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Photo. Mark Gillow

## Special Submission to NOPSEMA\* on the proposed Equinor Stromlo-1 Drilling Program in the Great Australian Bight.

Submitted by a specific knowledge expert group convened by the Sydney Environment Institute  
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## Table of Contents

Introduction .....	2
Inadequate consultation process for the Environment Plan .....	3
Ecological Sustainable Development .....	4
Unavailability of the Well Operations Management Plan .....	5
The risk of a blowout .....	6
Sea states .....	7
Preventing a blowout: organisational factors.....	9
Bonuses.....	9
Risk indicators .....	10
Incentivising the reporting of bad news .....	11
Centralisation.....	11
NOPSEMA’s ability to raise these issues.....	12
Preventing a Blowout: Standards and Inspection.....	12
Appropriate standards.....	12
Stewardship .....	13
Well construction and well inspection.....	14
Stopping a blowout.....	15
Does the regulator have the power to insist on a standby rig?.....	17
Clean up and containment.....	18
Spill modelling.....	18
Oil spill response .....	18
Dispersants.....	19
Biographical Statements .....	20
Greg Bourne .....	20
Andrew Hopkins.....	20
Tina Soliman Hunter .....	20
Madeline Taylor .....	21
References .....	22

## Introduction

On 23 April, 2019, The Sydney Environment Institute at The University of Sydney convened a group of specific knowledge experts to consider Equinor's proposal to drill an exploratory well in the Great Australian Bight (GAB). This submission to NOPSEMA is one of the outcomes of that meeting. It is authored by the following people:

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All authors have contributed to this report on a pro-bono basis. Brief biographical statements may be found at the end of this submission. Invaluable assistance and advice have been given by Nathan Hart, Nathaniel Pelle and members of the GAB community, and the authors thank them and the administrative services of the SEI.

The submission is made after the 30-day public comment period on Equinor's environmental plan (EP) has passed (21 March 2019), but before NOPSEMA is due to make a decision on its formal assessment of the environmental plan (23 May 2019). The submission is not exclusively focussed on Equinor's environmental plan but examines various other aspects of NOPSEMA's approval process and other legislative requirements. It is an unsolicited submission and is specifically *not* a response to an invitation as envisaged in section 11B (1) of the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (Cth).

Among other things, the submission identifies a number of inadequacies in Equinor's EP, which we believe require further work before any final approval by NOPSEMA is granted. Most importantly, we argue that NOPSEMA has the power to deal with the matters we raise. The submission is intended to be constructive and, as far as possible, to take into account the legal framework within which NOPSEMA operates.

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The proposed deepwater Stromlo-1 well in the Great Australian Bight can be categorised as a rank wildcat well in rough waters of the roaring forties. Throughout its Environment Plan (EP) <sup>1</sup> the operator, Equinor, has consistently made optimistic choices in order to convince the public and NOPSEMA that "it is safe" to drill Stromlo-1.

Overconfidence, however, precedes catastrophic failure in many spheres of engineering and human endeavour. No matter how many layers of defence there are between a hazard and an accident, accidents can, and still do, happen. We cannot know everything, nor can we know every failure mode. Behaviourally, a problem for engineers is that, the more we know, the more confident we get and the blinder we become to the possibility that we had not accounted for an unexpected failure mode. Among other things, this submission calls into question the optimism that Equinor shows in its EP.

## Inadequate consultation process for the Environment Plan

Equinor has taken a very narrow approach to consultation that is unlikely to meet the definition within the *Offshore Petroleum Greenhouse Gas Storage Act (2006) (Cth)* of consultation with ‘relevant persons’<sup>2</sup>. The approach to consultation as evidenced within Equinor’s EP certainly falls well short of even BP’s incomplete relevant persons consultation for the same well-site, and hence should not be accepted by NOPSEMA.

Equinor has avoided consulting with parties, aside from government parties, unless they have been determined by Equinor to have a direct interest in an arbitrarily declared ‘Impact environment that may be affected’ (EMBA) which is limited to a 40km radius around the well-site. This presumes, in the first instance, that parties outside that radius do not have a shared concern in the proper function of the environment as a whole, including the impact EMBA, or say, in migratory species that pass through the impact EMBA. More worryingly, though perhaps on trend for Equinor, this approach assumes that everything will go to plan. In the event of a significant accident, such as the worst credible case discharge Equinor have modelled, it is clear that there is a risk of harm to the far wider so-called ‘risk’ EMBA, including the Great Australian Bight coastline, and those with an interest or concern closer to shore or to the risk EMBA as a whole may be affected by it. Equinor must expand its relevant persons consultation to include those with interests or concerns with regard to the risk EMBA.

It is particularly egregious that Equinor has failed to consult any Indigenous organisations despite numerous Indigenous claimants holding sea and land title claims to coastal waters and land that may be affected by a spill resulting from a worst credible case loss of well control according to Equinor’s risk analysis of the environment that may be affected. It is well known in South Australia that for the Mirning Nation whales have an important cultural significance that alone ought to be sufficient to count Mirning elders as relevant.

It is notable that Equinor was advised by both the South Australian Department of Mining and Energy and the Department of Premier and Cabinet’s Aboriginal Affairs, Reconciliation, and Cultural Heritage Branch that it should consult “all Aboriginal communities with coastal claims” while being reminded that “informing is not the same as consulting”. However, Equinor does not consider Aboriginal groups as ‘relevant persons’ for the purpose of consultation.

It has also, unlike BP, failed to consult any of the eighteen coastal local government corporations that have directly raised their concerns with the regulator NOPSEMA, Equinor, and/or the Australian government. Nor has Equinor consulted with state and federal members of parliament who represent potentially affected coastal areas.

Notably, despite their significant involvement in the public debate, investment in research, contribution to relevant parliamentary processes and their representation collectively of hundreds of thousands of Australians with a shared concern for the conservation of the Great Australian Bight, Equinor has also ignored conservation groups such as The Wilderness Society and Greenpeace.

Equinor has arguably undermined public confidence in recent transparency and consultation law reform by declaring the overwhelming majority of the near 32,000<sup>3</sup> submissions it received following the release of its environment plan for public comment as irrelevant. This resulted in only about 1000 submissions being deemed compliant by Equinor, and of those, only 13 of the public comments led to Equinor clarifying or altering elements of their environment plan.

We argue that reducing the response to the large number of public submissions to just thirteen comments is not ensuring that Equinor has provided a genuine response to public comment’.<sup>4</sup> Indeed, in not addressing key submissions publicly, Equinor has infringed upon a key overarching aspect of transparent public consultation founded within Guidance Note N-04750-GN1847, in which proponents must not respond to public comments in “an overly broad generalisation of information to a level that degrades the meaning of the comments and undermines the purpose of transparency”.<sup>5</sup>

Further, restricting the public comment period in response to an EP to 30 days does not reflect the stated aim of the recent amendments to the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (Cth) (Environment Regulations) to adopt 'leading practices'<sup>6</sup> in the area of consultation and transparency. The *Norwegian Petroleum Act 1996* (NPA) is regularly recognised as being global 'best practice' petroleum legislation. Section 3-1 of the NPA stipulates that "the opening of new areas is a matter which shall be put before local public authorities, central trade and industry associations and other organisations which may be presumed to have a particular interest in the matter... Interested parties shall be given a period of time of no less than 3 months to present their views".<sup>7</sup> Thirty days cannot be taken as being a satisfactory and equitable time period in which stakeholders can respond to the technicalities of an EP that took two years to write.

We ask that Equinor be requested to consult with all affected parties, as required by the Environment Regulations and in accordance with the 'leading' regulatory practice of allowing no less than three months for public comment from 'relevant persons'.

## Ecological Sustainable Development

The legal concept of 'the environment' is both an expansive and adaptable concept in both Australian case law and legislation. A critical question facing NOPSEMA in its assessment of Equinor's EP is the important elements of the 'environment' which must be considered in the context of offshore petroleum drilling in the GAB. Due to the amendment of the revised Environment Regulations and the delegation scheme under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act), NOPSEMA now holds the role of environmental assessment and regulation of Equinor's EP.<sup>8</sup>

Within the Environment Regulations the definition of 'environment', per Regulation 4, is broad, in encapsulating:

"(a) ecosystems and their constituent parts, including people and communities; and (b) natural and physical resources; and (c) the qualities and characteristics of locations, places and areas; and (d) the heritage value of places; and includes (e) the social, economic and cultural features of the matters mentioned in paragraphs".

