APPEA

Method to assist titleholders in estimating appropriate levels of financial assurance for pollution incidents arising from petroleum activities

December 2014

Foreward

This document presents a simple, standard method for estimating the level of financial assurance necessary to meet the requirements of the *Offshore Petroleum and Greenhouse Gas Storage Act 2006*.

The method is intended to apply to most petroleum activities undertaken in Australian waters but may not be appropriate in all cases. Before applying the method, titleholders should consider the suitability of the method to their particular petroleum activity. Titleholders are able to demonstrate financial assurance using other methods.

NOPSEMA considers the method developed by APPEA and presented in this document to be generally suitable for determining the level of financial assurance for most circumstances in Australia's offshore areas. NOPSEMA reserves the right to require further information when they consider the APPEA method is not appropriate for a particular petroleum activity.

The APPEA method considers reasonably estimable costs, expenses and liabilities associated with responding to an incident, cleaning up and monitoring. The method does not consider unidentifiable or inestimable costs which may be associated with compensation for loss or ongoing damage.

A set of 10 case studies was used to determine the costs, expenses and liabilities (including monitoring, response and clean up) that were outlined in approved oil pollution emergency plans, to develop the cost bandings defined in the APPEA method.

The level of financial assurance calculated by the APPEA method does not limit the liability of the titleholder. In the event of a pollution incident, the titleholder will be liable for all the costs associated with the duties under the OPGGS Act, regardless of the level of financial assurance held.

The method has been prepared in good faith by APPEA and is intended to represent good industry practice. The method is not intended to replace professional advice.

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Appendices

Abbreviations

AFE	Authority for Expenditure
APPEA	Australian Petroleum Production & Exploration Association
EP	Environment plan
FA	Financial assurance
FLNG	Floating Liquefied Natural Gas
FPSO	Floating Production Storage and Offtake
IWE	Initial Well Estimate
MODU	Mobile Offshore Drilling Unit
NOPSEMA	National Offshore Petroleum Safety and Environment Management Authority
NWS	North West Shelf
OPEP	Oil Pollution Emergency Plan
OPGGS Act	*Offshore Petroleum and Greenhouse Gas Storage Act 2006*
OSCP	Oil Spill Contingency Plan
ROV	Remotely Operated Vehicles
UK	United Kingdom
WA	Western Australia

1. Introduction

Australian offshore petroleum activities are governed by the *Offshore Petroleum and Greenhouse Gas Storage Act 2006* (OPGGS Act) and related regulations. On 28 May 2013 the OPGGS Act was amended to strengthen the polluter pays principles of the act and clarify and broaden its financial assurance requirements.

In the event of an incident involving the release of hydrocarbons, the OPGGS Act imposes a statutory duty on titleholders to control the release, clean-up the spill and monitor the potential environmental impacts. If a titleholder fails to fulfil this duty and the government is required to act, the costs incurred by the government are recoverable from the titleholder.

The titleholder is required to maintain financial assurance sufficient to meet the costs of the operational response measures (e.g. well control and containment) and costs arising from addressing the environmental consequences (e.g. monitoring and remediating the environment).

The 2013 amendments to the OPGGS Act included provision for regulation requiring titleholders to demonstrate financial assurance as a prior condition for the acceptance of an environment plan (EP) by the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA).

The Australian Petroleum Production & Exploration Association (APPEA), on behalf of petroleum titleholders in Australia and in consultation with the Commonwealth Government, has developed a standard method that can be taken by titleholders to estimate the level of financial assurance necessary to meet the requirements of the OPGGS Act. This document presents the APPEA method.

Oil & Gas UK Guidelines

The APPEA method adopts the approach endorsed by the UK regulator, the Department of Energy & Climate Change (DECC). In January 2013, DECC recognised an approach developed by Oil & Gas UK and presented in their *Guidelines to assist licensees in demonstrating Financial Responsibility to DECC for the consent of Exploration & Appraisal Wells in the UKCS* (the Oil & Gas UK Guidelines). Those guidelines are not a DECC document but DECC gives considerable weight in each case where a titleholder uses the guidelines and can show that the guidelines have been met. Should a titleholder choose to present an alternative approach, the approval process is subject to greater scrutiny, which may delay the approval process.

