Estimating appropriate levels of financial assurance

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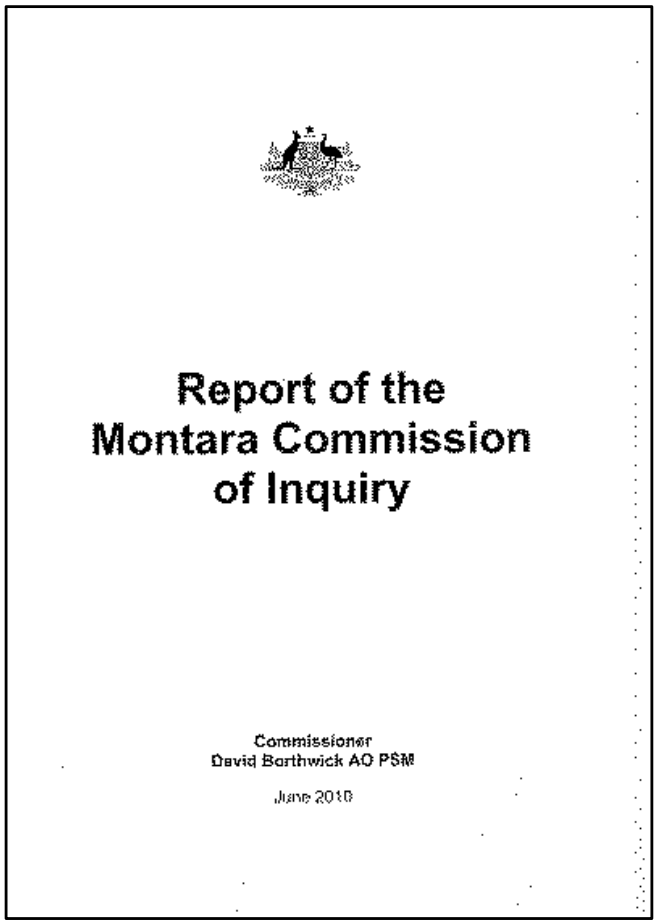
APPEA 20 May 2015

Estimating financial assurance

2013 amendments to OPGGS Act

- Clarified financial assurance (FA) requirements
- Titleholders required to maintain FA sufficient to meet potential costs and liabilities that may arise
- Titleholders required to demonstrate FA prior to acceptance of EP by NOPSEMA

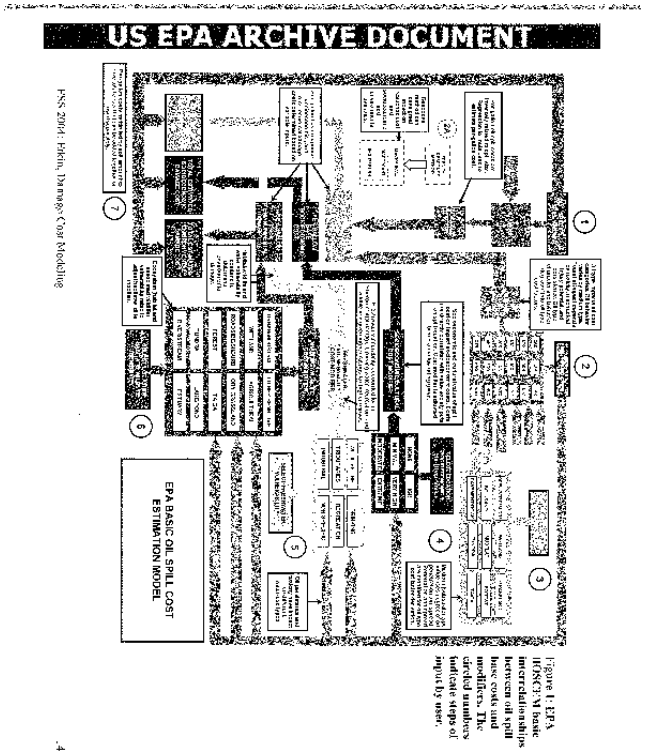
So how can we estimate an appropriate level of financial assurance?