The National Strategy for Ecologically Sustainable Development (NSES) defines Ecological Sustainable Development (ESD) as "development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends".<sup>9</sup> This definition is to be read in conjunction with the NSES's stated objectives for ESD:

- To enhance individual and community well-being and welfare by following a path of economic development that safeguards the welfare of future generations;
- To provide for equity within and between generations; and
- To protect biological diversity and maintain essential ecological processes and life-support systems.<sup>10</sup>

NOPSEMA has been entrusted to assess the risk of a proposed petroleum activity in determining whether Equinor's EP satisfies the objects of ESD found within Regulation 3 of the Environment Regulations to ensure any petroleum activity is:

(b) carried out in a manner by which the environmental impacts and risks of the activity will be reduced to as low as reasonably practicable; and

(c) carried out in a manner by which the environmental impacts and risks of the activity will be of an acceptable level.<sup>11</sup>

In conducting its assessment of Equinor's EP, NOPSEMA must bear in mind the importance of environmental protection as, "while health and safety concerns bear mainly on how exploration and production may be undertaken, environmental concerns may dictate that petroleum-related activities should not take place at all in certain areas".<sup>12</sup>

It is important to note that environmental impact here includes both direct and indirect impacts. Within the *Nathan Dam*<sup>13</sup> case, the Full Federal Court determined the proposed Nathan Dam would pose a threat to the marine-based Great Barrier Reef World Heritage Area, as the run-off from agricultural irrigation facilitated by the dam would flow out into the reef. The Court held that "all adverse impacts", both direct and indirect, must be considered.<sup>14</sup>

Equinor recognises that a large number of Threatened and Listed Migratory, Marine and Protected Matters are found within the prospective well area. Specifically:

- A total of 28 Listed Migratory Species are either likely to or may occur within, the Impact EMBA. Twenty of these are also Listed Threatened Species. Listed Migratory Species include: 12 migratory bird species (Section 4.6.7) 16 migratory marine species (mammals, sharks and reptiles).
- A total of 20 Listed Marine Species are either likely to, or may, occur within the Impact EMBA, including 17 bird species (Section 4.6.7) and three reptile species (Section 4.6.5). Sixteen of these species are also Listed Threatened Species.
- The Protected Matters search determined that 31 cetacean species or their habitat, may occur within the Impact EMBA. Five of these species are also Listed Threatened Species.<sup>15</sup>

Equinor has not comprehensively considered safeguards to address protection of the identified Listed Threatened Species in its EP. It has not demonstrated that its direct and indirect impact on these species will be as low as reasonably practicable or that the impact will be reduced to an acceptable level, as required by Regulation 3.

It is recommended that NOPSEMA cautiously assess all direct and indirect adverse impacts to the Listed Threatened Ecological Species, including taking into account the restoration of their populations. The importance of conserving biodiversity has been upheld in *Brown v Forestry of Tasmania (No 4)*.<sup>16</sup> Within *Brown*, the EPBC Act was applied as involving not only the preservation of threatened species, but the *restoration* of their populations, through the promotion of 'the recovery of threatened species' as per s 3(2)(e)(i). Despite this, the question of restoration of threatened species has not been considered in Equinor's EP.

## Unavailability of the Well Operations Management Plan

The Environment Plan deals among other things with how Equinor would *respond* to a blowout, should one occur. The crucial thing, however, is to *prevent* blowouts. The Well Operations Management Plan (WOMP) is the primary management plan for the prevention of blowouts. Yet, Equinor's WOMP has not been made publicly available. The public and other 'relevant persons' therefore have no way of assuring themselves that Equinor will be managing this risk effectively.

The aim of the recent amendments to the Environment Regulations, found within the Offshore Petroleum and Greenhouse Gas Storage (Environment) Amendment (Consultation and Transparency) Regulations 2019 ('Consultation and Transparency Regulations'), is to "ensure that industry's consultation practices represent leading practice and meet community expectations".<sup>17</sup> Public release of the WOMP is necessary to "improve consultation and transparency requirements and reinforce community confidence", as envisaged by the Explanatory Statement.<sup>18</sup> A key regulatory principle of these regulations is to ensure companies strive to attain a "social license to operate".<sup>19</sup> . Public access to the WOMP would be a positive step in the direction of Equinor



being afforded such a social license. In sum, the release of the WOMP would have the two-fold benefit of satisfying stated transparency policy aims, coupled with reflecting ‘leading practices’ in implementing the Consultation and Transparency Regulations.

Consequently, we recommend that NOPSEMA use its good offices to secure the public release of Equinor’s WOMP.

## The risk of a blowout

Equinor in their EP look at the probability of a Level 3 oil spill and assess the probabilities as below:

**Table 7.4 Probability of a large oil spill being stopped with blowout preventer, capping stack or relief well**

Reference	Probability of oil spill being stopped with blowout preventer (scenario 2)	Probability of oil spill being stopped with capping stack (scenario 3)	Probability of oil spill being stopped with relief well (scenario 4)
Stromlo-1	8.5E-05	4.0E-05	1.9E-05
Australian Maritime Safety Authority 2011	2.11E-05	9.43E-06	5.50E-06

These probabilities are mostly derived from the SINTEF database, which includes over 640 offshore blowouts that have occurred since 1955. The final figures are calculated using proprietary methodologies. However, it must be remembered that an historic database cannot give a prediction of the probability of a future well blowout in a new exploration province.

The above table is carelessly constructed. The first column refers two methodologies: Equinor’s standard methodology and AMSA’s methodology. To refer to Equinor’s methodology as Stromlo-1 is confusing. Furthermore, the second column is headed “probability of oil spill being stopped with blowout preventer (scenario 2)”. A literal reading of this is that if you have a blowout, the probability that the blowout preventer (BOP) will stop the flow of oil is variously estimated at 2 or 8 in 100,000. In other words, the BOP is useless. The same point may be made for the next two columns. That cannot be what Equinor means, but whatever they intend, this presentation of the data is inadequate and misleading. Finally, the scenario numbers in table 7.4 do not match the scenario numbers in table 7.10 which adds further confusion. This inconsistency of presentation between Equinor and their contractor RPS<sup>20</sup> does not inspire confidence in the figures themselves.

Various authors<sup>21,22,23,24</sup> on blowouts come up with quite different answers for blowout probabilities and current work has begun to concentrate more on the behaviours and processes needed to ensure that defences and barriers are not breached.

At the most basic level, every exploration well is a discrete event and is not part of a smooth and continuous probability distribution. Whilst much can be learned from studying past wells, predicting with accuracy the probability of a future blowout in a particular well is fraught with difficulty. At best, the designers of wells can get a picture of where best to intervene to lower the probability and flowrate of a potential blowout. The danger for an engineer is to believe that since the ‘statistics’ show that there has been a less than a 1 in 10,000 chance of a large oil spill, then that figure will apply to the next well no matter what. Drilling a well is a human endeavour and no matter how carefully we design the equipment and processes, continuous vigilance, humility and attention to anomalies are required if the well is to be drilled safely.

The table below taken from Exprosoft<sup>25</sup> gives a salutary lesson in how the human factors come into play leading up to blowout situations.

Table 6.5 Human errors in deep zone drilling LOWC events (2000–2015, US GoM OCS and the regulated areas)

LOWC ID	Time from kick to event	Human Error
459	Unknown	Unknown
463	> 6 hrs.	The casing was not centralized, and could not be worked during cementing because the brakes on the draw works overheated while running the casing. After the cementing job was complete, the crew's calculations indicated channeling.
460	Unknown	Unknown
465	0	No obvious
550	0	No obvious
516	1 day	Unknown
564	0	Yes removed gland nut/hold down pin from the wellhead flange
464	0	A modification on BOP controls were carried out when the reservoir was exposed. No risk evaluation was carried out. The maintenance personnel accidentally activated the LMRP disconnect
619	20 hours from kick observed until oil was observed on the sea surface.	No direct, but not following regulations and internal procedures, used too low kick tolerance
481	0	Failure of the driller to recognize the indications that the well was flowing when the kelly was broken from the drill string. The string safety valve (TIW) was not tested regular and could not be closed
524	5	Did not properly evaluate ditch magnet recovery of metal, probable rig misalignment
611	0	Accepted cement job that should have been rejected. Failed to observe kick before well was flowing
590	0	When the rig had departed from the well to undertake other work, not one well control barrier in the well had been satisfactorily tested and verified, and one barrier that should have been installed was missing. In other words, the well was suspended without regard to the company's own Well Construction Standards or sensible oilfield practice.
629	5 days	No obvious
605	Unknown	Unknown
622	Unknown	Unknown
580	Unknown	Unknown
608	0	Failed to observe kick before it was in the riser
595	5 hours (assumed)	Likely observed kick late, BOP closed late
583	0	Yes, seems the crew did not pay attention to gas alarm in the shale shaker area and gas was allowed to accumulate before it exploded
538	2.5 days	Yes according to MMS, did not sweep stack sufficiently after kick before opening annular
532	0	Likely, seems not to have anticipated gas when drilling out shallow cement plug
645	0	Observed kick late, 55 bbl. of mud on the drill floor before the BOP was closed
502	Some hours	Unknown

In summary, very little reliance should be placed on the risk calculations upon which Equinor wants to rely to predict the blowout probability for Stromlo 1.