The Oil & Gas UK Guidelines offer a practical method of demonstrating financial assurance and provide a consistent approach across industry. They address potential costs related to:

- the cost of well control and
- the cost of environmental remediation and compensation from pollution.

What makes the Oil & Gas UK Guidelines attractive for Australian titleholders is their practical, high-level, top-down approach, which captures the key issues while recognising the difficulty in accurately predicting the clean-up costs from an oil spill.

In developing a method for the Australian oil and gas industry, APPEA's Financial Assurance Reference Group has taken a similar approach to that presented in the Oil & Gas UK Guidelines. A limitation of the approach presented in the Oil & Gas UK Guidelines is that they only address incidents associated with a loss of well control. To meet the broader requirements of the OPGGS Act, the method developed by APPEA extends the range of activities considered to include not only drilling and wells but also FPSOs, FLNG facilities, pipelines, seismic activities and other vessel-based activities.

Review of the APPEA method

The APPEA method will be reviewed periodically or as required. Future reviews will: consider feedback from titleholders and NOPSEMA on the application of the method; consider escalation and potential fluctuations in the key cost assumptions; and seek to incorporate information from any additional case studies that may have been completed by APPEA.

Financial Assurance Reference Group

The APPEA Financial Assurance Reference Group was created to provide strategic direction for the development of the method and provide case studies to validate the approach. The members of the reference group were:

Apache Energy Ltd

BP Developments Australia Pty Ltd

Chevron Australia Pty Ltd

ConocoPhillips Australia Pty Ltd

ExxonMobil Australia

Finder Exploration Pty Limited

INPEX

Mitsui E & P Australia Pty Ltd

Murphy Australia Oil Pty Ltd

Origin Energy Limited

PTTEP Australasia Limited

Shell Development Australia

Vermilion Oil and Gas Australia Pty Ltd

Woodside Energy Ltd

2. Overall approach

The APPEA method has been developed to estimate the costs, expenses and liabilities arising from potential pollution incidents to meet the financial assurance requirements of the OPGGS Act.

The method is intended to apply to most petroleum activities undertaken in Australian waters but may not be appropriate in all cases. Titleholders are able to demonstrate financial assurance using other methods.

NOPSEMA considers the APPEA method is generally suitable for determining the level of financial assurance for most circumstances in Australia's offshore areas. NOPSEMA reserves the right to require further information when they consider the method is not appropriate for a particular petroleum activity.

The level of financial assurance calculated by the APPEA method does not limit the liability of the titleholders. In the event of a pollution incident, the titleholders will be liable for all the costs associated with the duties under the OPGGS Act, regardless of the level of financial assurance held.

Overall approach

The APPEA method broadly follows the approach presented in the Oil & Gas UK Guidelines. A limitation of the approach presented in the Oil & Gas UK Guidelines is that they address only incidents associated with a loss of well control. To meet the broader requirements of the OPGGS Act, the APPEA method considers activities in addition to drilling and wells, including FPSOs, FLNG facilities, pipelines, seismic activities and other vessel-based activities.

For some petroleum activities, the greatest reasonably credible costs may be associated with a pollution incident related to accidental release of chemicals or other waste. These incidents typically result in less impact than an oil spill and the costs of response are expected to be less than $10 million.

For most petroleum activities the greatest reasonably credible costs will result from an escape of hydrocarbon. For drilling activities and wells, where the credible worst case incident is likely to be a loss of well control, the costs considered are:

- the cost of well control, and
- the cost of operational response (including monitoring, response and clean-up).

For activities that do not include the risk of a loss of well control, the cost considered is the cost of the operational response to a pollution incident.

The APPEA method uses information that is readily available in the Environmental Plan (EP) and Oil Pollution Emergency Plan (OPEP) or Oil Spill Contingency Plan (OSCP).

The information required from the EP and OPEP/OSCP is:

- the hydrocarbon type – gas, gas/condensate, medium crude oil, heavy crude oil, marine diesel or fuel oil
- the total volume of hydrocarbon released
- oil spill modelling output, or some other means of determining the volume of oil ashore.

The method of estimating the financial assurance requirements involves two steps (Figure 1):

1. Where the incident is caused by a loss of well control, estimate the cost of a relief well if required and the deployment of a capping stack, if appropriate.
2. Estimate the cost of the operational response using:
   - the hydrocarbon type,
   - the total spill volume, and
   - the potential shoreline impact.

