



Response to the
Draft Final Report
of the
Scientific Inquiry into Hydraulic Fracturing of
Onshore Unconventional Reservoirs in the
Northern Territory

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Presented by	Origin Energy



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1 Summary

Origin acknowledge the thoroughness of the Draft Final Report (DFR) and the clear position taken by the Panel on a wide range of issues. Many of the recommendations in the DFR align with Origin's approach to safe and sustainable development of natural gas resources, including stakeholder engagement, cultural heritage protection, environmental monitoring, and project execution. Accordingly, we have not sought to comment on the majority of recommendations. Rather, this response is focused on individual recommendations where we have feedback for consideration by the Panel in finalising recommendations to the NT Government in the forthcoming Final Report.

Where we have made no comment on recommendations we either accept the recommendation in principle, or we consider it not helpful to comment until there is further policy detail as to how legislation to give effect to the recommendations (if accepted) may be enacted. Origin looks forward to the opportunity to contribute positively to a robust, collaborative reform process to ensure fit-for-purpose, objective-based legislation that enables the responsible development of onshore gas in the Northern Territory. Many recommendations that we have not commented on require detailed understanding of operating environments to be given effect without becoming onerous for limited or no risk benefit.

Many of our responses to specific recommendations are where the level of prescription, in our consideration, exceeds the level of knowledge we currently have as to the issues that may be faced and the details of any risk.

There are also two themes that are referenced throughout the DFR. We address them here rather than commenting throughout the responses to individual recommendations.

1.1 Timing of regulatory reform

The highest proportion of recommendations in the DFR are in Chapter 14 (Regulatory reform). Regulatory reform is clearly a priority area for the Panel. Origin supports a rigorous and comprehensive regulatory and legislative framework for the Northern Territory in preparation for potential onshore gas industry expansion. Regulatory reforms are consistently introduced as additional data, information and processes evolve. However, we accept, and previously submitted our support for, immediate recommendations that would benefit ongoing safe operations in the Northern Territory. In the interim, and while onshore shale gas activity remains small-scale and focused on exploration and appraisal piloting rather than development and production, we advocate that the existing Petroleum Act (the Act) and associated regulations can continue to provide appropriate oversight to the industry. In addition, under the current Act, basin-based directives can be introduced as required, which could assist with the swift implementation of selected recommendations.

The Panel points out that elements of the "Schedule" lack clear enforceability provisions. However, when coupled with the Act, which provides substantial Ministerial discretion, the Schedule can be a powerful regulatory instrument. Moreover, the Schedule could be updated

to reflect selected recommendations from the Panel prior to the comprehensive legislative review envisaged in Chapter 14 of the DFR.

A further benefit of continuing exploration and appraisal activities under the current Act is that operators can continue to acquire baseline environmental and geological data as envisaged in the DFR. These data will be critical to ensure development projects, if ultimately proved viable through exploration, appraisal, and piloting, can be progressed responsibly and without undue timing pressure on environmental studies and approvals.

1.2 Production licence and “production” precursor requirements

A key concept throughout the DFR is that the granting of a Production Licence (PL) or the activity of “production” is a key milestone by which time legislative reform and baseline or environmental (e.g. water allocation plans) studies must be complete. We request that the language in the Final Report be adjusted to minimise potential ambiguity.

We request that use of “production licence” in the DFR is adjusted to address potential ambiguity between:

- i) the granting of a Production Licence (PL) (which is part of the Northern Territory tenure management system rather than a final project commitment or grant of approval to commence activities), and
- ii) the granting of an authorisation to proceed with a major gas development project (which would require an EIS, Territory and Commonwealth approvals, and other steps taking some 2-5 years after the granting of a PL).

Based on the context in which “production licence” is generally used in the DFR we interpret that it relates to point (ii) above, and could be replaced by, for example, “Authority to develop and produce”.

We also request that the use of “production” is adjusted, where necessary, to address potential ambiguity between:

- iii) Production or well testing (small scale) in exploration and appraisal piloting, and
- iv) Commercial production (large scale) from a development project.

Based on the context in which “production” is sometimes used in the DFR we interpret that it typically relates to point (iv) above and could be replaced by “large scale gas production” and, again, the concept of “Authority to develop and produce” could be used more broadly.

A number of specific instances of ambiguity in the DFR where these terms are used are summarised in Appendix 1.

2 Responses to recommendations

In this chapter, we provide feedback only on those recommendations that we view as overly prescriptive, or where we consider that the principle and/or objective could be achieved through an alternative approach or mechanism.