## Sea states

In Equinor's section on Metocean conditions, Table 2.5 (copied below) is interpreted as showing the GAB to have a similar sea state to areas in which Equinor have worked and particularly in the North Sea and Barents Sea.

However, on closer inspection it can be seen that the ratio between the winter significant wave heights and the summer significant wave heights is far less for the GAB. The implication is that the GAB is rougher for longer with less calm periods than in either the North Sea or Barents Sea, which actually have better summer conditions.

It is also interesting to note that Equinor has not included the Gulf of Mexico (GoM) in the comparator set. The GoM is the only place in the world where a rudimentary version of a capping stack was deployed to finally stem the flow from the Deepwater Horizon blowout.



The GoM has a summer mean significant wave height of around 1 metre and a winter mean significant wave height of around 2 metres. The Macondo well blowout started on April 20<sup>th</sup> 2010 and the flow was stemmed 87 days later on July 15<sup>th</sup>. Throughout this period, remedial work was carried out in conditions with a mean significant wave height of around 1 metre.

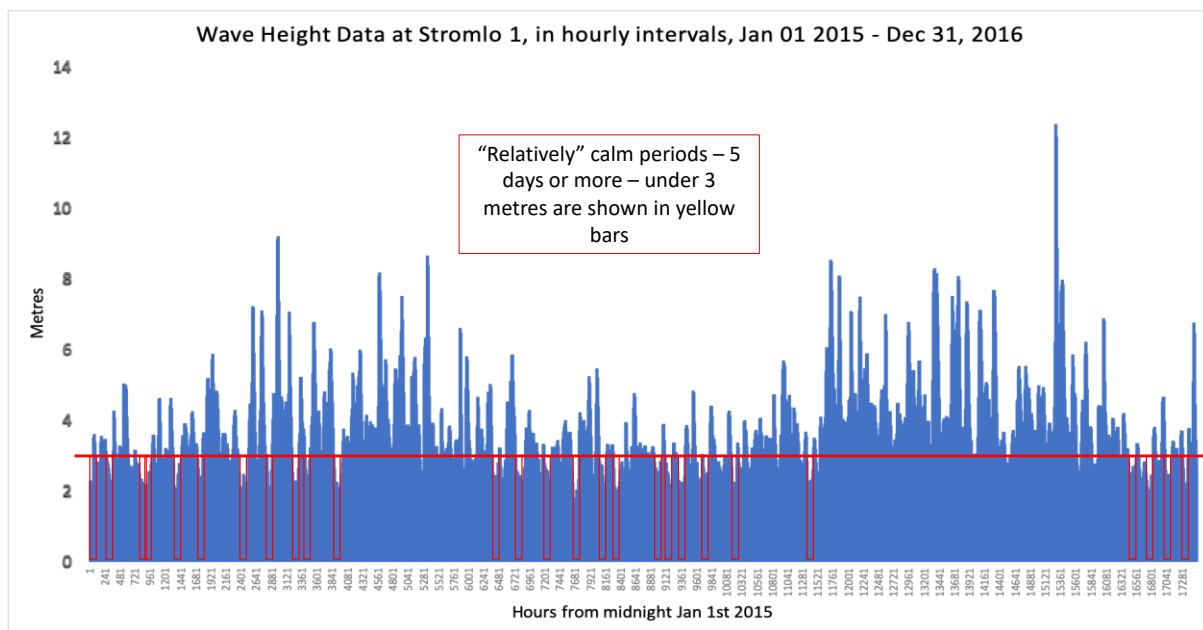
**Table 2.5 Metocean and sea-state data for Ceduna Sub-basin compared with other exploration basins worldwide where Equinor Australia B.V. has drilled successfully**

Parameter		Ceduna Sub-basin	Norwegian sea	Barents Sea	Canada east coast	Brazil
Wind speed (m/s)	100-year, 1 hr mean at 10 m	27.5	34	32.5	39	22
	Mean, 1 hr mean at 10 m	7.6	8.7	8.5	9.1	7.3
Significant wave height (m)	100 year	12.2	16.7	15.5	15.5	9.2
	100-year associated Tp (s)	14.9	18.5	18.5	16	16
	Annual mean	3	2.7	2.5	3.1	2
	Monthly mean – winter	3.6	3.9	3.4	4.5	2.3
	Monthly mean – summer	2.5	1.5	1.5	1.8	1.6
Extreme wave height (m)	100 year maximum	23	31	28.8	29.7	17.7
	10,000 year maximum	28.7	39.6	36.8	35.4	25.6
Current speed (cm)	100-year surface	113	132	138	35.4	25.6
	100-year mid-water	52	62	75	43	40
	100-year 3 m above seabed	30	57	52	45	30

Bureau of Meteorology (BoM) data is available for the Stromlo 1 location for the period 1<sup>st</sup> Jan 2015 through to 30<sup>th</sup> September 2018. Looking at the two years 2015 and 2016 the following picture emerges (see chart below<sup>26</sup>).

In Equinor’s scenario planning, they assume that the blowout could be capped in between 9 and 24 days and yet by inspection of the wave data there are few weather windows over 5 days at a time where the significant wave height is less than or equal to 3 metres which is perhaps a more prudent limit on stacking cap emplacement.

And yet during the Deepwater Horizon disaster, BP required 87 days to clear the debris, regain control of the Macondo well and finally cap the well – all in the benign conditions of the GoM summer.



Over the two years (2015 and 2016) there were around 30 “weather windows” that could have proved useful for subsea remedial operations such as interventions by remotely operated vehicles, debris removal or capping stack emplacements.

A further problem with Equinor’s analysis is that it takes no account of the changes that are now occurring in extreme weather events. A recent global study shows:

“small increases in mean wind speed and significant wave height over this period [1985-2018], with larger increases in extreme conditions (90th percentiles). The largest increases occur in the Southern Ocean”.<sup>27</sup>

This suggests the need for extreme caution in using short time-span data from the past to predict future wave heights in GAB.

We conclude that in the matter of sea states and their impact on remedial operations following a blowout, Equinor is unduly optimistic. And we noted earlier within this submission, over-confidence precedes catastrophic failure.

## Preventing a blowout: organisational factors

The 2010 Deepwater Horizon blowout in the GoM yielded many lessons about blowout prevention. Some of these were technical and have been widely implemented. Others concerned the human and organisational causes of the blowout.<sup>28</sup> These are not so widely recognised and implemented. There are four lessons, in particular, that Equinor needs to demonstrate that it has thoroughly learnt if we are to have confidence in its ability manage the risk of blowout.

### Bonuses

Principal among the organisational causes of the GoM blowout was the system of bonus payment made to employees at all levels. These provided continual pressures to minimise costs. Employee performance agreements required employees to show evidence of things they had done to reduce costs. Accordingly, many employees went to great lengths to demonstrate how they had saved the company money. The main cost for BP in drilling the well was the cost of the rig, chartered at \$533,000 per day<sup>29</sup>. Everyone was aware that if rig time could be saved, the total cost of drilling the well would be less.

The pressure to drill as quickly as possible was translated to all employees by means of the bonuses which depended on drilling speeds. A key performance indicator in this respect was “days per 10,000 feet of well drilled”. This resulted in a faster rate of drilling than was prudent.

The incentive scheme put pressure on all concerned to ignore anomalies, and warnings that things might be amiss, and to get on with the job in an almost blinkered way<sup>30</sup>. One official report identified ten separate occasions on which the drilling team accepted a higher risk in order to reduce drilling time and therefore cost.<sup>31</sup> Equinor needs to demonstrate that its remuneration system will not undermine safety, as BP’s did in the Gulf of Mexico.

## Risk indicators

The perverse effect of these incentives might have been tempered if bonuses had also taken account of how well major risks, such as the risk of blowout, were being managed. Some risk indicators were indeed included in bonuses, but BP was using the wrong indicators, which meant that it was systematically misleading itself and others about the risk of blowout. Its primary indicator of process safety risk was the number of cases of 'loss of containment', which, in the context of drilling, meant roughly the number of oil spills into the sea. Many oil spills were from hydraulic hoses. While such spills are clearly undesirable, they are not precursors to a blowout. In other words, the number of such spills is not an indicator of the risk of blowout. Far more significant is the number of 'kicks', meaning incidents in which operators temporarily lose control of the well and oil and gas under high pressure begin forcing their way upwards. Kicks are precursors to blowouts, in that if operators do not act quickly to control them, they can develop into blowouts. That was one of the contributory factors to the GoM blowout. The frequency of kicks is therefore one indicator of blowout risk; another would be the speed of response to kicks. Neither of these was an indicator that mattered to BP in the GoM.

BP subsequently recognised the importance of using well control incidents, such as kicks, as indicators of risk<sup>32</sup> and official industry guidance recommends that such incidents be treated as key performance indicators.<sup>33</sup> Equinor needs to demonstrate just what indicators of blowout risk it is using and what it is doing to make these measures matter, for example by influencing remuneration.