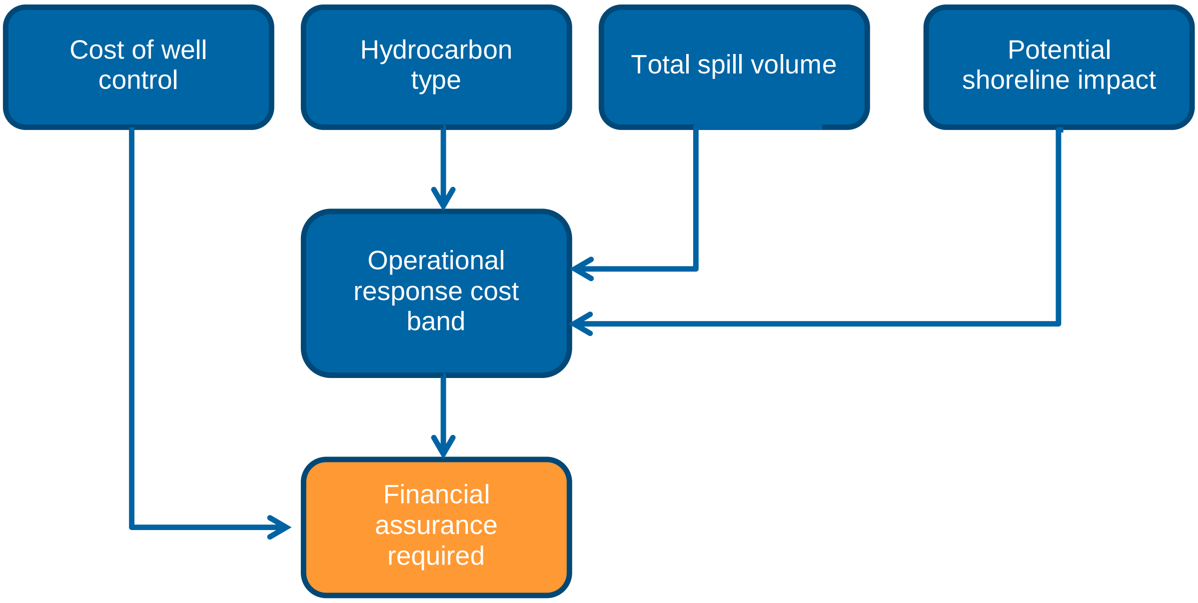


Figure 1 Process for estimating the level of financial assurance required

Limitations of use of the APPEA method

The APPEA method is intended to apply to most petroleum activities undertaken in Australian waters but may not be considered as appropriate in the following circumstances:

- the total volume of hydrocarbon release is estimated to be greater than 1,000,000 m^3
- the total volume of oil ashore is estimated to be greater than 25,000 m^3

The APPEA method is based on the following assumptions, which should be considered when assessing the appropriateness of the method for a particular activity:

- the estimated cost of well control assumes a single relief well will achieve effective well kill. Where multiple wells are envisaged a simple compounding should be adequate.
- the estimated cost of operational response assumes standard methods of spill response typically used in Australia and does not allow for additional discretionary activities
- operational response is assumed to perform as expected and no contingency is included
- scientific monitoring does not extend beyond five years

The methodology is anticipated to be adequate to estimate financial assurance associated with pollution incidents in any jurisdiction for reasonably estimable costs.

Titleholders should consider whether spill response plans for scenarios that extend outside of Australian waters are broadly similar to spill response plans entirely within Australian waters before using this methodology.

Where the APPEA method is not considered appropriate, Titleholders are able to demonstrate financial assurance using other methods.

The estimated costs are in Australian dollars, with a cost base of June 2014.