2.1 Chapter 5 - Shale gas extraction and development

2.1.1 Recommendation 5.3

“That in consultation with industry and other stakeholders, the Government develops and mandates an enforceable code of practice setting out the minimum requirements that must be met to ensure the integrity of onshore shale gas wells in the NT. This code must require that:

- *all onshore shale gas wells (including exploration wells constructed for the purposes of production testing) be constructed to at least a Category 9 (or equivalent) standard, with cementing extending up to at least the shallowest problematic hydrocarbon-bearing, organic carbon rich or saline aquifer zone;*
- *all wells be fully tested for integrity before and after hydraulic fracturing and the results be independently certified, with the immediate remediation of identified issues required;*
- *an ongoing program of integrity testing be established for each well during its operational life. For example, every two years initially for a period of 10 years and then at five-yearly intervals thereafter to ensure that if any issues develop they are detected early and remediated; and*
- *the results of all well integrity testing programs and any remedial actions undertaken be publicly reported.”*

Response:

Origin supports, in principle, the development of a code of practice that sets out minimum requirements to ensure the integrity of onshore wells in the Northern Territory (whether they be targeting unconventional or conventional reservoirs) that includes a level of prescription regarding cement placement in relation to aquifers and hydrocarbon bearing zones. Origin also supports the requirement for integrity testing prior to hydraulic fracturing.

However, there are two areas where we suggest improvements to this recommendation:

- i) The requirement to cement below important aquifers and above hydrocarbon bearing zones is agreed. References to a “Category 9” standard, however, is overly prescriptive and requiring an individual standard across all wells may not be appropriate for all targets in all basins. Although Origin’s exploration wells to date in the Beetaloo have met the “Category 9” definition, it is possible that other targets (such as the Kyalla Formation) could be effectively drilled and fracture-stimulated with a different casing configuration while still maintaining redundant barriers and meeting Origin’s internal drilling and completion standards.
- ii) The tools available to test the integrity of a well pre- and post-hydraulic fracturing, and the test objectives, are very different. The focus of this recommendation, in our consideration, should be on the confirmation of integrity

at high pressures prior to hydraulic fracturing. Once the well is in production (post hydraulic fracturing) operating pressures are much lower and the best diagnostic tool for a loss of integrity is constant surveillance, not discrete testing. Therefore, the focus should be on monitoring casing annuli to ensure that firstly there is no methane and/or pressure where it is not expected by design, and secondly that all required maintenance is completed to design and schedule. This process of monitoring and surveillance is continuous and allows rapid response to any issues with well integrity, and complements the requirement to undertake well-head and component maintenance and integrity testing

2.2 Chapter 7 - Water

As the Panel notes on page 326 of the DFR, it is forecast that even in a high-activity scenario (i.e. ACIL Allen's Gale scenario) the gas industry will be a minor user of water relative to other users. In the Beetaloo area we have submitted to this Inquiry that we anticipate increasing overall water usage by 1-2% relative to current levels while remaining a lower demand user relative to other users. To ensure the Panel's recommendations regarding a holistic understanding of aquifer recharge, water usage and a strategic water allocation plan are effective, we consider it critical that all water users are captured by the Panel's recommendations.

Origin supports the majority of the recommendations regarding water usage and water monitoring, and we seek confirmation from the Panel as to the equity and application of the recommendations to all water users are included in the scope of these recommendations.

2.2.1 Recommendation 7.1

"That before any production licence is granted to extract onshore shale gas, the Water Act be amended to require gas companies to obtain water extraction licences under that Act. That the Government introduce a charge on water in the NT for all onshore shale gas activities."

Response:

Origin supports the intent of this recommendation to create transparency about onshore gas activity water usage and to ensure water used by the industry is appropriately valued. Both aspects will support the social licence of the industry. However, we consider that for holistic water management to be achieved it is necessary that all major water users are required to obtain water extraction licenses and to report usage, and that a user-pays system will encourage usage reduction and preservation where possible.

We note that ACIL Allen make a comparison of the agricultural sector usage of groundwater in 2015, estimated by the ABS at 47 GL, and the forecast of groundwater required on annual basis by a shale gas industry, estimated at 1.13 GL. These figures demonstrate that monitoring the onshore gas industry in isolation will not allow for the strategic management of groundwater resources.

2.2.2 Recommendation 7.7

“That the following measures be mandated to ensure that any onshore shale gas development does not cause unacceptable local drawdown of aquifers:

- i. the drilling of onshore shale gas petroleum wells within 1 km of existing or proposed groundwater bores be prohibited unless hydrogeological investigations and groundwater modelling indicate that a different distance is appropriate, or if the landholder is in agreement with a closer distance;*
- ii. additional information on the aquifer characteristics is obtained as a result of the regional environmental and baseline assessment recommended in Section 7.4.1;*
- iii. relevant WAPs include provisions that adequately control both the rate and volume of water extraction by the gas companies;*
- iv. gas companies be required, at their expense, to monitor drawdown in local water supply bores; and*
- v. companies be required to ‘make good’ any problems if this drawdown is found to be excessive (that is greater than 1 m).”*

Response:

Origin supports the key objectives of this recommendation to protect existing water supply bores from a loss of productivity due to the activities of shale gas development operations. However, we note that this recommendation includes prescriptive elements (e.g. sub-recommendation v. regarding drawdown of greater than 1m) that are unlikely to be universally appropriate across all Northern Territory environments and should therefore be deleted.

