

# Panel Session 7 - Operating in adverse weather conditions (disconnectable FPSOs in cyclonic regions)



Michael Hamblin  
General Manager Assurance – Production Division

OTC Asia / Kuala Lumpur  
27 March 2014

# Disclaimer and important notice

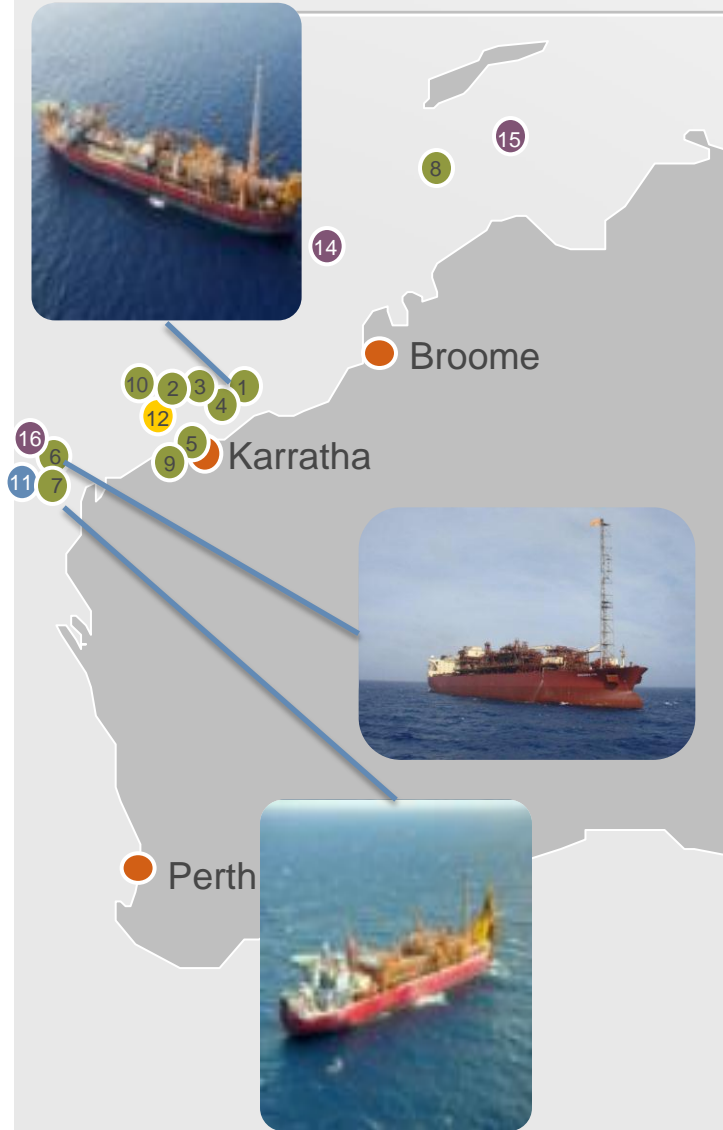
---

This presentation contains forward looking statements that are subject to risk factors associated with oil and gas businesses. It is believed that the expectations reflected in these statements are reasonable but they may be affected by a variety of variables and changes in underlying assumptions which could cause actual results or trends to differ materially, including but not limited to: price fluctuations, actual demand, currency fluctuations, drilling and production results, reserve estimates, loss of market, industry competition, environmental risks, physical risks, legislative, fiscal and regulatory developments, economic and financial market conditions in various countries and regions, political risks, project delay or advancement, approvals and cost estimates.

All references to dollars, cents or \$ in this presentation are to US currency, unless otherwise stated.

References to “Woodside” may be references to Woodside Petroleum Ltd. or its applicable subsidiaries.

# Areas of activity in Australia



## ● Our producing assets (operated)

- |                           |                            |
|---------------------------|----------------------------|
| 1 Angel platform          | North West Shelf           |
| 2 Goodwyn A platform      | North West Shelf           |
| 3 North Rankin Complex    | North West Shelf           |
| 4 <b>Okha FPSO</b>        | North West Shelf           |
| 5 Karratha Gas Plant      | North West Shelf           |
| 6 <b>Ngujima-Yin FPSO</b> | Vincent Field              |
| 7 <b>Nganhurra FPSO</b>   | Enfield Field              |
| 8 Northern Endeavour FPSO | Laminaria-Corallina Fields |
| 9 Pluto LNG Plant         | Pluto Field                |
| 10 Pluto platform         | Pluto Field                |

