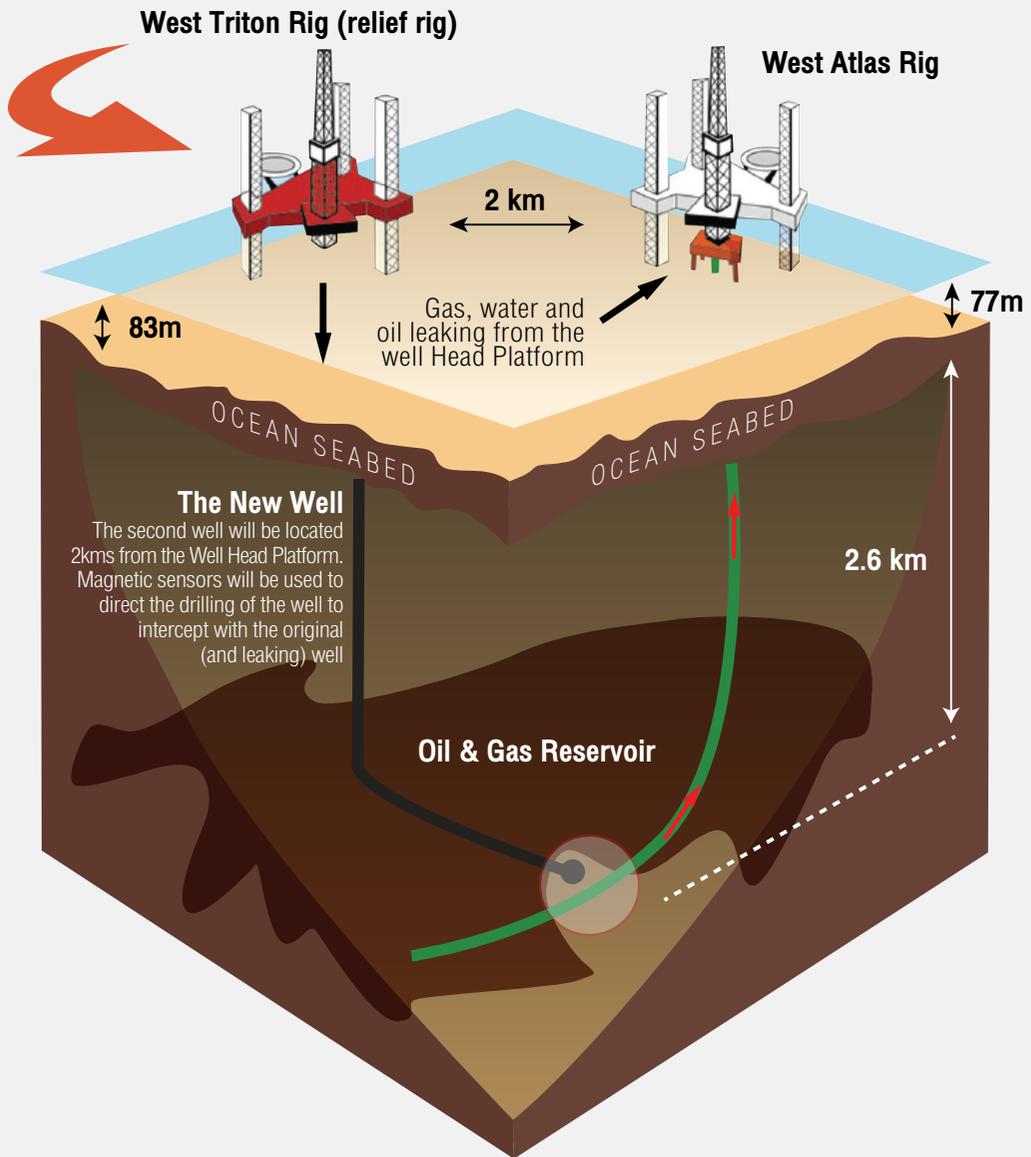
By 3rd December 2009 all spill response operations had ceased on instruction from AMSA.

WELL CONTROL

Options to control the well were investigated and subjected to risk assessments. In all these deliberations safety of personnel was paramount. One early option of boarding the West Atlas rig to cap the well was discounted because it would have posed too much risk to personnel, due to the potential for ignition of oil and gas flowing from the well.

Drilling a relief well was the only practical option. The West Triton rig was contracted and mobilized from Singapore, arriving some 3 weeks later.

The West Triton rig was positioned in a safe location 2 km away from the West Atlas rig. The relief well was drilled safely and successfully, with interception of the flowing well occurring on the fifth attempt. The technical challenges were significant - trying to intercept a dinner-plate sized target 2.5 km below the seabed.