Another relevant risk indicator is cementing failure. Drilling wells involves pumping cement down at various times to seal joints, and to plug the bottom of the well when drilling is completed but the well is not yet ready for production. Cementing jobs sometimes fail, and in fact, the regulator in the GoM found that half of all blowouts were initiated by a cementing failure. Number of cementing failures would seem to be an important indicator of risk.

One of the most insidious processes that contributes to many major accidents is the 'normalisation' of substandard or deviant practices. This happens when people start taking short cuts and find there are no negative consequences. Experience teaches them, in other words, that strict compliance is unnecessary. Eventually, however, an unusual set of circumstances may catch them out.

Closely related to this is the normalisation of deviations from standard engineering practices. Companies sometimes find themselves in situations where strict compliance with a standard seems unnecessary and onerous. To deal with this situation, the company may have a formal process for authorising a deviation from the standard in a particular case. Looking at these cases in isolation, the deviation may seem to involve a negligible increase in risk, but if the number of such authorisations is not controlled, the cumulative increase in risk may be considerable. Following the Deepwater Horizon disaster, BP has acknowledged that the number of authorised deviations from approved engineering practices needs to be treated as an indicator of risk and that this number should be driven as low as possible. It is important to know if this is an indicator that matters to Equinor in the Great Australian Bight.

Finally, a closely related but subtly different risk indicator. Safety generally, and blowout prevention in particular, depends on the existence of a number of controls, so that if one fails others will save the day. Accidents only happen when all controls fail simultaneously. Major accidents are relatively rare because the simultaneous failure of all controls that are supposed to be in place to prevent them is relatively rare.

If one of these controls is temporarily out of action for some reason, for example, whilst undergoing maintenance, the risk of accident will be marginally greater. Risk assessment in any one case may deem this to be acceptable. But if the total number of safety bypasses or 'defeats', as they are sometimes called, is uncontrolled, then the risk level may rise significantly. Hence an important indicator that companies need to keep track of is the number of

safety system bypasses or defeats that are currently in place.<sup>34</sup> It would be useful to know whether Equinor will use this indicator in its operations in the Great Australian Bight and whether it will be an indicator that matters for bonus purposes.

### Incentivising the reporting of bad news

Prior to every disaster, there are always warning signs — indications that things are amiss. Had these signs been identified earlier, the disaster could have been avoided. It is also true that people at the grass roots of an organisation are frequently aware of what is happening but do not transmit the bad news upwards, for a variety of reasons.

One of the most important reasons is an attitude on the part of senior management that discourages the reporting of bad news. BP's CEO at the time of the 2005 Texas City refinery accident created a climate in which bad news was not welcome. Likewise, the head of BP's exploration and production division at the time of the GoM accident "was not someone people wanted to share bad news with".<sup>35</sup>

All of this is something that risk-aware leaders and organisations are acutely aware of. For them, bad news is good news because it means that their communication systems are working to move the bad news up the hierarchy to the point where something can be done about it before it is too late.

Risk-aware leaders are always sceptical about whether they are getting the all the relevant information. One such leader embarked on a campaign to "encourage the escalation of bad news". One of the authors of this submission recalls sitting in her office while she was talking on the phone to a lower-level manager who had provided her with a report that presented only good news. "But where is the bad news", she said, "I want you to rewrite your report to include the bad news". The organisation in question had a policy of "challenging the green and embracing the red". The slogan referred specifically to traffic light score cards, but it also had the more metaphorical meaning of questioning the good news and welcoming the bad. She was implementing this slogan in a very effective way.

This leader had introduced an incentive system to encourage the reporting of bad news. Whenever someone demonstrated courage in transmitting bad news upwards, she provided them with an award (named after a man in her organisation who had saved someone's life by his alertness to a process safety hazard). The award had various levels, the highest worth \$1,000. On one occasion she gave this award to an operator who had recognised that some alarm levels had been changed on a rotary compressor without a proper "management of change" procedure. He had written an email about this to his manager who, in turn, had passed it on to her. She had made more than a hundred awards for courageous reporting in a period of less than 12 months.

A finding of one of the reports on the GoM Deepwater Horizon accident was that employees had become complacent with respect to the risk of blowout, believing that everything was under control. One way to overcome this problem is to incentivise the reporting of bad news. This encourages risk-awareness, a state of mind that is quite the converse of complacency. Equinor needs to demonstrate how it will encourage people to report the bad news.

### Centralisation

One of the organisational causes of the GoM accident was that BP head office did not exercise sufficient quality control over the leaders of its various business and sub business units. The result was that these leaders were subject to unrelenting commercial pressures with insufficient countervailing pressure to manage major hazard

risks effectively. BP has learnt this lesson very well. It created a new Safety and Operational Risk (S&OR) function whose staff work in local business units but who are not answerable to those units but rather to the head of S&OR in London.<sup>36</sup>

BP's WOMP for the GAB in 2016 addressed this issue in section 4.4, where it described the control which head office would exercise over its Australian business unit.

Equinor addresses the issue on page 381 of its EP. Its organisational chart indicates that Equinor's Australian business unit will operate quite autonomously and that there will be no formal input from any central corporate function concerned with the maintenance of drilling standards. It would seem that Equinor has not learnt this very important lesson from the Deepwater Horizon disaster.

### NOPSEMA's ability to raise these issues

Industry regulators have typically not addressed the matters raised above. They often view them as matters of corporate governance and therefore outside their purview. However, we argue that these matters are relevant both to EPs and to WOMPs.

The Offshore Petroleum and the Environment Regulations require that:

"The environmental impacts and risks of the activity will be reduced to as low as reasonably practicable; and...that the environmental impacts and risks of the activity will be of an acceptable level". (See "object of regulations" and sections 10A, 13, 14)

One of the ways to reduce the risks to the environment of a blowout is to reduce the risk of a blowout itself. Thus, one way to reduce the risk to the environment is to implement the organisational lessons identified above. NOPSEMA is therefore entitled to take account of these organisational issues in its consideration of Equinor's EP. Equinor needs to demonstrate to NOPSEMA's satisfaction that it has learnt and implemented those very important lessons from the GoM blowout.

## Preventing a Blowout: Standards and Inspection

### Appropriate standards

The prevention of a blowout relies on the barriers in place. The presence of such barriers is, ultimately, a factor of regulation. For any well to be drilled, a field development plan and a Well Operations Management Plan (WOMP) is required to be approved. Most jurisdictions require the use of standards for the construction of a well and to maintain well integrity to prevent a blowout. In its EP, Equinor argues in chapter 2 that the environment for petroleum activity at Stromlo-1 is similar to that of the North Sea. Therefore, it is appropriate to examine the well standards requirement for those states undertaking petroleum operations in the North Sea and compare to current Australian practice regarding well construction and well integrity.

A consideration of the well integrity requirements under the legislation of Norway, Denmark and the UK demonstrates that all three jurisdictions have a legal requirement for a standard and have provide such a standard. Denmark has established *GL65.2.1 on Health and Safety Aspects Regulating Offshore Well Operations*. Similarly, the UK has legislated the *Offshore Installations and Wells (Design and Construction, etc) Regulations*

1996, and the associated *Guide to the Well Aspects of the Offshore Installations and Wells (Design and Construction, etc) Regulations 1996*, and the *ED Offshore Inspection Guide: Well Integrity (Operate Phase)*, which outlines ISO and other standards required to maintain well integrity. In Norway, Equinor's home country, all wells must be drilled and managed in accordance with *NORSOK Standard D-010: Well Integrity in Drilling and Well Operations*, in order to demonstrate the requisite 'fitness to drill' required before drilling can commence.

Given that the physical environment of the GAB is at least as hostile as in the North Sea, (we have argued above that it is worse), it could be assumed that the well construction standards required for such a well would be at least comparable to those of North Sea jurisdictions. However, to date, NOPSEMA has required only the use of API/APPEA standards/guidelines. Both APPEA and API standards for well integrity fail to consider the physical environment, and the fact that regulators in environments like The North Sea do not use them is evidence that they have been found wanting. Indeed, the API standards were developed by industry to meet the requirements of good oilfield practice (GOP) and designed for offshore drilling in the Gulf of Mexico and other temperate environments.

APPEA has long been wedded to the acceptance and use of API standards as its *de facto* requirement for well control. However, given that Australia has moved from the acceptance of GOP as a regulatory standard for wells to the more onerous ALARP system, as part of the safety case, it is also appropriate that standards used in jurisdictions where ALARP is adopted should also be used. Furthermore, given the expected sea states in the GAB, the high integrity of the NORSOK Standard, and Equinor's familiarity with this Standard, it is recommended that Equinor be required to comply with NORSOK D-010 for all drilling in the GAB.