US EPA BOSCEM

Etkin (2004) Basic Oil Spill Cost Estimation Model (BOSCEM)

- Based on historical record of international spills
- Input spill criteria:
  - spill amount
  - oil type
  - response method
  - substrate type
  - location (socio-economic)
  - freshwater vulnerability
  - habitat vulnerability
- Historical data dominated by ship spills



Other models

Shahriari & Frost (2007)

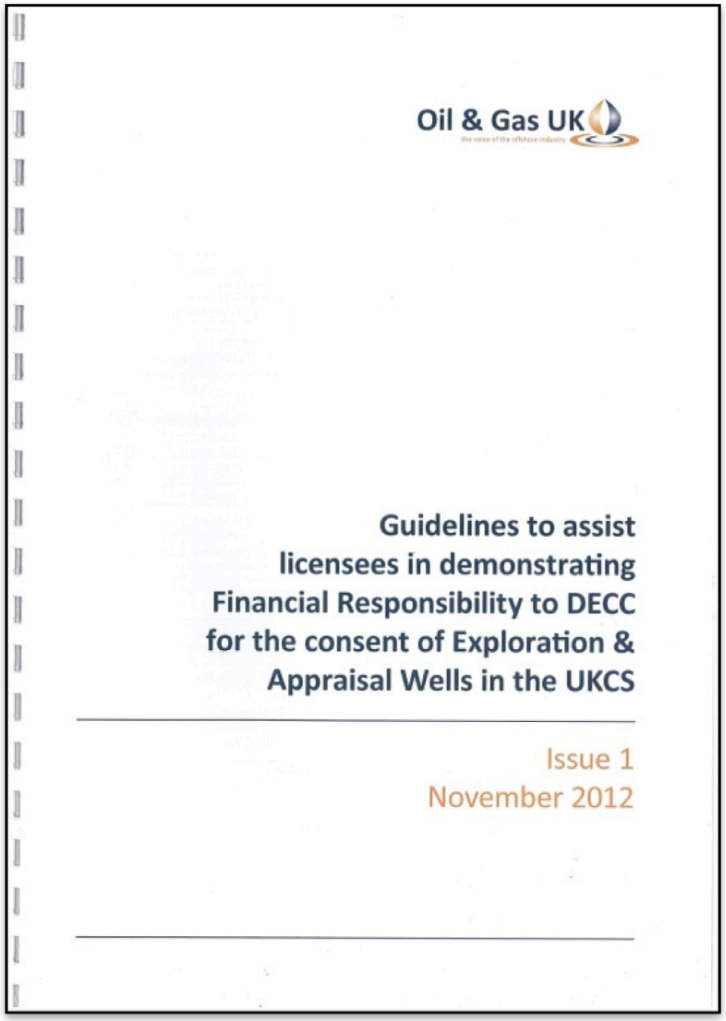
- Considered: spill volume, oil density, distance to shore, closeness to harbours, wind speed, cloudiness, water temperature, GDP per capita, level of preparedness
- spill volume, oil density, level of preparedness

Kontovas et al. (2010)

- cost data from 84 spills from IOPCF
- spill volume accounts for 62% of cost variability

Oil & Gas UK guidelines

- UK response to Deepwater Horizon
- DECC requires operators demonstrate financial responsibility
- Oil & Gas UK prepared Guidelines
  - Limited to exploration and appraisal wells
- DECC endorsed guideliness