We have two further suggested changes:

- i) that WAPs must be inclusive of historical and current extraction and all users, and not just include in scope the “rate and volume of water extraction by the gas companies”.*
- ii) that the final measure, regarding ‘make good’, is expanded to clarify that only drawdown resulting from gas company extraction is a trigger for gas company make good provisions. As currently stated, any reduction in water level would be assumed to be in scope for make good provisions even if the cause was not related to gas company activities.*

2.2.3 Recommendation 7.10

“That in order to minimise the risk of groundwater contamination from leaky gas wells:

- i. all wells to be hydraulically fractured must be constructed to at least Category 9 or equivalent and tested to ensure well integrity before and after hydraulic fracturing, with the results certified by the regulator (see also Recommendations 5.3 and 5.4);*
- ii. a minimum offset distance of at least 1 km between water supply bores and well pads must be adopted unless specific site-specific information is available to the contrary (see also Recommendation 7.7);*
- iii. a robust and rapid wastewater spill clean up management plan must be prepared for each well pad to ensure immediate remediation in the event of a spill: and*
- iv. real-time publicly available groundwater quality monitoring must be implemented around each well pad to detect any groundwater contamination. Multilevel*

observation bores must be used to ensure full coverage of the aquifer horizon, with a level of vertical resolution sufficient to be able to identify the location of any leak.”

Response:

As per our feedback on Recommendation 5.3 we support, in principle, the development of a code of practice for well design, construction and testing to ensure the protection of aquifers, however, we consider it overly prescriptive to prescribe “Category 9” as a standard across all plays in the Northern Territory.

Origin also supports the principle of transparency with regards to baseline and monitoring data availability as recommended by the Panel. The monitoring program and monitoring wells within that program should be fit-for-purpose, site specific and designed in conjunction with the WAP and SREBA that will be required under other recommendations. There will likely be reporting requirements under the WAP and/or SREBA and these would be preferred to prescription regarding ‘real-time’ and ‘publicly available’ as there will likely be practical challenges to real-time streaming of large volumes of uninterpreted and uncollated data direct to the public. We therefore request the Panel maintain an objective- or outcome-based focus for the monitoring recommendation.

Furthermore, we request that an appropriate offset distance is recommended rather than mandated. For existing bores on pastoral stations, compensation for use of an existing bore, or a request for a new bore should be agreed through land access negotiations. We anticipate that, typically, new supply water supply bores will be required in the Beetaloo for gas exploration and development, and suggest that bores constructed for this purpose are exempt from any minimum offset recommendation.

2.2.4 Recommendation 7.11

“That to reduce the risk of contamination of surface aquifers from on-site spills of wastewater:

- i. the EMP for each well pad must include an enforceable wastewater management plan and spill management plan, which must be approved prior to the commencement of hydraulic fracturing;*
- ii. enclosed tanks must be used to hold all wastewater;*
- iii. the well pad site must be treated (for example, with a geomembrane) to prevent the infiltration of wastewater spills into underlying soil and thence into to an aquifer; and*
- iv. a real-time publicly accessible monitoring program for each well pad must be established.”*

Response:

Managing wastewater is fundamental to successful operations in any shale gas development, and Origin supports collaborating with stakeholders to holistically manage wastewater. However, we suggest it is premature to prescribe universal standards given the diversity of the environments, project phases and site-specific requirements that operators could face

across the Northern Territory in exploring or developing unconventional gas. Existing EIS processes or the Panel's proposed SREBA process will provide fit-for-purpose and site-specific conditions that are appropriate to the operating environment. Specifically,

- i. Sub-recommendation supported.
- ii. To prescribe that all wastewater must be stored in enclosed tanks is, in our view, unnecessary and increases risk elsewhere:
 - a. At different project phases evaporation may be the primary means of reducing the volume of wastewater that requires transport. The land transport of large volumes would engender different risks than the evaporation of wastewater from above ground.
 - b. Double-lined ponds were used successfully by Origin at Amungee NW-1H and have been used successfully in similar environments across Australia and internationally.
 - c. The risk of over-topping can be managed and we concur with the Panel's observation in the DFR (pg 139) that "...design must be based on the maximum probable precipitation event, coupled with an appropriate wet season maximum operating level." The amount of freeboard required - a function of previous and forecast rainfall events (frequency, intensity, duration) - will be different in the Amadeus Basin relative to the northern McArthur Basin in the northeast of Arnhem Land, and therefore the risk profile will be different. Origin supports that for environmentally hazardous wastewater, double-lining and constant monitoring of wastewater ponds is a reasonable prescriptive minimum, but proposes that all tanks being enclosed is not an appropriate prescriptive minimum.
- iii. Geomembranes may not be appropriate on all well leases as the Panel finds, for instance, in its case study of the Beetaloo a 'low' risk for contamination of aquifers from surface spills. In other parts of the Northern Territory where similar risks may be assessed as medium or high (i.e. a shallower surface aquifer), then geomembranes may be appropriate. Site-specific or regional (i.e. SREBA) data should be used to inform where prescribing well pad treatment is a useful policy instrument for reducing environmental risk.
- iv. We support the principle of transparency in reporting and request an objective-based recommendation that allows a fit-for-purpose monitoring and reporting program to be designed for any proposed development activity.