MONTARA ACTION PLAN (MAP)

The MAP was developed within PTTEP AA from a number of sources – our internal investigation, the Commission of Inquiry and the Noetic review.

The MAP contained 9 main themes and 59 individual actions.

PTTEP AA has undergone a complete transformation since the Montara incident. One development has been adopting the concept of a “Mindful Organisation” to help improve SSHE culture.

The Minister of Resources and Energy stated that a final review of the MAP in May 2013 concluded that the company had made a transformation in all aspects of its business, and is a very different company and one that exhibits both good oilfield and corporate practice.

This transformation was recognized by the Minister when he announced the ending of the Deed of Agreement in June 2013. The Minister stated that the company

- had improved its systems, processes and culture to ensure these changes were sustainable, and
- had taken an industry lead in developing new and innovative techniques for ensuring safe operations.

Following completion of the action in the MAP, sustainability became the focus of attention both in PTTEP AA and in its headquarters, Bangkok.

MONTARA COMMISSION OF INQUIRY

The Australian government launched a Commission of Inquiry into Montara. Public hearings were held in Canberra during 15th March–16th April 2010.

The Commission of Inquiry Report was published on 24th November 2010.

It contained 100 findings and 105 recommendations which had broad implications for governments, regulators and the operational processes and procedures of the offshore petroleum industry.

The Commission of Inquiry made some positive findings for PTTEP AA:

- Injury free evacuation of all 69 personnel on the drilling rig.
- Underwriting of oil spill response costs and providing logistics support to AMSA.
- Acting appropriately in undertaking to drill a relief well.
- Highest considerations for human safety when reviewing well control options.
- Acting diligently, with vigour and a sense of urgency in relief well operations.
- Largely achieving the objective of preventing oil from impacting sensitive marine resources (supporting the work of AMSA).
- Initiating and funding the long term Environmental Monitoring Program.

In August 2012, PTTEP AA pleaded guilty in the Darwin Magistrates Court to four charges arising out of the Montara incident. The charges were brought against the company by the Australian Government Solicitor, under the Offshore Petroleum and Greenhouse Gas Storage Act 2006. Three of these charges related to a failure to maintain a safe workplace, and one a failure to observe good oilfield practice in accordance with the relevant provisions of the Act. The company was fined a total of \$510,000. This concluded all Australian Government legal matters in relation to the Montara incident.

DEED OF AGREEMENT

Based on the findings of Noetic, the Government's auditors, the Minister of Resources and Energy announced in February 2011 that PTTEP AA's license would not be withdrawn. However, the company would only be allowed to operate under a comprehensive and rigorous monitoring regime with an initial duration of 18 months. This was formalized in a binding Deed of Agreement between the Department of Resources, Energy and Tourism (DRET) and PTTEP signed in February 2011. The main features were

- Monthly progress reports must be submitted to DRET.
- Meetings to be held with DRET on a quarterly basis.
- Independent reviews of the Montara Action Plan progress (by Noetic) every 6 months.

Following the completion of five reviews by Noetic the Minister for Resources and Energy announced the end of the Deed in June 2013 stating that the company had successfully implemented the Montara Action Plan and had met its obligations under the Deed. He also announced the ending of the special Title Conditions at the same time.