The APPEA method does not consider unidentifiable or inestimable costs which may be associated with compensation for loss or ongoing damage to other parties

Cost Bands

The cost estimates for each operational response band and the default values to be used for relief well costs were based on an initial analysis of ten case studies, provided by operators. The ten case studies spanned a range of petroleum activities (drilling, production, FPSOs, vessel-based construction and seismic surveys), hydrocarbon types (gas, condensate, light and heavy crude, marine diesel and heavy fuel oil) and petroleum basins (Perth Basin, Carnarvon Basin, Browse Basin and Bass Strait) in three states (Western Australia, Northern Territory and Victoria). In each case the cost of activities described in the approved EP for the case study was estimated using industry standard rates to give an estimate of the direct cost of the operational response. An allowance of 2% of the direct costs was included to account for estimable liabilities for managing the response (e.g. crisis management teams). The sum of the direct and indirect costs is then taken to represent the total cost of operational response. These estimated total costs were then used to calibrate the cost bands used in the APPEA method.

Escalation

The cost bands represent indicative costs, expenses and liabilities in Australian dollars of operational response using a cost base of 2014. It is likely that the costs of some of the major resources included in the cost estimates will fluctuate due to factors that are not captured by most indices commonly used for estimating cost escalation. Given these potential cost fluctuations, the conservative nature of the cost bands and the difficulty in accurately estimating the cost of responding to a pollution incident, the benefit of applying an escalation factor is considered marginal. Hence, the unit costs will be reviewed periodically and the cost bands revised as necessary.

3. Estimating the cost of well control

In the unlikely event of a loss of well control the first response of the titleholder should be to ensure the safety of all personnel and then to control the flow of petroleum from the well.

The cost to control a well includes the costs of a drilling rig suitable for drilling a relief well, if required, together with the related costs including casing and accessories, cement, drilling fluids, drills bits logistical support (e.g. anchor handling vessels and supply vessels), specialist manpower and completion costs and, where applicable, the costs for the deployment of a capping stack.

Two methods are presented for estimating the cost of well control, depending on the availability of information at the time of assessment. Where a titleholder has adequate data available, both methods to estimate the cost of well control should be presented, with the larger of the two cost estimates being used.

Where multiple relief wells are envisaged, the cost of well control should be increased accordingly.

3.1 Method A – initial well estimate

Method A is based on the initial well estimate (IWE), which is the estimated cost of the proposed drilling activity, usually based on the authority for expenditure (AFE) for the activity, or the actual expenditure for the well(s), if the drilling is complete and such costs are available.

Using Method A, the cost of well control is calculated using

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

where:

C	= the estimated cost for well control including the deployment of a capping stack (if appropriate), drilling a relief well, and achieving bottom well kill,
IWE	= the initial well estimate, AFE or actual expenditure for the original well, and
Z	= the estimated cost of deploying a capping stack, if appropriate, including cost of vessels, ROV, cutting and clearance of debris, use of subsea dispersants, specialist manpower and consultants. In the absence of a titleholder estimate, A$50 million is proposed as the default value for Z.

As adopted by the Oil & Gas UK Guidelines, a factor of two is applied to the initial well estimate to account for the typically higher costs of drilling a relief well due to:

- variation in the day rate for the relief well rig;
- additional mobilisation/demobilisation time and cost;
- suspension and re-entry costs where the relief well rig has been diverted from current drilling activities; and
- increased costs due to the high-angle nature of the relief well and additional activities needed to accurately locate and intercept the blowout well.

3.2 Method B – time and cost based

Method B is based on estimated rig costs and the time required to achieve well kill.

Using Method B, the cost of well control is calculated using

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

where:

C = the estimated cost for well control in A$, including deploying a capping stack (if appropriate), drilling a relief well, and achieving bottom well kill.

R = the estimated daily full spread rig cost. In the absence of a titleholder estimate, $1 million/day is proposed as the default value for R.

T = the required to achieve well kill, as specified in the OSCP. In the absence of a specified time in the OSCP, 80 days is proposed as the default value for T.

Z = the estimated cost of deploying a capping stack, if appropriate, including cost of vessels, ROV, cutting and clearance of debris, use of subsea dispersants, specialist manpower and consultants. In the absence of a titleholder estimate, A$50 million is proposed as the default value for Z.

4. Estimating the cost of operational response

The operational response to a pollution incident includes activities such as containment and recovery, dispersant application, shoreline clean-up, waste management, monitoring and evaluation, pre- and post-contact wildlife response and other associated field activities.

For the purposes of estimating the costs, expenses and liabilities of operational response, a pollution incident is assigned to one of eight cost bands, according to the potential impact of the incident.