2.3 Chapter 8 - Land

2.3.1 Recommendation 8.2

"That a baseline assessment of all weeds within a permit area be conducted prior to any onshore shale gas exploration or development and that ongoing weed monitoring be undertaken to inform any weed management measures necessary to ensure no incursions or spread of weeds. Gas companies must have a dedicated weeds officer whose role is to monitor well pads, roads and pipeline corridors for weeds."

Response:

Origin supports this recommendation, except for the requirement that companies “...have a dedicated weeds officer whose role is to monitor well pads...” which we suggest deleting. An approved EMP must describe how monitoring for compliance is undertaken to ensure that weed management is effective in the site-specific context (including any other land management practices) established by the baseline assessment.

2.3.2 Recommendation 8.15

“That to minimise the impact of any onshore shale gas industry on landscape amenity, gas companies must demonstrate that they have minimised the surface footprint of development to ALARP, including that:

- i. well pads are spaced a minimum of 2 km apart; and*
- ii. the infrastructure within any development areas is not visible from major public roads.”*

Response:

On well pad spacing (i):

- a. Origin agrees with the objective to minimise the surface footprint of development to ALARP. Multiple drivers, including efficiency of logistics and economics, support this least-impact approach to development. These should be sufficient along with a prescription to demonstrate an ALARP approach to avoid a prescriptive minimum pad spacing.
- b. There may be instances where the optimal pad location is less than 2 linear km in an effort to avoid a subsurface geohazard.
- c. If a spacing prescription is required, Origin suggests an area based rather than linear distance based approach is more appropriate as it achieves the objective of ensuring areas are not ‘industrialised’ but recognises that a development will be characterised by asymmetric pad spacings due to the nature of pad development and horizontal drilling.

On infrastructure visibility from major public roads (ii); the appropriateness of any given temporary or permanent infrastructure should be assessed on a case-by-case basis. To exclude the placement of a rig (which is likely to be in location for 1-3 months during exploration and 3-6 months during development), for instance, from anywhere it may be visible from a major public road could be restrictive and the benefit subjective.

2.4 Chapter 9 - Greenhouse gas emissions

2.4.1 Recommendation 9.1

“That to reduce the risk of upstream methane emissions from onshore shale gas wells in the NT the Government implement the US EPA New Source Performance Standards of 2012 and 2016.”

Response:

Origin supports the adoption of the major components of the US EPA New Source Performance Standards (USEPA NSPS) and agrees a bi-annual monitoring frequency is appropriate. However, to mandate use of both OGI and Method 21 concurrently is not necessary in our consideration (this is not specifically included in Recommendation 9.1. but the language in Section 9.5.2 could be interpreted as recommending that both methods should be implemented or mandated). Such a requirement would significantly increase the cost and effort to undertake leak detection with limited additional benefit.

2.4.2 Recommendation 9.5

“That all monitoring results should be published online on a continuous basis in real time.”

Response:

Origin agrees in principle regarding transparency of monitoring data, however, the detail should be carefully considered. Real time publishing of field methane measurements is not realistic as it would not allow for appropriate quality assurance and interpretation. We request that "in real time" is removed and consideration to routine and regular summary reporting of data and interpretations.

2.5 Chapter 10 - Public Health

2.5.1 Recommendation 10.3

“That in consultation with industry, landowners and local communities, the regulator set appropriate setback distances to minimise risks identified in HHRA reports, including potential pathways for waterborne and airborne contaminants, for all shale gas development (exploration and production). Such setback distances to be not less than 1,600m.”

Response:

We support the adoption of setback distances where HHRA reports determine their use as a key control in minimising any identified risks. However, it is our view that the setting of setback distances should be informed by the site and regional-specific HHRA on a case by case basis, in accordance with the principles of outcome-based regulation, rather than prescribing a uniform 1,600m in the absence of relevant studies.

2.6 Chapter 12 - Social impacts

Under review and awaiting release of the Social Impact Assessment by the Panel, at which point Origin may provide a written response.