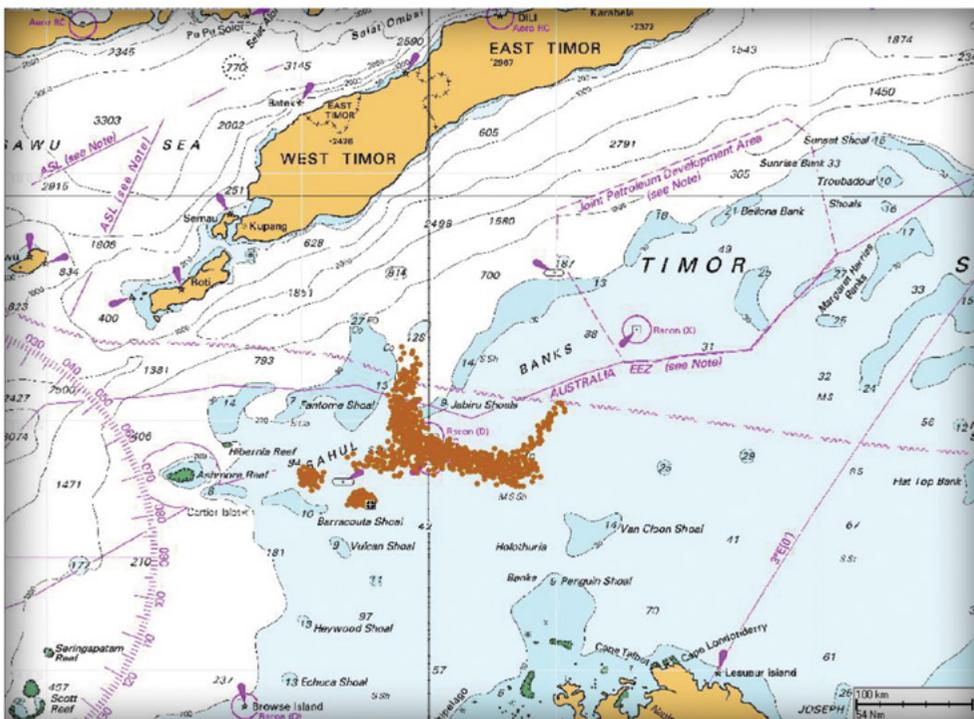
LONG TERM ENVIRONMENTAL MONITORING

During the Montara spill:

- The majority of observed oil remained within 35 km of Montara while patches of sheen and weathered oil were reported at various distances and directions.
- No oil reached the Western Australian or Indonesian coasts.
- The closest oil approached to shore was 35 km from the Australian coastline on 5th November 2009 and 94 km from the Indonesian coastline on 21st September 2009.

(Reference: AMSA Montara Investigation Team Report)

The map below shows a hindcast of the oil spill on 3rd September 2009.



PTTEP AA confirmed it would pay for costs of the Montara incident on the day it occurred. In October 2009, the company also agreed to fund an environmental monitoring program to address any long term impacts under an agreement with the Department of the Environment and Energy (formerly Department for Sustainability, Environment, Water, Population and Communities or DSEWPaC).

Independent research was carried out by the following world-class Australian institutions:

- Queensland, Curtin, Monash and Charles Darwin Universities.
- Commonwealth Scientific and Industrial Research Organization (CSIRO).
- Australian Institute of Marine Science.
- Asia Pacific ASA.

All studies are transparent and were released to the public through the Department of the Environment website.

The results of the studies have detected some exposure of marine life and eco-systems to hydrocarbons in some areas although it is unclear as to whether this was from the Montara spill. However, there appears to have been no discernible impact detected on the health of any species or habitats.

One positive outcome of the monitoring program is that a significant body of new baseline scientific data on the Timor Sea and Western Australia coastline was created. This has been shared with the industry and wider community.

To this end, PTTEP AA has published Reports of Research in July 2012 and September 2013 to highlight the work done in producing this world-class body of scientific research into the region's marine environment which can be found via the following links:

- <http://www.environment.gov.au>
- <http://www.au.pttep.com/our-business/montara-incident/>



Montara Environmental Monitoring Program
Report of Research



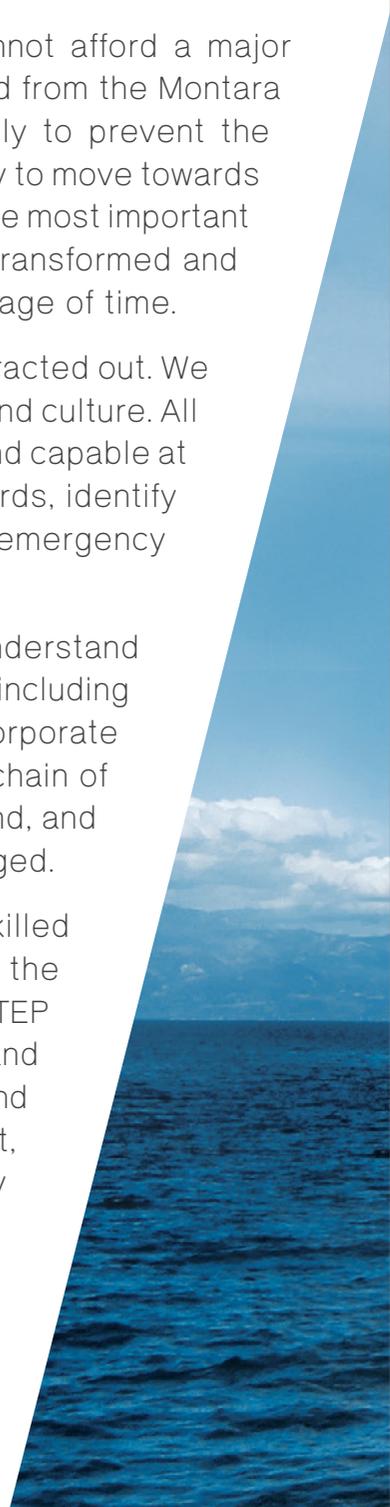
KEY LESSONS FROM THE MONTARA INCIDENT

The Montara incident has reminded us that we cannot afford a major accident again. PTTEP Group, as a whole, has learned from the Montara incident and has transformed in many ways not only to prevent the recurrence of the similar incidents but also to be ready to move towards sustainable growth through Operational Excellence. The most important thing is to pass on the information of what we have transformed and ensure that the messages are not lost with the passage of time.