For pollution incidents related to a hydrocarbon release (from a well, vessel or other facility), the incident is first assigned an impact/cost score (using Table 4) based in each of the following:

- the hydrocarbon type,
- the total volume of hydrocarbon released
- the potential shoreline impact (based on results of oil spill modelling).

The sum of these impact/cost scores is then used to determine the operational response cost band.

The OPGGS Act requires titleholders to demonstrate financial assurance for all petroleum activities and some activities may result in pollution incidents other than the release of hydrocarbons. These incidents typically result in less impact than an oil spill and the costs of response are expected to be less.

Potential incidents that might require demonstration of financial assurance include:

- chemical spill
- fire (including damage, discharges and fire response)
- unplanned waste discharge.

It is proposed that the level of financial assurance required to meet the cost of responding to these incidents be assumed to be less than $10 million, so that these incidents be considered to lie in cost band 0.

4.1 Score due to hydrocarbon type

For pollution incidents related to a hydrocarbon release, the hydrocarbon type determines the operational response to a pollution incident and therefore the costs of that response.

For example, the different weathering characteristics and volatilities of marine diesel and heavy crude lead to different responses.

Similarly, the application of dispersants is only appropriate for some hydrocarbon types.

Table 1 assigns a score for the type hydrocarbon associated with the incident (see overleaf).

Table 1 Score due to hydrocarbon impact

Impact/cost score due to hydrocarbon type			
• gas • other chemicals and wastes	• condensate • marine gas oil • marine diesel	• light/medium crude (ρ<920 kg/m^3) • marine fuel oil	• heavy crude (ρ >920 kg/ m^3)
No significant impact **0 points**	Low impact **1 point**	Medium impact **2 points**	High impact **3 points**

The hydrocarbon type table includes hydrocarbons from loss of well control events and other events (spills of fuels and other materials) for the purposes of simplicity, and no comparative impact or cost should be inferred between the different event types. Marine Fuel Oil represents all grades of fuel oil, including Heavy Fuel Oil. The impact/score is limited to 2 points as this is the maximum impact/cost attribution for any fuel.

4.2 Score due to total spill volume

Although the hydrocarbon type determines many aspects of the spill response and therefore the estimated cost, the cost of response is also significantly determined by the total volume of hydrocarbon released. For example, a loss of well control lasting several weeks will require a very different response to the release of limited volume of oil from the same well if the incident is contained by the activation of a blow-out preventer.

To account for the reduced scale of the operational response required to manage smaller oil spills a score of minus one (-1) is assigned to incidents where the total volume of the spill is less than 10,000 m^3, or 63,000 bbl.

Table 2 Score due to total 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 points**	**0 points**

4.3 Score due to shoreline impact

If hydrocarbons are washed ashore it may be necessary to undertake shoreline response

Table 3 assigns a score for the potential shoreline impact described in the EP and OPEP/OSCP. The potential shoreline impact is determined from the total bulked volume of oil washed ashore (V m^3 or bbl). These parameters are usually obtained as a result of oil spill trajectory modelling of the credible worst case incident. The credible worst case incident should be defined as the incident resulting in the greatest financial reserve requirement among those included in the oil spill modelling exercise.

Table 3 Score due to potential shoreline impact

Impact/cost score due to potential shoreline impact				
No shoreline impact	$V \le 500\ m^3$ (6250 bbl)	$500\ m^3 < V \le 2500\ m^3$ ($6250 < V \le 15725$ bbl)	$2500\ m^3 < V \le 5000\ m^3$ (15725 bbl $< V \le$ 31500 bbl)	$V \ge 5000\ m^3$ ($V \ge 31500$ bbl)
No significant impact **0 points**	Low impact **1 point**	Medium impact **2 points**	High impact **3 points**	Very high impact **4 points**

4.4 Estimating the cost of operational response

For pollution incidents caused by the release of hydrocarbons, the indicative cost of operational response is estimated by calculating the sum of the scores for:

- Hydrocarbon type (Table 1)
- Total spill volume (Table 2), and
- Potential shoreline impact (Table 3).

and then using this total score to determine the cost band in Table 4.

Other pollution incidents are assigned to cost band 0, since the indicative cost of operational response for these incidents is expected to be less than $10 million.