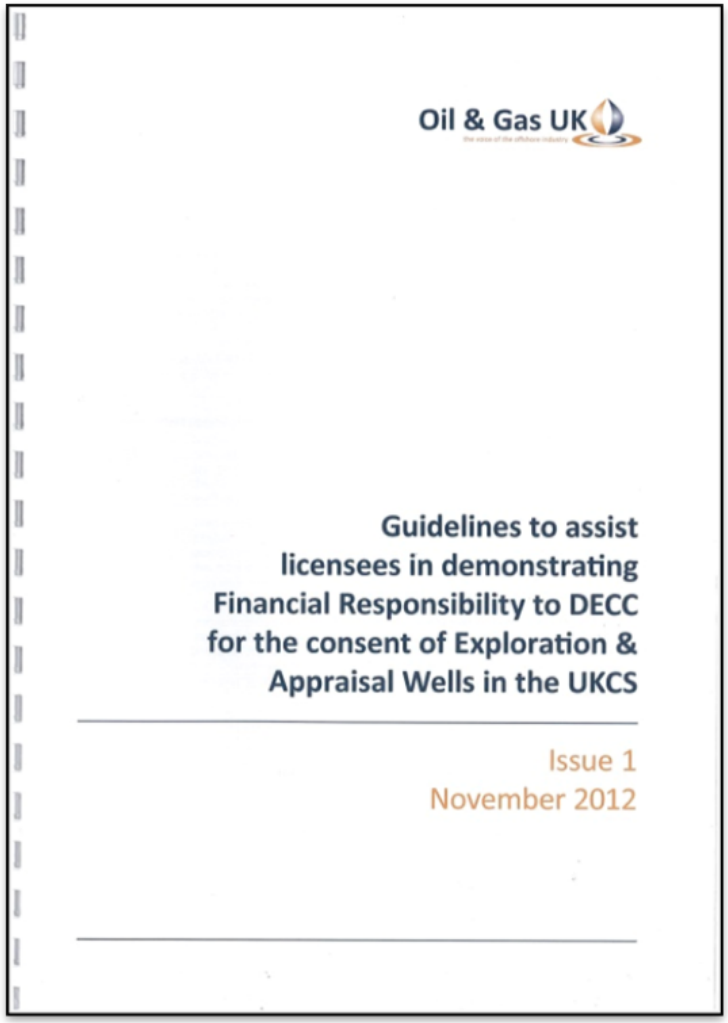
Oil & Gas UK guidelines

Cost of well control

- 2 x AFE
- capping stack

Cost of remedial measures and compensation

- Oil spill category assessment (score)
  - length of coastline impacted
  - volume of oil on shoreline
  - Fisheries impact (ICES map)
  - Aquaculture impact (SEPA map)
- Cost banding according to score