We provide the following additional evidence in support of our claim that API standards do not meet the definition of "best practice found in internationally recognised industry guidance",<sup>37</sup> as required under Guidance Note N-04750-GN1344. The API standards were examined in the fallout of the Deepwater Horizon blowout and oil spill in the *Report to the President by the National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling, January 2011*. The report states that API standards:

"have increasingly failed to reflect 'best industry practices' and have instead expressed the 'lowest common denominator'—in other words, a standard that almost all operators could readily achieve. Because, moreover, the Interior Department has in turn relied on API in developing its own regulatory safety standards, API's shortfalls have undermined the entire federal regulatory system."<sup>38</sup>

The report further states:

"it is clear that API's ability to serve as a reliable standard-setter for drilling safety is compromised by its role as the industry's principal lobbyist and public policy advocate. Because they would make oil and gas industry operations potentially more costly, API regularly resists agency rulemakings that government regulators believe would make those operations safer, and API favours rulemaking that promotes industry autonomy from government oversight."<sup>39</sup>

## Stewardship

The Norwegian petroleum regime is regularly acknowledged as evidencing an "exemplification of effective and efficient offshore petroleum regulation".<sup>40</sup> Within Norway's NPA, broad principles of 'Resource Management' are required in developing petroleum resources. Resource Management is defined within section 1-2 of the NPA as:

"a long-term perspective for the benefit of the Norwegian society as a whole. In this regard the resource management shall provide revenues to the country and shall contribute to ensuring welfare, employment and an improved environment, as well as to the strengthening of Norwegian trade and



industry and industrial development, and at the same time take due regard to regional and local policy considerations and other activities.”

This definition of Resource Management is founded on the regulatory concept of ‘stewardship’. Stewardship is critical for a national regulatory system to effectively and transparently monitor and assess prospective offshore petroleum activities. Without such stewardship, it is difficult for a regulatory body to adopt ‘leading practices’ and be held accountable in the management of nations’ petroleum resources. Indeed, the *Offshore Petroleum Resources Management Review* (2015) adopts the concept of stewardship in recognising the Australian Government’s role as “ultimately to work within the concepts of resource management and stewardship to achieve an appropriate balance between the objectives of the owner of the petroleum resources (i.e. the Crown) and the developer of those resources (i.e. industry).”<sup>41</sup>

It is recommended NOPSEMA be guided by principles of stewardship in adopting ‘best practice’ standards when assessing Equinor’s EP. This would require displacing API standards with the leading NORSOK D-010 standard and adopting a ‘long-term perspective’ in assessing the EP for the benefit of all Australian citizens. We argue that limiting the assessment of the EP to compliance with API standards does not adequately address the principles of stewardship.

## Well construction and well inspection

In jurisdictions such as Australia, the USA, the UK, Denmark, and Norway, all wells are constructed according to the WOMP submitted and approved by the relevant regulator, and the operator is required to construct, operate and workover the well in accordance with the approved plan. In Norway, Denmark, the USA and the UK, wells are inspected during construction, operations and workover stages and compared to the approved WOMP to ensure that the well meets the approved WOMP, thereby reducing the risk of a blowout occurring. Such inspection does not occur in Australia, meaning that a well may be constructed in a manner that is substandard to that which was approved.

Such a disparity in the construction of the well versus the approved WOMP was the root cause of the 2009 Montara blowout, where a poor cement job and a failure to put in place the pressure containment cap on the outer pipe led to a well blowout. It is highly likely that such an incident, which saw oil leaking for 75 days, could have been averted if inspection occurred. Whilst the Montara Commission of Inquiry blamed the regulatory failure on the Northern Territory, the responsible Joint Authority at the time, and shifted the regulation of such operations to NOPSEMA from January 2012, the root issue of a failure to inspect well construction and operation prevails.

The general inspection power granted under Schedule 2A, Part 2, Division 1 (cl 3) of the OPGGSA could be utilised to establish well inspections:

### 3 Petroleum environmental inspections—nature of inspections

#### *Inspections—general power*

- (2) A NOPSEMA inspector may, at any time, conduct a petroleum environmental inspection:
- (a) to determine whether a petroleum environmental law has been, or is being, complied with; or
  - (b) to determine whether information given in compliance, or purported compliance, with a petroleum environmental law is correct.

The inspection may be conducted at the inspector’s own initiative or in compliance with a direction under subclause

(3) Inspections—directed by NOPSEMA. NOPSEMA may give a written direction to a NOPSEMA inspector to conduct a petroleum environmental inspection.

(4) The NOPSEMA inspector must conduct a petroleum environmental inspection as directed under subclause (3).

Finally, under r 5.07 (6) of the Offshore Petroleum and Greenhouse Gas (Resource Management and Administration) Regulations 2011 (Commonwealth), the regulator has the capacity to accept the WOMP subject to conditions. Such conditions could include the requirement for well inspection.

## Stopping a blowout

In the event of a blowout, Equinor is relying on three strategies to stop the flow – the first is the blowout preventer, the second is to cap the well, and the third is to drill a secondary relief well. This would be drilled so as to intersect the blowout well, which would then be pumped full of cement.

Blowout preventers have not been reliable in the past and although they are continually improving, they cannot be assumed to be completely reliable.

Capping stacks are a new technology that were not available at the time of the Deepwater Horizon blowout. As far as we know, the capping stacks now available have never been used to stop a blowout. Furthermore, they must be lowered into position from a surface vessel, and as discussed in the earlier section of this report, the sea states in the GAB are such that for significant periods of time this would not be possible. According to BP's earlier WOMP:

“overboarding [deployment] of the capping stack would be limited by a maximum sea state of around 3.5-4m, so some WOW [waiting on weather] delays could be experienced [for any sea state beyond this]”.<sup>42</sup>

The relief well is the ultimate strategy on which Equinor will rely to “kill” the blowout, if the other two strategies fail. We concentrate here on the issue of a relief rig that would be used to drill a relief well.

The question is: where would Equinor find a spare drilling rig to carry out this operation? Equinor's EP considers three options:

1. A relief rig would be reliably available in Singapore. The time taken to bring such a rig to the Bight and to kill the well would be 102 days. The Deepwater Horizon's Macondo well flowed for 87 days before it was stopped. Equinor judged that this was not a sufficiently rapid response, given the other options available.

2. A relief rig could be obtained from the oil fields of Australia's North Western shelf. Using such a rig, it would take 88 days to kill the well. There are no rigs on standby on the NW shelf, but there is a memorandum of understanding (MOU) among operators on the shelf that envisages the release of a rig currently engaged in drilling in order to drill a relief well in the Bight. According to Equinor's EP, “at the time of writing” there were two suitable rigs available on the NW shelf. Equinor's view is that this is the option that reduces the risk to as low as reasonably practicable, and it is this option they rely on to drill a relief well in the event of a blowout.

However, it needs to be said that there is no guarantee that those two rigs will still be available when Equinor is drilling its exploratory well. Nor does Equinor demonstrate that these rigs would indeed be effective in the GAB. Finally, it is simply taken for granted that the MOU will work as intended. None of this provides much reassurance that this option will be as effective as Equinor assumes. In view of the uncertainties, BP assumed in its EP for the

GAB that it would take up to 149 days to acquire an appropriate rig for the NW shelf, drill a relief well and plug the blowout. This casts considerable doubt on Equinor’s optimistic estimate of 88 days.

3. The third option Equinor considered is to have a dedicated relief rig on standby in GAB. This would enable a blowout to be killed in 68 days, 20 days less oil flow than would occur in option 2 above. However, to have a dedicated rig on standby would be very expensive. In fact, according to the EP it would make the proposal “commercially non-viable”<sup>43</sup>. Moreover, they claim that the additional risk reduction achieved by the presence of the standby rig would not be sufficient to justify the expense<sup>44</sup>. Equinor concludes that this option is therefore not reasonably practicable and accordingly rejects this option.

The issue of commercial non-viability is strictly speaking irrelevant. NOPSEMA’s guidance on the meaning of reasonably practicability is that,

“reasonably practicable [is] not [the same as] reasonably affordable: justifiable cost and effort is not determined by the budget constraints/viability of a project.”<sup>45</sup>

In other words, if an option is justifiable on other grounds, the fact that it might make a project uneconomic is not a reason to reject the option. It simply means that the operator needs to drill elsewhere, where the risks and the costs are not as great.

We argue that the third option is indeed justifiable on other grounds. In particular, there is precedent in other parts of the world. In 2016 the US made new regulations covering drilling in the US Arctic – off the northern coast of Alaska.<sup>46</sup> Those regulations required that there be a backup rig stationed in the vicinity and able to kill the blowout within 45 days. When Shell was planning to drill in the area it did not regard this particular requirement as making drilling “commercially non-viable”, and its proposed campaign actually involved two rigs drilling different wells simultaneously. In the event of a blowout on one rig, the other rig would disconnect and move across to drill a relief well.