Table 4 Cost bands for indicative cost of operational response

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

5. Demonstration of Financial Assurance

The amendments to the OPGGS Act require titleholders to demonstrate to NOPSEMA that they have financial assurance to meet all costs, expenses and liabilities arising in connection with a petroleum activity as a condition precedent to the acceptance of an environment plan.

5.1 Level of financial assurance required

Using the APPEA method, the level of financial assurance necessary to meet the requirements of the OPGGS Act is the sum of:

1. the estimated cost of well control (section 3) and
2. the estimated cost of operational response (section 4).

The Australian oil and gas industry has an excellent safety and environment record. The likelihood of a pollution incident such as a loss of well control is very low and the likelihood of a titleholder being exposed to more than one such incident at the same time is not considered credible. Therefore it is considered sufficient that titleholders demonstrate financial assurance for the single reasonably credible worst case consequence which will result in the highest costs and not the aggregate costs from multiple incidents.

5.2 Forms of financial assurance

APPEA does not make recommendations related to the forms of financial assurance that might be appropriate. The amended OPGGS Act recognises the following forms of financial assurance:

- insurance
- self-insurance
- a bond
- the deposit of an amount as a security with a financial institution
- an indemnity or other surety
- a letter of credit from a financial institution
- a mortgage.

Titleholders can use a combination of these forms to meet the financial assurance requirement.

5.3 Demonstration of financial assurance

To demonstrate compliance with section 571(2) of the OPGGS Act, titleholders are required to submit to NOPSEMA a declaration of compliance, signed by an authorised officer.

The titleholder is responsible for maintaining records of the calculations used to determine the level of financial assurance required. Appendix A includes a form for assessing the level of financial assurance using the APPEA method. NOPSEMA considers this method generally suitable for calculating the level of financial assurance required.

NOPSEMA may request evidence of the level and form of financial assurance maintained by the titleholder and of the methods used to calculate the level of financial assurance required.

Appendices

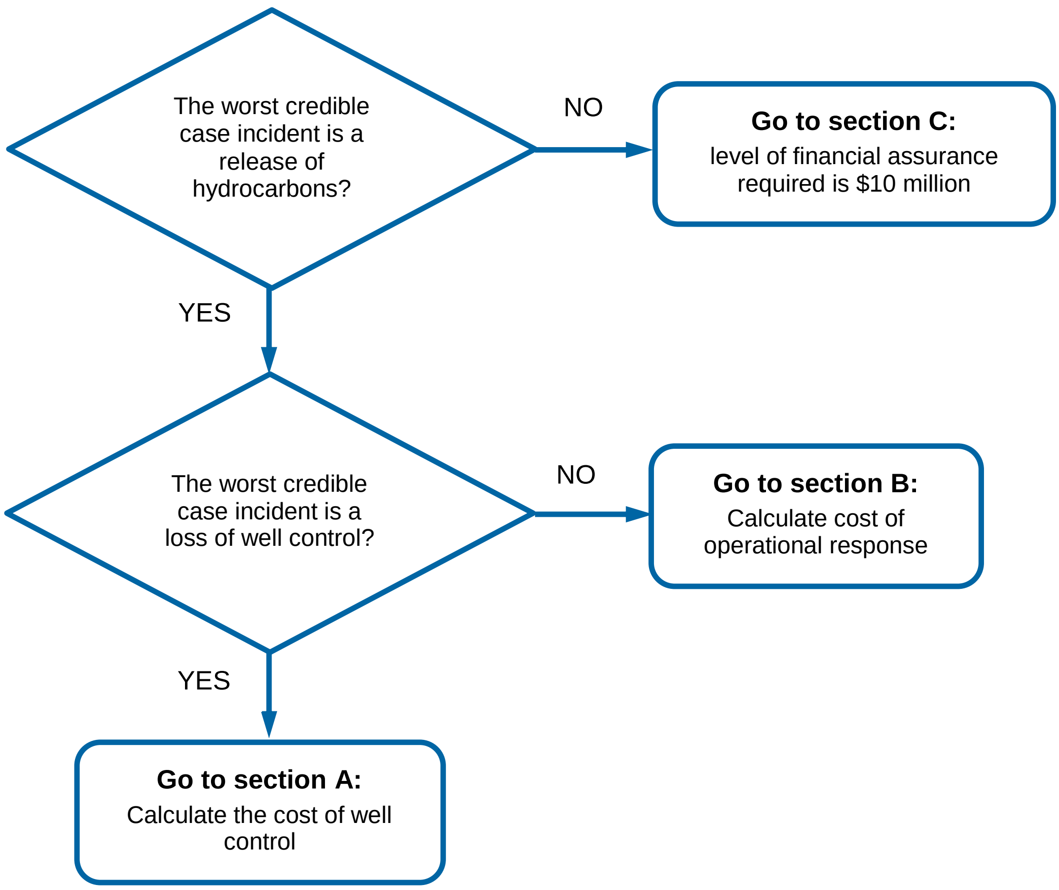
Appendix A – Example Certificate of Assessment of level of Financial Assurance required for a Petroleum Activity