APPEA overall approach

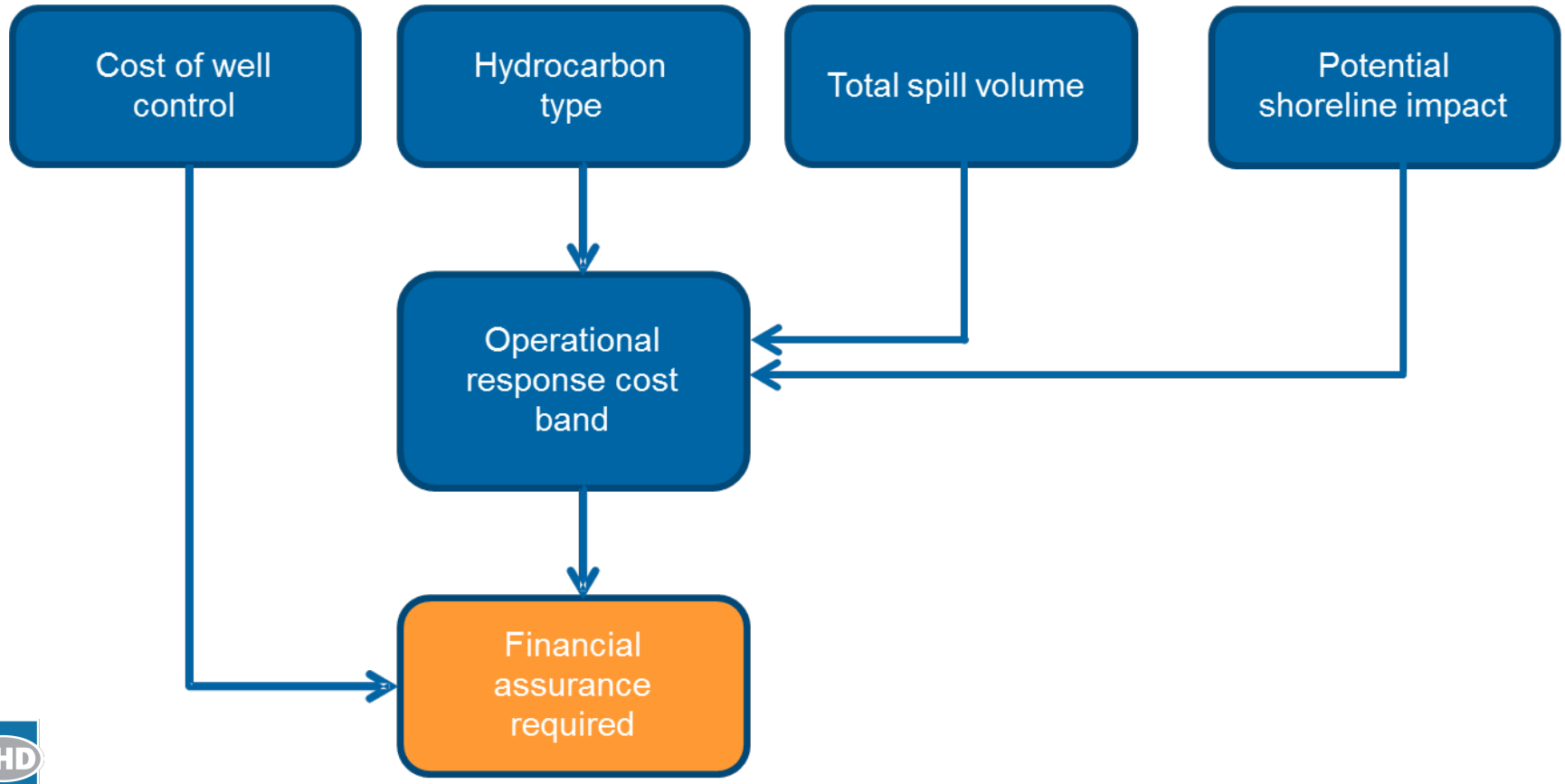
- Broadly follows Oil & Gas UK Guidelines approach

- For the credible case incident, include:
  - Cost of well control
  - Cost of operational response (response, clean-up and monitoring)

- Does not include:
  - Third party liabilities
  - Environmental damage costs

- Extended to include activities other than drilling and wells (eg FPSOs, LNG facilities, seismic surveys, vessel-based construction)

APPEA overall approach



Cost of well control

Method A, based on initial well estimate (IWE), AFE, or actual expenditure

$$C = (2 \times IWE) + Z$$

C is the cost of well control
IWE is the initial well estimate, or AFE, or actual expenditure
Z is the cost of deployment of capping stack

Method B, based on estimated full spread rig costs (R) and duration (T)

$$C = (R \times T) + Z$$

C is the cost of well control
R is the full spread rig day rate
T is the duration the rig is required
Z is the cost of deployment of capping stack

Cost of operational response – hydrocarbon type

Impact/cost score due to hydrocarbon type			
• Gas • Other chemicals and wastes	• Condensate • Marine gas oil • Marine diesel	• Light/medium crude ($\rho < 920$ kg/m^3) • Marine fuel oil	• Heavy crude ($\rho > 920$ kg/m^3)
No significant impact **0 points**	Low impact **1 point**	Medium impact **2 points**	High impact **3 points**

Cost of operational response – spill volume

Impact/cost score due to total spill volume	
Volume of hydrocarbon released ≤ 10,000 m^3 (≤ 63,000 bbl)	Volume of hydrocarbon released > 10,000 m^3 (> 63,000 bbl)
Limited response allowance **-1 point**	**0 points**