2.7 Chapter 14 - Regulatory reform

2.7.1 Recommendation 14.5

“That prior to undertaking any onshore shale gas activity on a Pastoral Lease (including exploration), a land access agreement must be signed by the Pastoral Lessee and the gas company.

That the land access agreement be required by legislation.

That breach of the land access agreement will be a breach of the relevant approval giving rise to the petroleum activity being carried out on the land.”

Response:

Origin has entered land access agreements with all Pastoral Lessees in the Northern Territory where it has undertaken work, as per the current DPIR regulations. Origin accepts that there are benefits to legislating a fair and reasonable access framework, which includes that a breach should be treated as a non-compliance to permit conditions.

We request that the Panel support the continuation of the existing regulatory process for land access agreements to be negotiated until such time as a comprehensive legislative review is completed that will include land access legislation. The current regulations have worked successfully across the Northern Territory with operators and landholders and there is no evidence to suggest it cannot continue successfully until legislation is updated. Without such a continuation, the critical data required from exploration, appraisal and baseline studies will not be available.

In addition to the sub-recommendations included in Recommendation 14.5, a list of 24 “...protections for Pastoral Lessees” was included on Page 351 of the DFR. Given the importance of this issue we have provided feedback on some of those protections as follows:

vii) notification to the pastoral lessee as soon as practically possible of all spills, incidents, harm or damage to the Pastoral Lease and its infrastructure and operation;

Open disclosure to the Pastoral Lessee is an important principle, however, there are practical considerations to any recommendation that ‘all’ spills, incidents, harm or damage are reported immediately to the landholder. The protection could instead be tied to environmental legislative obligations, where if the incident is reportable to a regulator, then Pastoral Lessees are notified and on the same timeframe

ix) 'make good' provisions for any damage or harm to the water (surface and ground), land, infrastructure, or operation of the Pastoral Lease. The onus of proof is to be reversed so that the obligation is on the gas company to demonstrate that the harm or damage was not caused by the onshore shale gas activities.

Origin accepts the intent of this protection regarding 'make good' provisions for any harm caused by a gas company.

The onus of proof resting on the gas company will work where the legislative regime is clear about what constitutes damage or harm. Further detail regarding this protection is needed before we are able to comment more comprehensively.

x) indemnification for any harm or damage caused by any third party engaged by the gas company or any of its sub-contractors to the water (surface and ground), land, infrastructure or operation of the Pastoral Lease;

Origin agrees with the principle that it should compensate for the impacts of its activities including those caused by parties who act on Origin's behalf. However, the terms of a proposed indemnity, the types of losses to be included, and contribution issues are not yet known and will require further consideration once developed.

xi) the provision of appropriate guarantees where the holder of the approval to carry out the relevant onshore shale gas activity is not the person or company undertaking the activities on the land

This protection requires further clarification. This protection should reflect any updated policy and/or legislative provisions regarding security and may be better dealt with in broader regulation rather than in an individual land access agreement.

xiii) a prohibition on the sale, assignment or transfer of any rights or obligation by the gas company;

The inclusion of 'fair and reasonable person' tests or 'financial and technical capacity' terms would sufficiently protect landholders. In Origin's view, a prohibition does not reflect common oil and gas industry practices. Certainty in legitimate transactions is important to allow business to function. Also, infrastructure could become stranded if new agreements are required to be entered into following sale, or delay transactions where land access agreements are stated as a pre-condition.

xviii) clear termination mechanisms;

Termination rights may leave substantial infrastructure stranded, give rise to adverse impacts including for pastoralists, and create ambiguity as to the

respective rights and obligations of the parties in relation to existing infrastructure.

xxiii) continuing liability in respect of all decommissioned wells to be the responsibility of the gas company;

This should be the subject of broader regulation rather than a requirement of an individual land access agreement and include provisions both on liability while the tenure remains operational, and ongoing liability after a tenure is relinquished.

xxiv) the ability to renegotiate the land access agreement after a specified period of time, including post-exploration and pre-production.

Origin concurs that agreements should be appropriate for the phases of projects, i.e. exploration and appraisal may require a separate agreement to development and production. However, once a development and production agreement is reached, it should remain on foot until the end of its term or until a new agreement is finalised to avoid uncertainty in the respective rights and obligations of the parties in relation to existing infrastructure and activities.

2.7.2 Recommendation 14.14

“That all draft EMPs for hydraulic fracturing must be published and available for public comment prior to Ministerial approval.

That all comments made on draft EMPs be published.

That the Minister must take into account comments received during the public consultation period when assessing a draft EMP.”

Response:

Origin supports this recommendation in principle, with the addition that there needs to be clear statutory timelines for all application and submission processes, as well as statutory decisions.

2.7.3 Recommendation 14.15

“That all notices and reports of environmental incidents, including reports about reportable incidents under the Petroleum Environment Regulations, must be published.”