## ● Our producing assets (non-operated)

- |                                |                 |
|--------------------------------|-----------------|
| 11 Stybarrow Venture MV16 FPSO | Stybarrow Field |
|--------------------------------|-----------------|

## ● Our projects

- |                                  |                  |
|----------------------------------|------------------|
| 12 Greater Western Flank Phase 1 | North West Shelf |
|----------------------------------|------------------|

## ● Our developments

- |                |                 |
|----------------|-----------------|
| 14 Browse LNG  | Browse Basin    |
| 15 Sunrise LNG | Timor Sea       |
| 16 Laverda     | Greater Enfield |

## ● Woodside offices and representative offices

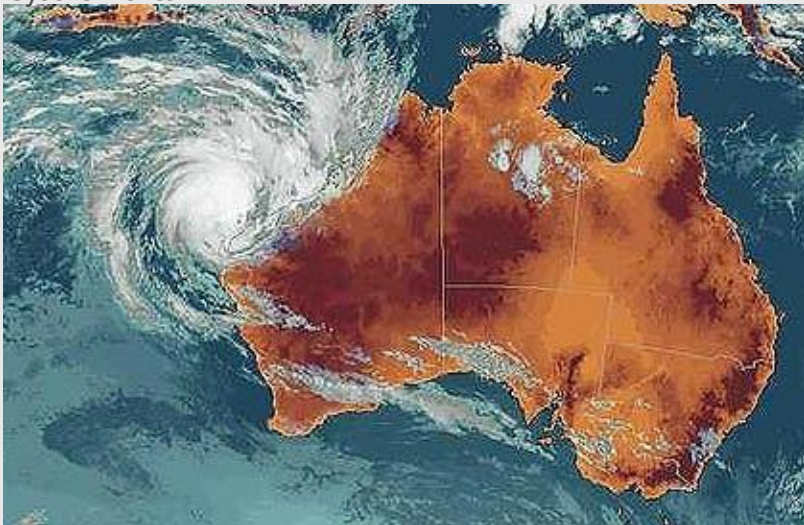
## Plus Previously:

- Jack up oil platform and FSO NWS Australia
- FPSO West Africa
- FPSO NWS Australia
- Gas platform and onshore plant Victoria Australia
- Other non operated JVs FPSOs, platforms and TLPs

# Why a disconnectable FPSO?

- Remote oil fields with no pipeline or terminal infrastructure.
- Extreme weather events (cyclones with 20+m waves and 300+km/h winds).
- Relatively shallow water (~100m) with riser motion limitations.
- Hull strength / topside strength / mooring strength.

Cyclone "Bianca"



Tanker in heavy weather



# Purpose of discussion

---

**How do we balance personal safety, environment, production and asset integrity risks for disconnectable FPSOs in extreme weather regions?**

In plain English we need to:

- Predict the cyclone.
- Shutdown the field.
- Get off the mooring.
- Get away out to sea.



# Performance Requirements (ALARP goal)

## Dependent on:

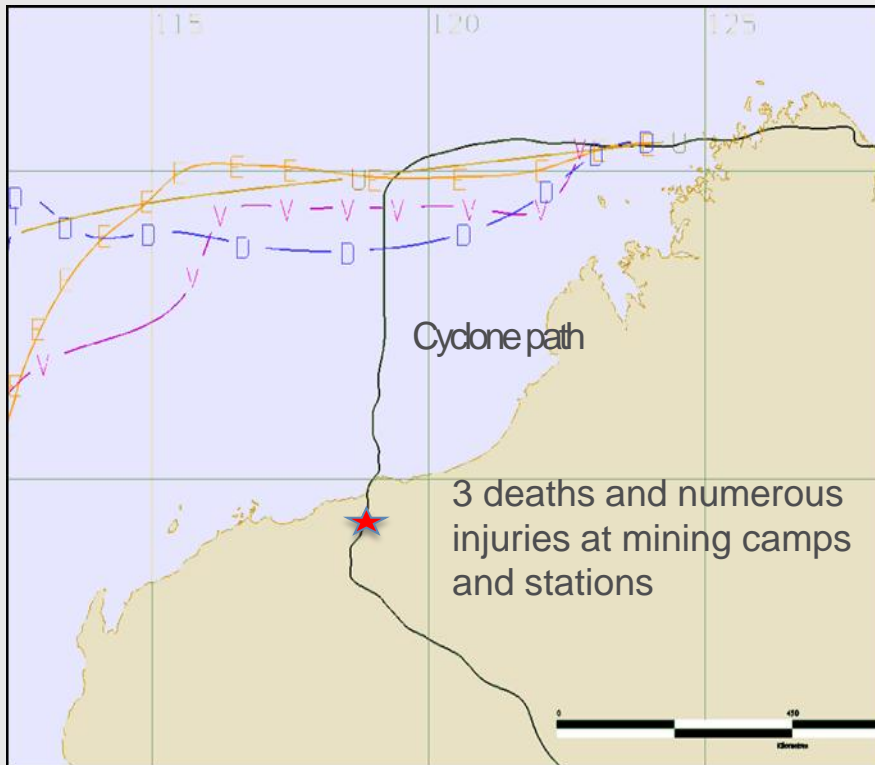
- Advance warning of potential tropical cyclone events.
- Predicting cyclone location, speed, track, wind and waves.
- The ability and time taken to shutdown production.
- The time taken, intervention required and confidence to disconnect from the mooring reliably within the planning window.
- Sufficient 'Navigation Time':  
*The time available for the FPSO to manoeuvre to evade the cyclone.*
- Sufficient vessel speed while on evasion combined with a reliable propulsion/steering system.
- Hull and topsides strength during sea passage.
- Capacity of Mooring System.
- Logistics support constraints: helicopter, fixed wing, airports, supply boats, harbour closures.