Cost of operational response – shoreline impact

Impact/cost score due to potential shoreline impact			
No shoreline impact	$V \leq 500\ m^3$ ($V \leq 6{,}250$ bbl)	$500\ m^3 < V \leq 2500\ m^3$ ($6{,}250$ bbl $< V \leq 15{,}725$ bbl)	$2500\ m^3 < V \leq 5000\ m^3$ ($15{,}725$ bbl $< V \leq 31{,}500$ bbl)
No significant impact **0 points**	Low impact **1 point**	Medium impact **2 points**	High impact **3 points**

Cost of operational response – cost band

Total score (Cost band)	Indicative cost of operational response
0	$10 million
1	$75 million
2	$125 million
3	$200 million
4	$250 million
5	$300 million
6	$350 million
7	$500 million

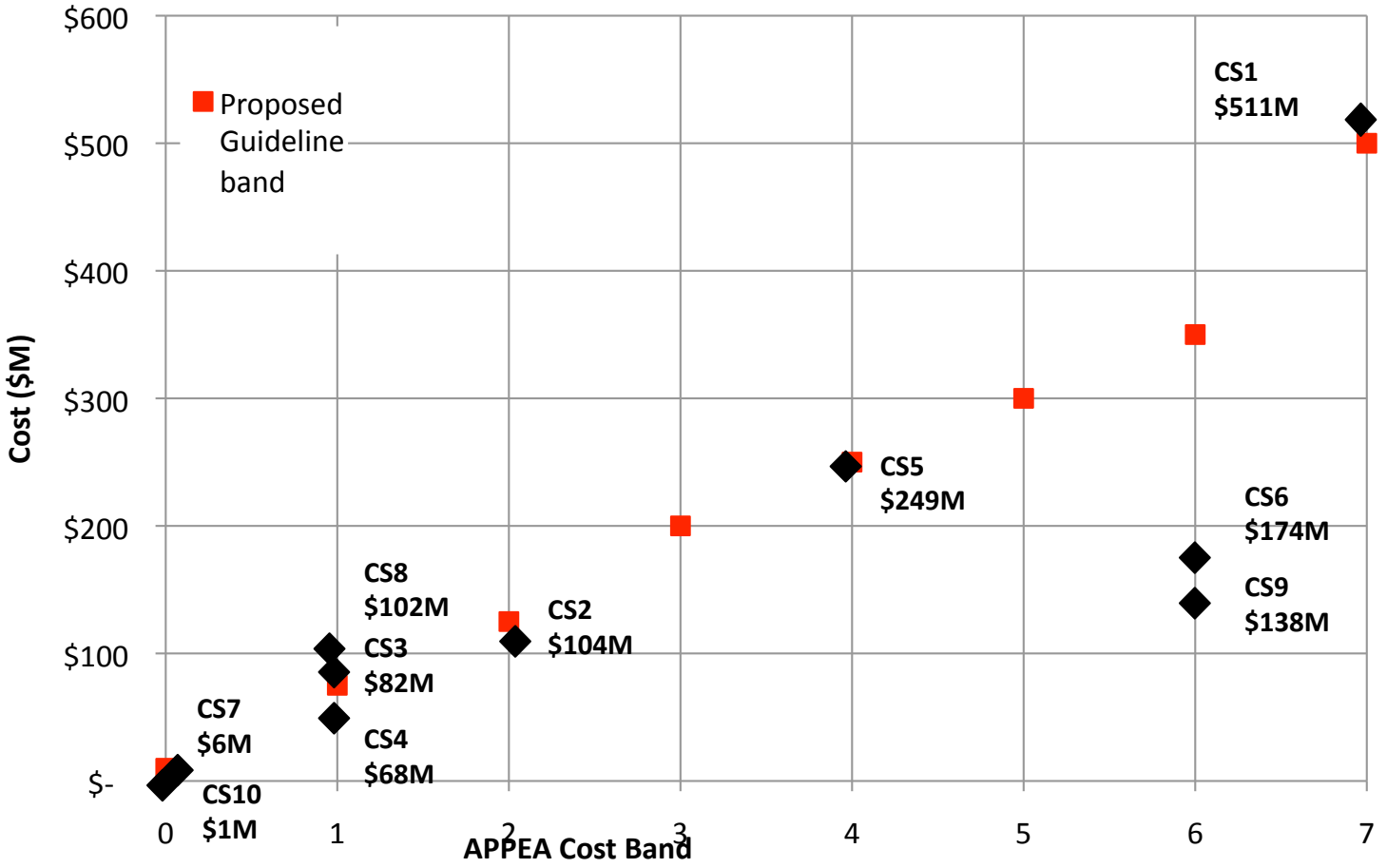
Case studies methodology

- 10 case studies selected to span:
  - activities (drilling, FPSOs, vessel-based construction, seismic surveys)
  - hydrocarbon types (gas, condensate, crude, diesel, fuel oil)
  - geographical locations (Perth, Carnarvon, Browse, Bass Strait)
- Case study information sourced from approved EPs/OSCPs/OPEPs:
  - time to achieve well kill
  - need to deploy capping device
  - volume of oil ashore
  - viable response strategies
  - operational and scientific monitoring programs
- Method of estimating the cost of operational response:
  - resources and durations in the approved EP/OSCP/OPEP
  - same unit rates were applied to all case studies
  - 2% owner's costs were added to account for incident management

Case studies

Ref.	Activity	Location	H'carbon type	Vol. spilt (m3)	Oil ashore (m3)	Cost of operational response			Cost of well control
						Cost band	APPEA method	Bottom-up estimate	
CS1	Drilling	Carnarvon Basin	Heavy crude (3)	199,714 (0)	24,682 (4)	7	$500 M	$511 M	$188 M