Accountability for safety and integrity cannot be contracted out. We cannot be complacent about our SSHE performance and culture. All PTTEP personnel and contractors will be competent and capable at all times and will strictly comply with relevant standards, identify and mitigate likely errors and effectively manage emergency situations.

Wherever we operate, it is critical that we clearly understand and strictly comply with the local laws and regulations including company regulations, standards and procedures. Corporate oversight has been strengthened to ensure a clear chain of command and that business decisions made are sound, and risks are properly identified and appropriately managed.

It is worth reiterating that no one was injured or killed and there was little or no long-term impact upon the environment as a result of the Montara incident. PTTEP places the highest priority on safety of our personnel and contractors whilst striving to protect the environment and critical resources. Crisis and emergency management, drills and exercises are important and will be strictly adhered to for immediate incident response.





The key lessons from the Montara incident that apply to both PTTEP and PTTEP AA are:

Governance

Systems and structures were put in place to ensure an appropriate level of corporate oversight of subsidiary activities, including a Corporate Governance Framework.

In addition, Service Level Agreements (SLAs) between the PTTEP SSHE function and all operating Assets, both domestic and international, were developed to clearly describe expectations and responsibilities for SSHE Management System (MS) implementation.

Corporate audits and reviews are used to monitor each subsidiary's activities and performance.

Safety Culture

Underpinning all aspects of PTTEP and PTTEP AA work is Safety Culture. PTTEP AA completed a Safety Culture survey at the end of 2010, 2012, 2013 and 2015, showing a significant improvement. Results were analysed and measures to improve Safety Culture have been followed up by a dedicated work group. Regular feedback on progress has been given to staff. The survey is to be repeated regularly for continuous improvement.

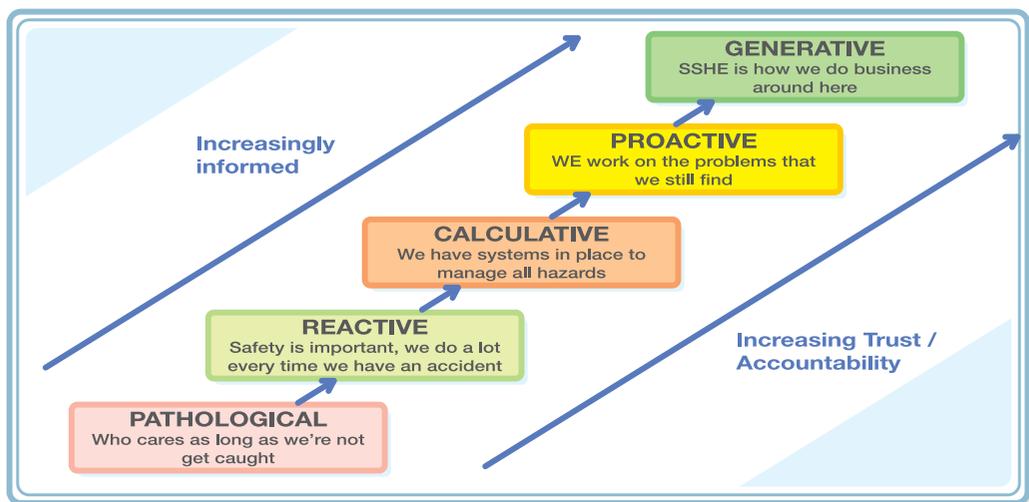
Strengthening Safety Culture is also a key objective at PTTEP Corporate level. Our aim is to have Generative SSHE Culture meaning SSHE is the way we do business. Culture Surveys have been completed in 2011 and 2014 showing steady improvements. A further survey is planned for 2017.

In 2011 PTTEP launched the "Step Change in SSHE" initiative which is a catalyst for SSHE improvement including SSHE Culture. This initiative proved successful in helping improve SSHE Culture and performance. Step Change in SSHE was deployed until 2013 when a SSHE Culture Roadmap was implemented in response to changing circumstances.

Management Systems

Management Systems provide the references for how we conduct our business. Following Montara, the Corporate and PTTEP AA Drilling Management Systems have been re-written, taking into account good oilfield practices and lessons from the Montara incident. One of the key principles described is that there must be a minimum of two verified barriers in place during drilling and well operations.