Equinor rejected the standby rig option, in part, on grounds that,

“A stand-by rig on location is generally only a consideration in parts of the world where the sea freezes and it is not possible to access the drilling location in winter.” EP Appendix 7-4, p23

We believe this misses the point. The point is that where the stakes are high this kind of solution is justified. In the US Arctic, the fact that the sea freezes over in winter raises the stakes. Likewise, the remoteness of Arctic region raises the stakes, for example by making clean up much more difficult. According to the US Department of the Interior,

“The Arctic region is characterized by extreme environmental conditions, geographic remoteness, and a relative lack of fixed infrastructure and existing operations. This final rule is designed to help ensure the safe, effective, and responsible exploration of Arctic OCS [outer continental shelf]..., while protecting the marine, coastal, and human environments”

In the GAB, the extreme environmental sensitivity of the area, and its remoteness, raise the stakes in similar ways. We believe that if the Arctic deserves the protection of a backup rig, so does the GAB. This is particularly so, given the uncertainties and disadvantages of Equinor’s preferred option – borrowing a rig from the NW shelf.

Norwegian regulations<sup>47</sup> are also relevant here. They do not specify a time to kill the blowout, but rather the time to commence relief well drilling. Equinor’s best estimate of the time taken to bring a relief rig from the NW shelf and begin drilling in the GAB is 26 days. This is more than twice the time specified in the NORSOK D-010 well integrity standard, which requires a relief well to be commenced within 12 days. If Equinor can comply with the Norwegian standard in Norwegian waters, we believe they should be held to this standard in the GAB.

## Does the regulator have the power to insist on a standby rig?

We have already noted that NOPSEMA has the power to insist that Equinor reduce the risk to as low as reasonably practicable. This is a legal requirement in many jurisdictions, but it is inherently vague. Risk engineers have therefore developed various ways of calculating whether the risk is as low as reasonably practicable. Equinor has used this engineering approach in its EP. However, the attempt to quantify risk in this way is problematic. Regulators in Australia, the UK and elsewhere have therefore increasingly adopted the view that reducing the risk to as low as reasonably practicable means following good practice.

In its guidance on the meaning of reasonable practicability, NOPSEMA states:

“In the great majority of cases, a decision [about reasonable practicability] can be made by referring to existing ‘good practice’ that has been established. However, for complex situations it may be difficult to reach a decision on the basis of ‘good practice’ alone. There may be some situations, for example in the case of new technology, where there is no relevant ‘good practice’ that can be followed. In these situations, other decision-making techniques need to be applied to inform our judgment.”<sup>48</sup>

Moreover,

“The term ‘good practice’ in NOPSEMA guidance documentation therefore is taken to refer to any well-defined and established standard or codes of practice adopted by an industrial/occupational sector, including ‘learnings’ from incidents that may yet to be incorporated into standards. Good practice generally represents a preferred approach; however, it is not the only approach that may be taken. While good practice informs, it neither constrains, nor substitutes for, the need for professional judgement. Good practice may change over time because of technical innovation, or because of increased knowledge and understanding”.<sup>49</sup>

The 45-day rule for the US Arctic can reasonably be regarded as ‘good practice’ for drilling in the Arctic and therefore good practice for the purposes of drilling in the GAB.<sup>50</sup> Likewise, Norwegian rules can reasonably be regarded as good practice and therefore potentially applicable to Equinor in the GAB. *Ipsa facto* the failure to comply with such rules means that the risk is not as low as reasonably practicable.

We can take this argument a step further. It will be recalled that the Environment) Regulations require that:

“the environmental impacts and risks of the activity will be reduced to as low as reasonably practicable; and ... *that the environmental impacts and risks of the activity will be of an acceptable level*” [emphasis added].

So, risks must not only be reduced to as low as reasonably practicable; they must also be reduced to an *acceptable* level. What does this mean? NOPSEMA provides the following guidance as per Guidance Note N-04750-GN1344,<sup>51</sup>

To define the acceptable level of impacts and risks a titleholder should have regard to all relevant context including, but not limited to:

Best practice found in internationally recognized industry guidance, such as that published by the International Petroleum Industry Environmental Conservation Association (IPIECA) for oil spill risks.

Notice that the reference is to ‘best practice’, not just good practice. And although the NOPSEMA guidance note refers to best practice *industry guidance*, it also notes that this is not intended to exhaust the possibilities. It is reasonable therefore to look for best practice in legislation and regulations. The implication is that the titleholder should carry out a global search for best practice wherever it may be found and use this as a guide to what is

acceptable. The US Arctic regulations and the Norwegian regulations can both lay claim to being considered best practice. NOPSEMA is therefore entitled to hold Equinor to these standards.

## Clean up and containment

### Spill modelling

BP in its 2016 Well Operations Management Plan (WOMP), written for the same well location now proposed by Equinor, Stromlo-1, and submitted to and accepted by NOPSEMA, listed the open well bore scenario as its worst credible discharge (WCD); “BP model WCD as a worst case wellbore outcome (i.e. full wellbore open to seabed, no pipe in hole)”. In this scenario, BP predicted a flow rate of 54,000 barrels per day for 149 days for a total of 7.9 million barrels.<sup>52</sup>

Equinor, however, have opted not to base their response plan on an equivalent worst case discharge scenario to BP, stating in an early version of its oil pollution emergency plan (OPEP) that, “an ongoing flow from an open well bore is not considered a credible response because it has never happened in the industry”. But the absence of a precedent is not grounds for dismissing the possibility of an event occurring. Failure to pay proper heed to low probability, catastrophic eventualities is one of the precursors of major accidents. Equinor ought to both model and plan a response for a genuine worst-case scenario.

Nonetheless, the scenario that Equinor has developed its OPEP around would still amount to a catastrophic and unprecedented environmental event. It models what it calls a worst *credible* case discharge, predicting a lower flow rate than did BP based on an assumption that there will be equipment, the drill string, blocking the well hole. This results in a discharge of 6,739 m<sup>3</sup> or 42,387 barrels per day until the well is killed on day 102, for a total of 687,378 m<sup>3</sup> or 4,323,478 barrels of oil. This is a similar quantity of oil to that which is estimated to have entered the Gulf of Mexico following the Deepwater Horizon disaster.

Equinor should be asked to provide a better justification for its departure from the BP worst case scenario, or better still, to accept BP’s open bore scenario and model the spill and response requirements accordingly.

### Oil spill response

As part of the Environment Plan for an exploration drilling proposal, NOPSEMA guidance requires every petroleum company to have an OPEP that addresses the strategies and tactics that may be required to be implemented in response to a variety of oil spill scenarios. Furthermore, according to NOPSEMA, “the OPEP will identify how the petroleum company will maintain the arrangements and capability to be able to implement their OPEP at any given time.”<sup>53</sup>

However, Equinor’s OPEP does not describe in detail the response capability or quantify the resources that might be required, let alone how Equinor proposes to maintain the capability to implement its response. While Equinor references existing state-based response plans, there is no analysis to demonstrate that these plans have been drafted to account for a response to a spill scenario described in the worst credible case, no demonstration of how Equinor’s response would interact with the state agencies response plans, and consequently no evidence that Equinor has assessed what is required, let alone that it is capable of resourcing a response that can fill the gaps.

In the absence of such detail, and given total volume of oil in Equinor's worst credible case discharge (WCCD) is similar to that which escaped from the Deepwater Horizon's blown-out Macondo well, it is appropriate to use BP's experience with the GoM blowout as an analogue for the potential consequences and response requirements that would follow from Equinor's worst credible case discharge in the GAB.

BP's 2016 GAB Oil Spill Response Planning Strategic Overview for Stromlo-1 admitted the following:

"Both containment and recovery and in-situ controlled burning (ISB) have many operational constraints within GAB, principally due to weather and sea-state constraints, and *are not expected to provide significant benefit.*"<sup>54</sup> [emphasis added]

BP's 3-year response to the GoM spill included over 48,000 people, 6,800 ocean going vessels, 1,300 km of containment boom, 2,800 km of sorbent boom, 2,063 mechanical skimmers, 32 oil/water separators, and 6.8 million litre of chemical dispersants.<sup>556</sup> Being located near tens of thousands of oil and gas workers, engineers and their facilities permitted such a response to be mounted. Yet even with this massive effort, BP was only able to collect 3% of the estimated spill volume.<sup>57</sup> The 8% BP claims was chemically dispersed simply relocated oil and impact from the sea surface into the water column. The 5% of the spill volume that was burned created significant atmospheric contamination (particulates, dioxins, furans), and substantial volumes of heavy burn residues which sank to the sea floor.

Equinor must quantify the human, technological, and financial resources that would be needed to mount a similar response in the GAB, then prove that it can resource the effort. Assuming such a response, it must then calculate the final ecological and social cost.