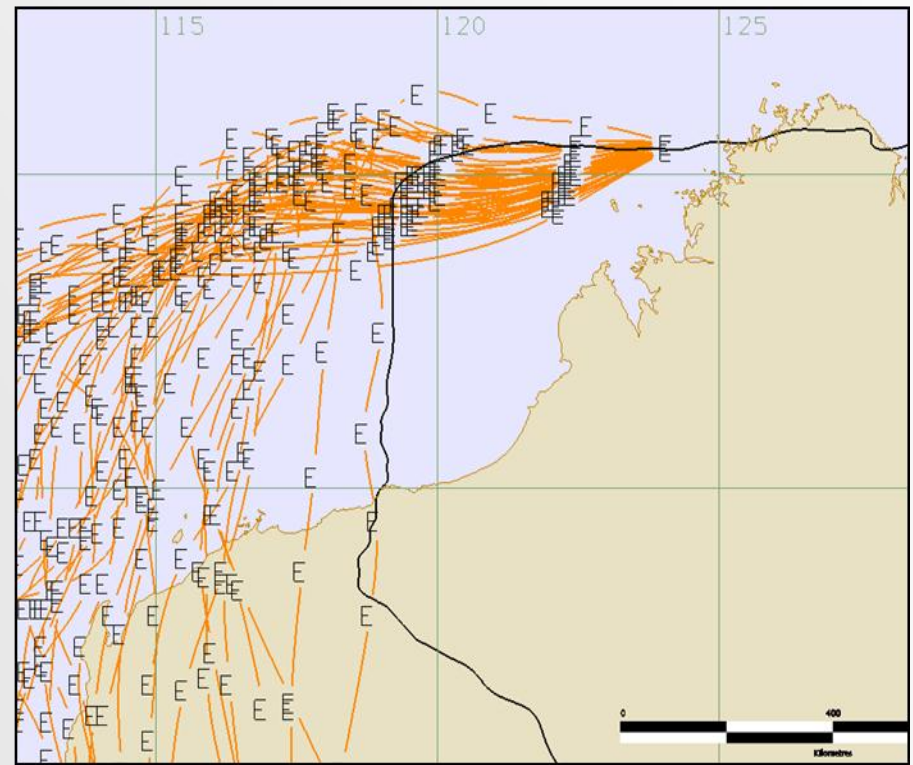
# Deterministic vs Ensembles tracks for cyclone “George” 2007