Response:

Origin supports this recommendation in principle, with some key caveats:

- i) A sensible reporting threshold is used to define what level of events are published as very low environmental impact triggers create high volumes of work for regulators and operators with little additional oversight or transparency value; and
- ii) That a Victorian model is adopted whereby annual environmental performance statements are made by all permit or licence holders; or
- iii) A Queensland model is adopted where individual incidents are not published by the Environment Department but annual summary data for the different levels of environmental incidents and, by discretion, notable prosecutions are reported.

2.7.4 Recommendation 14.32

“That the Government develop and implement the reforms described in Option 1 and/or Option 2 above prior to any production licences being issued for any onshore shale gas activities in the NT.”

Response:

Origin supports legislative reform, however, it is critical that existing legislation and regulations remain in force in the interim to allow the legislative review process to be thorough and comprehensive without causing undue delays to the exploration and appraisal activities and baseline studies that are needed to inform the potential for a viable onshore gas industry in the Northern Territory.

As outlined in Chapter 1 (Summary), we request that it is clarified that legislative reform should be mature prior to the final approval of any large-scale onshore gas development in the Northern Territory, however, it is not necessary for the reform process to be complete prior to the granting of a Production Licence (PL), which is simply a permit instrument that in, and of itself, grants no authority to undertake development activity.

2.8 Chapter 15 - Strategic regional environmental and baseline assessment

2.8.1 Recommendation 15.1

“That a strategic regional environmental and baseline assessment (SREBA) be undertaken prior to the grant of any production licence for onshore shale gas.”

Response:

Origin agrees that strategic and regional assessments are important and support the principle of this recommendation. The detail of how a SREBA will interact with existing

environmental approvals and other EIS and/or EPBC processes will be important to ensure the process is efficient and beneficial.

We also note that a SREBA may not be the most appropriate mechanism to complete all baseline assessments. Regional, industry wide assessment is suited for some environmental aspects (such as public health, groundwater, and air quality), however, other aspects are likely to be more suited to targeted localised assessments that will most likely be impacted through specific infrastructure placement or local factors (such as weeds, terrestrial ecology, surface water, fire risk, etc.). In addition, a socio-economic assessment will provide key data if it is localised to a notional project area.

We suggest that for a SREBA to be most effective, its scope is the key environmental aspects of groundwater, greenhouse gas, air quality and public health. Such a program could be implemented by an independent body with support of the government and industry.

3 Clarification or correction requests

3.1 Correction regarding Origin's discovery announcement

Section 6.2 (Exploration for and development of unconventional gas in Australia) includes the following statement “...*the announced discovery by Origin in 2016 confirming a commercial shale gas resource...*”. Later in Chapter 6 (Section 6.4) the discovery is correctly reported to be a non-commercial contingent resource, however we request that the earlier statement in Section 6.2 is corrected for consistency and accuracy.

3.2 Correction regarding reinjection of (treated) produced water

On page 144 of the DFR it is stated that “There has been a limited pre-feasibility assessment on reinjecting CSG produced water in Queensland, which the Panel understands has now been discontinued due to technical issues”. Origin can confirm that trial projects were successful and the injection program that followed has been operational since 2015. Origin has injected over 17.5 GL of treated water into the Precipice Sandstone aquifer in the Surat Basin and monitoring demonstrates an increase in aquifer level over that time (volumes reinjected are comparable to the extraction by landholders and other industries over the same period). For detailed information please see APLNG's website (<https://www.aplng.com.au/topics/water-and-csg.html>), re-injection project summary (<https://www.youtube.com/watch?v=P4bpD04kocQ>) or most recent annual groundwater reports (<https://www.aplng.com.au/content/dam/aplng/compliance/management-plans/2016-2017%20AnnualGroundwaterAssessment%20-%20Rev%200.pdf>)

3.3 Correction regarding Origin's reporting of OGI measurement accuracy

The statement on page 204 of the DFR that “*Origin notes that the accuracy in determining methane concentrations using OGI could be only as good as 10,000 ppm*” does not appropriately reference the US EPA. Origin reported the USEPA accuracy estimate of the OGI was 10,000 ppm and, therefore, the USEPA should be referenced directly rather than Origin.

3.4 Property values

In Section 13.2.2 the DFR includes a reference to “*Examples of the presence of CSG wells in Queensland leading to reduced property values and subsequent refusals by banks to accept those properties as security for finance or bridging loans...*”. The Commonwealth Bank, which was the bank at the centre of the allegations publicised by The Guardian newspaper and groups like Lock the Gate, went public to correct the record and state the Guardian story on the impact of coal seam gas is untrue

<https://www.commbank.com.au/guidance/newsroom/guardian-story-on-impact-of-coal-seam-gas-untrue-201609.html>).

Given the impartiality of the Panel it would be appropriate to also include the Commonwealth Bank's rebuttal of the Lock the Gate claims regarding property values and loan securitisation.