## Dispersants

Equinor's principal oil spill mitigation method is the application of dispersant and in particular sub-surface dispersant injection (SSDI). It states that "sub-surface dispersant injection activities will be defined in the Source Control Plan, which will be provided in the Well Operations Management Plan"<sup>58</sup> which, as mentioned previously, is not available for public scrutiny.

Equinor claims that SSDI "will have significant benefit" but does not offer an evidence-based description of the mitigating effect that SSDI is expected to have on the spread of oil into the water column, in comparison to an unmitigated worst-case scenario. It is confident that dispersant response will reduce surface oil concentrations to less than 10g/m<sup>2</sup> at all areas adjacent to the shoreline, but this significant difference claimed between an uncontrolled discharge and a discharge involving dispersant use only is not substantiated and ought to be scrutinised.

Evidence from the significant volume of data compiled by the Gulf of Mexico Research Initiative indicates the use of SSDI in response to the Deepwater Horizon blowout was largely ineffectual.<sup>59</sup> The recent data analysis confirmed an earlier study that found "pumping chemical dispersants at the spewing wellhead may have had little effect on the amount of oil that ultimately surfaced" and has prompted the authors to call for "a reconsideration and reprioritisation of response measures."<sup>60</sup>

Equinor should explain why its prediction regarding the effect of applying very large quantities of dispersant will have an outcome that is contrary to the outcome predicted by the Deepwater Horizon data analysis. It should also fully quantify the environmental harm that may be expected as a result of the application of dispersants.



## Biographical Statements

**Greg Bourne** studied chemistry at the University of Western Australia under a scholarship from BP Refinery, Kwinana. After graduating with honours in 1971, he carried out research into refinery processes for two years at BP's Research Centre in Sunbury in England before joining BP Exploration as a Drilling Engineer. Bourne worked as a drilling engineer, supervisor and manager throughout the world specialising in deepwater drilling. His exploration drilling activities saw him drilling offshore wells in the North Sea, Canada, Ireland, Brazil, China and Australia. He was involved in designing some of the first deepwater equipment and wells.

Seconded to the Prime Minister's Policy Unit at 10 Downing Street in 1988, he was the Special Adviser on Energy and Transport, and returned to BP in January 1990 to take up the position of Chief Executive, BP Marine, London. He returned to Australia in October 1992 as President and General Manager - Exploration and Gas, BP Developments Australia Ltd., with responsibility for BP Exploration's activities in Australia and Papua New Guinea. In September 1995 he became Director and General Manager, BP Exploration and Director BP Scotland. In 1997 he moved to Venezuela and took up the post of Regional Director - Latin America, based in Caracas. He returned to Australia in January 1999 to become Regional President - BP Australasia the position from which he retired from BP in September 2003.

Bourne was CEO of WWF-Australia for six years and later a non-executive director of Carnegie Wave Energy. He is the former Chair of the Australian Renewable Energy Agency. Bourne is a member of the NSW Climate Change Council and is a Councillor for the Climate Council. A Fellow of the Australian Institute of Company Directors, he was awarded the Centenary Medal for services to the environment and an Honorary Doctorate from the University of Western Australia for services to international business.

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**Andrew Hopkins** is Emeritus Professor of Sociology at the Australian National University in Canberra. He has done safety consultancy work for major companies in the resources sector, as well as for Defence. He speaks regularly to audiences around the world about the causes of major accidents. Professor Hopkins was a consultant to the US Chemical Safety Board in its investigation of the Texas City accident. His book on that accident, *Failure to Learn: the BP Texas City Refinery Disaster*, was published in 2008. He was again a consultant to the Board for its investigation of the Gulf of Mexico oil spill disaster and has written a book on that subject - *Disastrous Decisions: The Human and Organisational Causes of the Gulf of Mexico Blowout (CCH, 2012)*. He was the winner of the 2008 European Process Safety Centre safety award, the first in time it was awarded to a non-European.

In 2016 Professor Hopkins was made an honorary fellow of the Institution of Chemical Engineers in recognition of his "outstanding contributions to process safety and to the analysis of process safety related incidents". He has a BSc and an MA from the Australian National University, a PhD from the University of Connecticut and is a Fellow of the Safety Institute of Australia.

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**Tina Soliman Hunter** is the Director of the Aberdeen University Centre for Energy Law (AUCEL) and the Professor in Petroleum Law at the University of Aberdeen. She teaches and researches in the area of upstream offshore petroleum law, Arctic resources law, extractive industries law and shale gas law. She has received academic qualifications in marine sediments and geology, political science, applied science, and law, completing her PhD at the University of Bergen, Norway. She presently an Honorary Professor at the University of Eastern Finland and

Murdoch University, and a Visiting Professor of Science at the Biological Research Institute, Tomsk State University, Russian Federation.

She has undertaken teaching and research in numerous countries including the UK, Australia, Norway, Canada, Iceland, Greece, Finland, Russia, the USA and the Philippines. Her expertise in regulating petroleum activities has been sought worldwide, undertaking activities such as analysing petroleum laws, drafting legislation and advising governments, industry groups and NGO's worldwide.

Professor Soliman Hunter is presently the Leader of the multidisciplinary UK-Russian Consortium of Researchers and Experts in North and Arctic Marine Ecosystems Oil Contamination (CRENAME), a team of researchers from Tomsk, Arkhangelsk and Murmansk Universities investigating seabed sediment contamination in the Arctic and High North arising from oil spills, and the implications for legal reform. She has published five books and over one hundred articles, book chapters and conference papers. Professor Soliman Hunter recently published a book on shale gas and agriculture co-existence with Dr Madeline Taylor. She is currently completing a book on Russian Petroleum Law, the first of its kind in English.

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**Madeline Taylor** is an Academic Fellow at The University of Sydney, School of Law. Dr Taylor specialises in Energy and Natural Resources Law. She has authored over 35 published peer reviewed articles, book chapters and conference papers examining the regulatory dimensions of unconventional petroleum and resource development approvals in sensitive areas. Her research focuses on energy policy, natural resource contestation in land use and land access agreements and transitioning energy regulation from a comparative and socio-legal perspective. She has written a number of publications concerning the fragmentation of ownership rights between the state, corporations and landholders, with a particular emphasis on the food security - energy security nexus and agricultural land protection laws within Commonwealth jurisdictions. Taylor also researches and publishes on the regulation of Native Title negotiations during natural resource activities. Dr Taylor has been awarded a number of Federal research grants in the areas unconventional gas regulation, collective bargaining law and agricultural policy. She teaches within the areas of Real Property Law, Energy Law and Commercial Law.

Her recent co-authored book with Professor Tina Soliman Hunter entitled, *Agricultural Land Use and Natural Gas Extraction Conflicts: A Global Socio-Legal Perspective* (Routledge, 2018), examines the socio-regulatory dimensions of coexistence between agricultural and onshore unconventional gas land uses in seven jurisdictions with the highest concentration of proven unconventional gas reserves - Canada, Australia, the USA, the UK, France, Poland and China. She is also an ongoing author of [Energy and Resources Law](#), published by LexisNexis.