<http://www.bom.gov.au/cyclone/history/george.shtml>

Deterministic model tracks



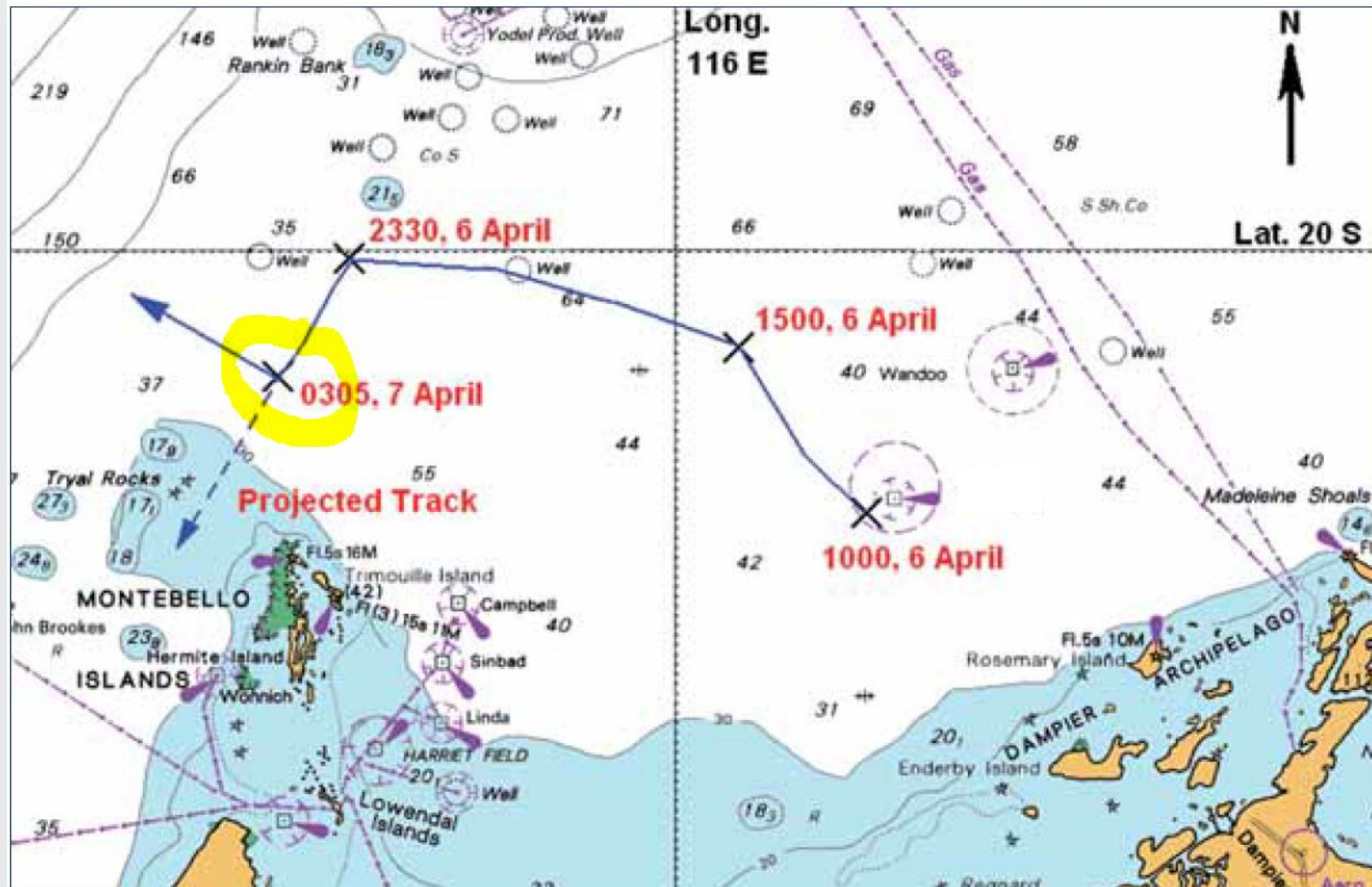
Enhanced ensemble modelling to understand track variability



# Impact of extreme weather on an FSO during cyclone "Hubert" 2006

[https://www.atsb.gov.au/media/1363283/mair226\\_001.pdf](https://www.atsb.gov.au/media/1363283/mair226_001.pdf)

Figure 3: Extract from navigational chart Aus 416, showing the ship's track





# How do we balance personal safety, environment, production and asset integrity risks for disconnectable FPSOs in extreme weather regions?

---

## In plain English we need to:

- Predict the cyclone.
- Shutdown the field.
- Get off the mooring.
- Get away out to sea (and then get back on mooring and start up).

## How we get better:

- Take the experiences of both Oil and Gas and Marine industries.
- Work with multidiscipline teams and across organisation(s)
- Consider the whole system and many scenarios in evasion studies reducing the risk to ALARP (Temporary Refuge Impairment Frequency target of  $<10^{-4}$ ).
- Check readiness and exercise systems pre season.
- Review performance post cyclone and post season.
- Investigate incidents and hazards (unexpected surprises).