The following pro-forma certificate provides a documented record of the application of the APPEA method and is provided as an example, which titleholders may use as a basis for their own internal records.

CERTIFICATE OF ASSESSMENT OF LEVEL OF FINANCIAL ASSURANCE REQUIRED TO MEET THE OPGGS ACT

We, the undersigned titleholder, hereby certify that we have followed the APPEA method to assist titleholders in estimating appropriate levels of financial assurance for pollution incidents arising from petroleum activities' (the "**APPEA method**") in calculating the financial assurance required for Australian Petroleum Licence Number [NUMBER], Block [NUMBER], Well [NUMBER / PRE-SPUD NAME], *(fill out only relevant information)* (the "**Petroleum Activity**").

We have assessed the nature and circumstances of the **Petroleum Activity** and consider the **APPEA method** to be suitable for estimating the level of financial assurance.



A. Estimate the cost of well control

Method A: using initial well estimate

Item	Description
Initial well estimate based on AFE	AFE = $_______________________million
Use of capping device?(YES/NO)	_____________________________
Capping device costs	Z = $_________________________million (default $50 million)
Cost of well control: C = (2 x AFE) + Z	C = $_________________________million

or

Method B: time and cost based

Item	Description
Full spread rig rate	R = $_________________________million/day (default $1 million/day)
Time to achieve well kill	T = __________________________days (default 80 days)
Use of capping device?(YES/NO)	_____________________________
Capping device costs	Z = $_________________________million (default $50 million)
Cost of well control: C = (R x T) + Z	C = $_________________________million

Indicative cost of well control: $______________________

B. Cost of operational response

Impact/cost score due to hydrocarbon type			
• gas • other chemicals and wastes	• condensate • marine diesel	• light/medium crude (ρ<920 kg/m^3) • fuel oil	• heavy crude (ρ >920 kg/ m^3)
No significant impact **0 points**	Low impact **1 point**	Medium impact **2 points**	High impact **3 points**

Hydrocarbon score: ______________________

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 points**	**0 points**

Spill volume score: ____________________

Impact/cost score due to potential shoreline impact				
No shoreline impact	V ≤ 500 m^3 (6250 bbl)	500 m^3 < V ≤ 2500 m^3 (6250 < V ≤ 15725 bbl)	2500 m^3< V ≤ 5000 m^3 (15725 bbl < V ≤ 31500 bbl)	V ≥ 5000 m^3 (V ≥ 31500 bbl)
No significant impact **0 points**	Low impact **1 point**	Medium impact **2 points**	High impact **3 points**	Very high impact **4 points**

Potential shoreline impact score: ____________________

Total score: ____________________

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

Cost band (0-7): ____________________

Indicative cost of operational response: $____________________

C. Total Financial Assurance for Petroleum Activity

The total indicative costs arising from the credible worst case pollution incident are:

Cost to control the well (if applicable)	$___________________
Cost of operational response	$___________________
Total	**$**___________________

This assessment has been approved by our co-venturers.

Signed for and on behalf of the Titleholder:

....Name of Titleholder

....Address of Titleholder

....Authorised Signature

....Full Name

....Position

....Date

GHD

GHD House, 239 Adelaide Tce. Perth, WA 6004
P.O. Box 3106, Perth WA 6832
T: 61 8 6222 8222 F: 61 8 6222 8555 E: permail@ghd.com.au

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