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## References

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- <sup>1</sup> Equinor-Environment-Plan-Rev-1-20190422.pdf - <https://www.equinor.com/gabproject>
- <sup>2</sup> As per Regulation 5 of the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (Cth). Regulation 11A requires consultation of relevant persons in the course of preparing any environment plan. A relevant person is defined in Regulation 11A as including '(d) a person or organisation whose functions, interests or activities may be affected by the activities to be carried out under the environment plan, or the revision of the environment plan'. Second, for the purpose of consultation, (2) 'the titleholder must give each relevant person sufficient information to allow the relevant person to make an informed assessment of the possible consequences of the activity on the functions, interests or activities of the relevant person. (3) The titleholder must allow a relevant person a reasonable period for the consultation'.
- <sup>3</sup> <https://www.afr.com/business/energy/investors-ally-with-green-groups-over-bight-oil-drilling-20190425-p51h1c>
- <sup>4</sup> NOPSEMA, N-04750-GN1847 Revision0-16 April2019 <https://www.nopsema.gov.au/assets/Guidance-notes/A662607.pdf> pg 3.
- <sup>5</sup> NOPSEMA, N-04750-GN1847 Revision0-16 April2019 <https://www.nopsema.gov.au/assets/Guidance-notes/A662607.pdf> pg 3.
- <sup>6</sup> Explanatory Statement, Offshore Petroleum and Greenhouse Gas Storage (Environment) Amendment (Consultation and Transparency) Regulations 2019, Issued by the Authority of the Minister for Resources and Northern Australia <https://www.legislation.gov.au/Details/F2019L00370/Explanatory%20Statement/Text>, 24.
- <sup>7</sup> Section 3-1, *Act 29 November 1996 No. 72 relating to petroleum activities*.
- <sup>8</sup> Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (Cth) regulation 3(a)
- <sup>9</sup> Australian Government, National Strategy for Ecologically Sustainable Development (1992) <http://www.environment.gov.au/about-us/esd/publications/national-esd-strategy-part1>.
- <sup>10</sup> Australian Government, National Strategy for Ecologically Sustainable Development (1992) <http://www.environment.gov.au/about-us/esd/publications/national-esd-strategy-part1>.
- <sup>11</sup> Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (Cth) regulation 3..
- <sup>12</sup> Terence Daintith and John Chandler, Offshore Petroleum Regulation: Theory and Disaster as Drivers for Institutional Change (2017) 39:2 *Houston Journal of International Law*, pg 360.
- <sup>13</sup> *Minister for Environment and Heritage v Queensland Conservation Council Inc and Another* [2004] FCAFC 190.
- <sup>14</sup> 53. Subsequently, s 527E(1) within the EPBC Act now provides where environmental impacts flow indirectly from an action, the question is whether the action is a 'substantial cause of that event or circumstances'.
- <sup>15</sup> Equinor, Environmental Plan, page 40.
- <sup>16</sup> (2006) 157 FCR 1.
- <sup>17</sup> Explanatory Statement, Offshore Petroleum and Greenhouse Gas Storage (Environment) Amendment (Consultation and Transparency) Regulations 2019, Issued by the Authority of the Minister for Resources and Northern Australia <https://www.legislation.gov.au/Details/F2019L00370/Explanatory%20Statement/Text>, 24.
- <sup>18</sup> Explanatory Statement, Offshore Petroleum and Greenhouse Gas Storage (Environment) Amendment (Consultation and Transparency) Regulations 2019, Issued by the Authority of the Minister for Resources and Northern Australia <https://www.legislation.gov.au/Details/F2019L00370/Explanatory%20Statement/Text>, 24.
- <sup>19</sup> Explanatory Statement, Offshore Petroleum and Greenhouse Gas Storage (Environment) Amendment (Consultation and Transparency) Regulations 2019, Issued by the Authority of the Minister for Resources and Northern Australia <https://www.legislation.gov.au/Details/F2019L00370/Explanatory%20Statement/Text>, 2.
- <sup>20</sup> <https://www.rpsgroup.com/>

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<sup>21</sup> Silje Johnsen; Probabilistic Blowout Risk.pdf

<https://brage.bibsys.no/xmlui/bitstream/handle/11250/182531/Johnsen%2C%20Silje.pdf?sequence=1&isAllowed=y>

<sup>22</sup> Vandebussche et al; Well-Specific Blowout Assessment <https://www.onepetro.org/conference-paper/SPE-157319-MS>

<sup>23</sup> Bercha Group; Loss of Well Control Occurrence and Size Estimators for Alaska OCS - OCS Study BOEM 2014-772

<sup>24</sup> Geir-Ove Strand; Risk Control in the Drilling Phase of Offshore Wells

[https://brage.bibsys.no/xmlui/bitstream/handle/11250/2448491/Geir-Ove%20Strand\\_PhD.pdf?sequence=1](https://brage.bibsys.no/xmlui/bitstream/handle/11250/2448491/Geir-Ove%20Strand_PhD.pdf?sequence=1)

<sup>25</sup> Per Holand; Loss of Well Control Occurrence and Size Estimators <https://www.bsee.gov/sites/bsee.gov/files/tap-technical-assessment-program/765aa.pdf>

<sup>26</sup> This chart was constructed by Greg Bourne from BoM supplied data. Two full years were chosen to ensure all seasons were captured and a significant wave height of 3 metres chosen halfway between the summer mean and winter mean significant wave height

<sup>27</sup> <https://science.sciencemag.org/content/364/6440/548>

<sup>28</sup> Hopkins A, *Disastrous Decisions: The Human and Organisational Causes of the Gulf of Mexico Blowout* (CCH, 2012)

<sup>29</sup> Report of the Chief Counsel for the National Commission on the DWH Oil Spill, p247

<sup>30</sup> For examples see *Disastrous Decisions*, p28-29.

<sup>31</sup> Chief Counsel's report, p246

<sup>32</sup> See *Disastrous Decisions*, p93.

Also, Bly recommendation 14, requires BP to establish key performance indicators for well integrity, well control, and rig safety-critical equipment

These should include but not be limited to:

- Dispensations from DWOP.
- Loss of containment (e.g., activation of BOP in response to a well control incident).
- Overdue scheduled critical maintenance on BOP systems. <http://www.bp.com/en/global/corporate/sustainability/safety/safer-drilling/the-bly-report-recommendations.html>

<sup>33</sup> OGP Process Safety- Recommended Practices on Key Performance Indicators, Nov, 2011, p15

<sup>34</sup> For examples, see Hopkins A and Maslen S, *Risky Rewards: How Company Bonuses Affect Safety*, (Ashgate, UK, 2015), p133.

<sup>35</sup> *Disastrous Decisions*, p133

<sup>36</sup> Hopkins A, *Organising for Safety: How Structure Creates Culture*. (CCH, Sydney, 2019)

<sup>37</sup> NOPSEMA, Environment plan content requirements, N-04750-GN1344 <https://www.nopsema.gov.au/assets/Guidance-notes/A339814.pdf> p17

<sup>38</sup> Report to the President, National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling, January 2011, p 225.

<sup>39</sup> Report to the President, National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling, January 2011, p51.

<sup>40</sup> Terence Daitthith and John Chandler, Offshore Petroleum Regulation: Theory and Disaster as Drivers for Institutional Change (2017) 39:2 *Houston Journal of International Law*, pg 361.

<sup>41</sup> Offshore Petroleum Resources Management Review, <https://archive.industry.gov.au/resource/UpstreamPetroleum/Pages/Offshore-Petroleum-Resources-Management-Review.aspx> 4. Stewardship is defined as 'the informed and responsible management of the nation's petroleum inventory in the national interest'.

<sup>42</sup> p121

<sup>43</sup> EP Appendix 7-4, p23

<sup>44</sup> Equinor considers a further option in which the blowout rig is not damaged and is able to start drilling a relief well immediately, handing over to a relief rig when it arrives. This scenario would see the flow stopped in 73 days, only 5 days more than if a standby rig were available in the Bight. On this basis they conclude that it is not reasonably practicable to go to the expense of engaging a standby rig. However, this is really a red herring because the Worst Credible Case scenarios must envisage the destruction of the rig, as happened at Macondo. The

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additional risk reduction from using a standby rig should therefore be based on a comparison with option 2 above which sees the flow stopped in 88 days,

<sup>45</sup> <https://www.nopsema.gov.au/assets/Guidance-notes/A138249.pdf>, p6

<sup>46</sup> <https://www.boem.gov/81-FR-15699/>

<sup>47</sup> s4.8.2 of NORSOK D-010 (Well integrity in drilling and well operations)

<sup>48</sup> <https://www.nopsema.gov.au/assets/Guidance-notes/A138249.pdf>, p5

<sup>49</sup> <https://www.nopsema.gov.au/assets/Guidance-notes/A138249.pdf>, p6

<sup>50</sup> At the time of writing, the Trump administration is seeking to water down these regulations.

<https://www.nytimes.com/2019/05/02/climate/offshore-drilling-safety-rollback-deepwater-horizon.html> We would argue that this in no way invalidates the point made in the text.

<sup>51</sup> NOPSEMA Guidance Note: “ Environment plan content requirements”, p17

<sup>52</sup> BP WOMP, 2016, table 32, p111

<sup>53</sup> NOPSEMA: “At a glance - oil spill response strategies” <https://www.nopsema.gov.au/assets/Publications/A626270.pdf>

<sup>54</sup> BP, 2016 (c). Great Australian Bight Exploration Drilling Program Stromlo-1 and Whinham-1: Fate and effects oil spill modeling assumptions, parameters, and results. Sept. 14.

<sup>55</sup> BOEM, 2014. Oil Spill Discussion in Appendix A: Deepwater Horizon – BOEM. Mar.17

<sup>56</sup> OSC, 2011. Deepwater: The Gulf oil disaster and the future of offshore drilling. National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling: Deepwater. Jan.

<sup>57</sup> Ramseur, Jonathan. 2015. Deepwater Horizon Oil Spill: Recent Activities and Ongoing Developments. Congressional Research Service. April 17.

<sup>58</sup> Equinor Environment plan, Appendix 9-1 Stromlo-1 exploration drilling program, p15

<sup>59</sup> Claire B. Paris, Igal Berenshtein, Marcia L. Trillo, Robin Faillettaz, Maria J. Olascoaga, Zachary M. Aman, Micheal Schlüter, Samantha B. Joye. BP Gulf Science Data Reveals Ineffectual Subsea Dispersant Injection for the Macondo Blowout. *Frontiers in Marine Science*, 2018

<sup>60</sup> Deep sea chemical dispersants ineffective in Deepwater Horizon oil spill, study finds Research suggests dispersants suppress oil's natural ability to biodegrade - <https://www.sciencedaily.com/releases/2018/11/181101085144.htm>