3.5 Approval of Amungee NW-1H and 2016 Petroleum Environment Regulations

In Section 14.7.3.1 there are inaccurate representations made about the approval of Origin's application to hydraulic fracture stimulate the Amungee NW-1H well and the following statements made:

"But the requirements of the Petroleum Environment Regulations can be readily circumvented by gas companies. An example of this was Origin's ...Amungee NW-1H well".

The above statement suggests Origin attempted to circumvent relevant regulations in its application; this is categorically not the case.

Origin was formally advised by the CEO of the Department of Mines and Energy (Appendix 2) that existing environmental management plans (EMP), such as Origin's EMP for the hydraulic fracture stimulation of Amungee NW-1H, would be considered a "current plan" under the new regulations. Origin had been in the process of seeking authorisation to undertake the hydraulic fracture stimulation at Amungee NW-1H for several months prior to the introduction of the 2016 Petroleum Environment Regulations, so although they were in effect at the time of the hydraulic fracture operations, there was no expectation that our pre-existing application would be assessed against the new regulations.

We recognise that the intent of this section is to point out that the current Act allows the Minister's discretion to be applied broadly and that this could erode public confidence in the regulator and its processes. However, we believe this point can be made without impugning Origin's reputation and we request that the suggestion Origin circumvented regulations is removed from the Panel's final report.

4 Conclusions

The comprehensive nature of the DFR, and the research and consultations that underpin it, have mapped a clear pathway forward for the Northern Territory Government to establish the necessary framework for a responsible and well-regulated onshore gas industry if exploration and appraisal ultimately proves successful. We support the efforts to keep legislation and regulation objective-based to promote innovative ways of achieving ALARP impacts, and agree that in some instances prescriptive minimum standards are a necessary complement to such regulations.

Many of the recommendations made by the Panel align with Origin's existing processes and philosophies. We have attempted in this response to highlight some areas where prescriptive elements to some recommendations may be counter-productive or even sufficiently onerous to prevent commercialisation of a resource, without reducing the risk of unforeseen events that cause adverse impacts.

Origin looks forward to the opportunity to continue exploration and appraisal and baseline data acquisition in the Beetaloo Sub-basin if the moratorium is lifted following the completion of the Inquiry. Data from exploration and appraisal and baseline studies will inform a thorough assessment of environmental and social risks, and allow preventative measures and mitigation planning to be developed, and of benefits to the local Traditional Owners, pastoralists and broader Northern Territory community. Such exploration and appraisal activity will remain small-scale for a number of years and can be successfully undertaken under the existing Act and regulatory regime.

5 Appendices

Appendix 1:

A compilation of examples where “production licence” or “production” are used in a way that is ambiguous.

Page	Rec. #	Reference	Comment
120	7.4 and 8.1	7.4. “...a...(SREBA)...be undertaken ...before any production licences are granted...” 8.1. “...a SREBA for all bioregions prior to any onshore gas production...”	The granting of a PL or allowance of production testing should not be prevented if a SREBA has not yet been completed - although granting of approval to undertake a gas development should require completed environmental approvals that will include EIS and SREBA (or equivalent) processes.
123	7.6	“...all groundwater extraction for any shale gas production be prohibited until there is sufficient information to demonstrate that it will have no adverse impacts on existing users and environment...”	In this instance, we interpret that “production” is intended to mean commercial and large-scale production, however, taken literally this recommendation could prevent any groundwater extraction even on the small scale required during exploration and appraisal.
230	10.1	“...HHRA...approved prior to the grant of any production licence for the purpose of any shale gas development.”	Here a further caveat “...for the purpose of any shale gas development...” helps add useful context. The granting of a PL to manage tenure should not necessarily require the completion of an HHRA as discussed above the PL itself does not grant a right to undertake development or large scale production.
368	14.6	“That the Schedule be repealed and replaced with legislation...prior to the grant of any production licence...”	A PL could be granted under the existing Act without the need for legislative reform as the granting of a PL confers no development or production rights in and of itself - additional approvals are required.
392	14.32	“That the Government develop and implement the reforms ...prior to any production licences being issued”	As above
395	15.1	“That a strategic regional environmental and baseline assessment (SREBA) be undertaken prior to the grant of any production licence...”	Again, we interpret that in this context the Panel recommends that a SREBA is complete prior to authorisation being given for a large scale development project rather than for the granting of a PL

Appendix 2:

Notification from the Department of Mines and Energy regarding the transition to the 2016 Petroleum Environment Regulations.