CS2	Drilling	Carnarvon Basin	Medium crude (2)	337,053 (0)	0 (0)	2	$125 M	$104 M	$74 M
CS3	Drilling	Browse Basin	Condensate (1)	255,475 (0)	0 (0)	1	$75 M	$82 M	$126 M
CS4	Drilling	Bass Strait	Condensate (1)	36,750 (0)	0 (0)	1	$75 M	$68 M	$90 M
CS5	Drilling	Carnarvon Basin	Light crude (2)	901,221 (0)	868 (2)	4	$250 M	$249 M	$72 M
CS6	Drilling	Perth Basin	Med. crude (2)	128,013 (0)	2,751 (4)	6	$350 M	$174 M	$127 M
CS7	Drilling	Browse Basin	Condensate (1)	4,897 (-1)	0 (0)	0	$10 M	$6 M	$77 M
CS8	Constr.	Browse Basin	Fuel oil (2)	1,000 (-1)	0 (0)	1	$75 M	$102 M	N/A
CS9	FPSO	Carnarvon Basin	Heavy crude (3)	8,630 (-1)	5,447 (4)	6	$350 M	$138 M	N/A
CS10	Seismic Survey	Carnarvon Basin	Marine gas oil (1)	67 (-1)	0 (0)	0	$10 M	$1 M	N/A

APPEA overall approach



Summary

- APPEA Method captures operational response costs for oil spills where
  - Total spill volume < 1,000,000 m^3
  - Volume of oil ashore < 25,000 m^3
- Reviewed by NOPSEMA and endorsed as generally suitable for most circumstances
- $10M minimum band cost (Band 0) may over-estimate cost but allows a wide variety of activities
- Additional case studies planned

Acknowledgements

- APPEA
  - Miranda Taylor and Andrew Woodhams
- APPEA Financial Assurance Reference Group
  - Apache Energy, BP Developments Australia, Chevron Australia, Conoco Phillips Autralia, ExxonMobil Australia, Finder Exploration, INPEX, Mitsui E&P Australia, Murphy Australia Oil, Origin Energy, PTTEP Australasia, Shell Development Australia, Vermilion Oil & Gas Australia, Woodside Energy
- NOPSEMA and Cardno
- Oil & Gas UK

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