PTTEP had developed a Competency Management System prior to the Montara incident. This was extended to PTTEP AA. Some additions were required to Job Competency profiles to account for the specific requirements of working in Australia e.g. familiarization with national legislation. Competency assessments have been done for SSHE, Projects and Operations personnel using Panel Assessors from PTTEP Bangkok and external experts.



The PTTEP Corporate SSHE Management System, comprising the SSHE MS manual, SSHE MS standards, procedures and guidelines, is continuously developed and reviewed to reflect current operations

and international best practices whilst meet all relevant SSHE laws and regulations. In 2011, SSHE Due Diligence and Joint Venture Requirements Standard was developed to ensure all relevant SSHE aspects are identified and evaluated before acquiring a new Asset. This brings our SSHE MS into line with IOGP and International Standards Organization recommended practices. PTTEP AA has also amended their SSHE MS, taking into account lessons from the Montara incident and Corporate requirements. One of the most important elements of the SSHE MS relates to Management of Change.

Any changes to work programs must be risk assessed and approved by Line Management.

It is emphasized that requirements of all Management Systems must be complied with.

What Can YOU Learn from the Montara Incident?

To prevent Major Accident Events there are 6 actions YOU can learn from Montara:

1. Always follow work procedures - they are there for your safety.
2. Be aware of the hazards and risks involved in your job.
3. Follow Management of Change procedures to risk asses any change in circumstance or procedure, including risk assessment.
4. Stop Work if you have any concerns about the safety of your job.
5. Report any near misses or accidents that occur.
6. Actively participate in safety meetings, discussions, campaigns, etc.

ACRONYMS AND EXPLANATIONS

AMSA	Australian Maritime Safety Authority. Responsible for oil spill response command and control.
APPEA	Australian Petroleum Production and Exploration Association. The exploration and production industry association in Australia.
Coogee Resources	Coogee Resources Limited (CRL) - a small, independent oil company in Australia, acquired by PTTEP in February 2009.
DRET	Department of Resources, Energy and Tourism. The Australian Commonwealth government department for resources, energy and tourism - now Department of Industry, Innovation and Science.
DSEWPaC	Department for Sustainability, Environment, Water, Population and Communities - now Department of the Environment and Energy. The Australian Commonwealth department involved in long term environmental studies post-Montara incident.
FPSO	Floating Production, Storage and Offloading
NOPSA/NOPSEMA	National Offshore Petroleum Safety Authority (since January 2012, the National Offshore Petroleum Safety and Environmental Management Authority). The Australian Commonwealth statutory authority responsible for health, safety, environment and integrity issues offshore.
Noetic Group	An independent management and risk consultancy company engaged by DRET to conduct independent reviews of actions taken by PTTEP and PTTEP AA since the Montara incident.
MAP	Montara Action Plan. The plan developed by PTTEP and PTTEPAA after the Montara incident to ensure lessons learned and no recurrence occurs.
IOGP	The International Association of Oil and Gas Producers, based in London.
PTTEP	PTT Exploration and Production Public Company Limited, based in Bangkok.
PTTEP AA	PTTEP Australasia Pty Limited, PTTEP's subsidiary company in Australia.
SSHE	Safety, Security, Health and Environment

APPENDIX 1 – MONTARA INCIDENT'S FIGURES

ITEM	MONTARA
Fatalities	0
Damage	West Atlas rig total constructive loss
Leak duration (days)	74
Leak rate (bbl/day)	400
Spill size (bbl)	30,000
People involved (max)	330
Vessels involved (max)	17
Aircraft involved (max)	11
Dispersants used (m ³)	Surface 140, subsea 0
Booms deployed (km)	2 short containment booms + skimming booms
Oil - water mix recovered (m ³)	493
Coastline oiled (km)	None
Dead birds recovered - visibly oiled	22
Dead turtles recovered - visibly oiled	1
Dead mammals recovered - visibly oiled	0

Sources: AMSA Presentation, Incident Response - Montara Wellhead Platform AMSA Website

REFERENCES

- **Department of Industry, Innovation and Science** - www.industry.gov.au (for government response to the Commission of Inquiry Report including the Deed of Agreement and independent reviews)
- **Australian Maritime Safety Authority** - www.amsa.gov.au (for spill response information)
- **Department of the Environment and Energy** - www.environment.gov.au (for environmental studies post-Montara)
- **IOGP** - <http://www.iogp.org/> (Global Industry Response Group, Well Expert Committee).
- **APPEA** - www.appea.com.au (Australian industry response to Montara)



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