Mr Grant King
Managing Director
Origin Energy Resources Limited
Ground Floor, North Tower, 339 Coronation Drive
MILTON QLD 4062

Paspalis Centrepoint Building
48-50 Smith Street Mall
DARWIN NT 0800

Postal Address
GPO Box 4550
DARWIN NT 0801

T [REDACTED]
F 08 8999 5191

E [REDACTED]

File Ref: E2015/0030

Dear Mr King

New requirements relating to the *Petroleum Act*

I write to advise you of various matters relating to the new *Petroleum (Environment) Regulations* (the **Regulations**) and the *Schedule of Onshore Petroleum Exploration and Production Requirements* (the **Schedule**). The Regulations were notified in the *Gazette* on 6 July 2016 and, in accordance with the *Interpretation Act*, came in to effect on that date, and now apply to you as an interest holder under the *Petroleum Act*.

The Regulations establish a regulatory framework under which interest holders must prepare, and comply with, environment management plans that ensure onshore petroleum activities are undertaken in a manner consistent with the principles of ecologically sustainable development and the risks and impacts associated with those activities are reduced to a level that is as low as reasonably practicable and acceptable. The Regulations are available at <https://minerals.nt.gov.au/legislation>.

Explanatory guide

The Department of Mines and Energy developed an explanatory guide for the Regulations to assist interest holders interpret the Regulations and prepare environment management plans accordingly. The explanatory guide is available at <https://minerals.nt.gov.au/legislation>.

Schedule

The Schedule has been amended with effect from 6 July 2016 to increase clarity, consistency with current industry practice, and remove inconsistencies between the Regulations and the Schedule. A copy of the amended Schedule, with which you are required to comply in accordance with the **attached** direction, is at <https://minerals.nt.gov.au/legislation>.

Existing environmental management plan

The **attached** direction establishes that your existing environment management plan (Existing Plan) is a **current plan** under the Regulations and requires you to achieve compliance with the Regulations by obtaining the Minister's approval of a **proposed revision** of the current plan by 5.00pm ACST on 1 December 2017 (if you intend to carry out relevant activities under that plan after that date including decommissioning and rehabilitation).

For the avoidance of doubt, at any time before that date a circumstance may arise whereby, under the Regulations, you are required to submit a proposed revision of the current plan which must comply with the Regulations. Therefore, it is recommended that you familiarise yourself with the requirements of the Regulations and plan ahead to achieve compliance in the most efficient manner.

I advise that the Existing Plan will not be published by the Minister, as regulation 24 of the Regulations is not considered to apply.

Should you require any further information please contact Jop van Hattum on [REDACTED] or via email [REDACTED]

Yours sincerely

A handwritten signature in black ink, appearing to be 'Ron Kelly', with a stylized, cursive script.

RON KELLY
Chief Executive

6 July 2016

Northern Territory of Australia

Petroleum Act

DIRECTIONS

I, RON KELLY, as the Delegate of the Minister for Mines and Energy, in pursuance of section 71 of the *Petroleum Act*, direct that:

ORIGIN ENERGY RESOURCES LIMITED (ABN 66 007 845 338)

FALCON OIL & GAS AUSTRALIA LIMITED (ABN 53 132 857 008)

SASOL PETROLEUM AUSTRALIA LIMITED (ABN 93 134 827 982)

the permittees of **PETROLEUM EXPLORATION PERMIT 98**, in relation to the operations in, or in relation to, the **PETROLEUM EXPLORATION PERMIT** areas:

1. The document entitled Drilling Environment Plan, Rev. 3 dated 28 April 2015 and approved on 3 July 2015 in respect of Kalala South 1 Well Drilling and 21 August 2015 in respect of Amungee NW 1H Well Drilling is described as the **Existing Plan**.
2. The Existing Plan is deemed to be a **current plan** within the meaning of that term in the *Petroleum (Environment) Regulations* (the **Regulations**), notwithstanding it may not strictly comply with all requirements of the Regulations.
3. If the Existing Plan or any approval of the Existing Plan is subject to any limitations or conditions, the limitations or conditions are deemed to be part of the Existing Plan consistent with the meaning of **current plan** in the Regulations.
4. If you intend to carry out a **regulated activity** within the meaning of that term in the regulations under the Existing Plan after *1 December 2017*, to ensure the Existing Plan meets the form and content requirements of the Regulations and the **approval criteria** within the meaning of that term in the Regulations, you must take all steps necessary to obtain the Minister's approval of a **proposed revision** of the current plan under the Regulations by no later than 5.00pm ACST on 1 December 2017.
5. To comply with the requirements contained in the document entitled "*Schedule of Onshore Petroleum Exploration and Production Requirements*" as amended from time to time, and
6. To comply with any law of the Commonwealth, Northern Territory or both.

Dated this 6th day of July 2016

Made under the *Petroleum Act* of the Northern Territory of Australia

A handwritten signature in black ink, appearing to be 'Ron Kelly', written in a cursive style.

RON KELLY

Chief Executive
Delegate of the Minister for Mines and Energy
Pursuant to the instrument of delegation dated 15 June 2015