



Origin – Hearing Transcript

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Darwin Convention Centre, Darwin

Speakers: Ross Evans, Dr David Close, Alex Cote, Stephanie Stonier

Ross Evans: Good morning, my name is Ross Evans. I'm General Manager, Exploration, and Development for Origin. I'll just pass around the great team we have here today.

Hon. Justice Rachel Pepper: Thank you.

David Close: Hi I'm David Close. I'm Chief Geologist and Unconventional Exploration Manager with Origin Energy.

Hon. Justice Rachel Pepper: Thank you.

Alexander Cote: Hi, I'm Alexander Cote, and I am the Senior Petroleum Engineer ...

Hon. Justice Rachel Pepper: Sorry, could you please repeat that?

Alexander Cote: Alexander Cote.

Hon. Justice Rachel Pepper: Thank you very much.

Alexander Cote: I am the Senior Petroleum Engineer working the Beetaloo assets for Origin.

Hon. Justice Rachel Pepper: Thank you.

Stephanie Stonier: Stephanie Stonier. I'm the Corporate Affairs Manager from Northern Australia for Origin.

Hon. Justice Rachel Pepper: Thank you very much. Thank you. Yes, please proceed.

Ross Evans: Thank you. Good morning, Madam Chair and members of the panel. As I said before, I look after exploration and development for Origin. Part of that is the Beetaloo, the exciting Beetaloo Project that is in the Barkly Region east of Daly Waters. Firstly, I'd like to acknowledge the traditional owners, the Larrakia, traditional owners whose land upon which we meet. I'd also like to acknowledge the many traditional owners that we have worked with on the Beetaloo project since 2014. I'd like to thank the panel for opportunity to present for Origin, to present to the panel. Origin is an



integrated Australian energy company, and we have unique insights into gas development and energy markets. In particular, we have a long experience with on-shore gas development in Australia, and in particular, we've been the operator for the successful Australia-Pacific LNG, Coal Seam Gas LNG Project.

At Origin, one of our overriding principles is to be open and transparent at all times. We accept that people have different perspectives. We understand that people have questions about our gas developments. We understand that and we welcome that. We seek to engage with all stakeholders, to build understanding, and to share perspectives on our projects. And consistent with our principles, we always engage respectfully based on a dialogue of facts. Now I'd like to turn to the topics of specific interest to the panel. The background and issues paper covers many topics, and we will address all of those in our written submission. With the time available to us today, we're going to talk to three key topics.

Firstly, we'll demonstrate how our fracking checks and controls protect groundwater and the environment. Secondly, the community does not have to choose between agriculture or resources. We will demonstrate a coexistence is a proven proposition. Lastly, we will demonstrate the significant public benefits that can be delivered by a successful on-shore shale gas industry in the Northern Territory. A successful and well-regulated shale gas industry. My colleagues and the great team that we have here today will talk to each of these in turn, and on our hand to Alex Cote, who will address the first topic.

Hon. Justice
Rachel Pepper:

Thank you.

Alexander Cote:

Thank you, Madam Chair and distinguished panel members. I've had the privilege of working on these assets for the past three years. I'm a professional engineer. I'm registered both with APEGA in Alberta, Canada, and Engineers Australia. I have nine years of shale and tight gas engineering experience. As a practicing member of the engineering profession, I hold paramount the health, safety, and welfare of the public and the environment. As an engineer, it is my responsibility to identify risks, assess risks, to eliminate risks where possible through design, or otherwise to mitigate them to an acceptable level through controls. Protecting water resources is at the heart of almost every conversation about fracking, and we understand how critical groundwater resources are to our traditional owners, pastoralists, and communities.

In order to protect groundwater resources, we employ risk management techniques. We have robust risk and integrity management systems in place to ensure and verify the operational integrity of our assets in order to protect both the public and the environment through the full life cycle of our assets. I'll therefore take you through the controls that are in place to protect both the groundwater and the environment during hydraulic fracture stimulation activities.



Firstly, it is important to note that the controls that I'll be presenting are equally applicable to all hydraulic factor stimulation operations, regardless of reservoir type such as shale or sandstone, or well trajectory, vertical or horizontal. I'll draw your eye to the panel on the top right of storyboard one. This panel illustrates the principle that there are multiple checks and controls in place to prevent failure and that if any of those controls or tests are not successfully met, fracking operations won't be undertaken. A corresponding table that you'll find on the very left summarises some of these key checks and associated controls that we put in place. Some controls are ever-present, like our groundwater monitoring programme. We test and report based on results prior to the start of activity on a pad, and continue to actively monitor throughout the life of a well. Dr. Close will elaborate further on this topic in a moment, but before he does, I'll cover three primary checks that we have in place to protect groundwater and the environment during fracking operations. Check one: are the additives safe for use? Check two: how do we know the well has integrity, and check three: how do we know that fractures won't propagate into the aquifer? Let's have a look at these three checks and associated control in more detail.

Check one is all about knowing what goes into our fluid system and down our well. Every additive in the fluid system, so the frack fluid, carries out a specific function, such as clay stabilisation or friction reduction. The fluid system is not only designed, tested, and assessed against technical requirements, but also in the context of our ability to safely handle the fluid pre- and post-simulation at surface. As a result, we know all the additives that make up our frack fluid and furthermore, we publicly disclose this knowledge. All the additives, including their detailed composition, volume, weights, are fully disclosed to both the DPIR and the EPA, who make it publicly available. Risk assessments are conducted to ensure that the procedures and practises are in place for the safe transport, handling, and disposal of the frack fluid and its additives. We also take multiple verification steps. We verify that all our additives that are used are registered on NICNAS, National Industrial Chemical Notification and Assessment Scheme. We verify that no BTEX, or polycyclic aromatic hydrocarbons, are present in our frack fluid before use. Lastly, we screen for any signs of contamination in the aquifer and ensure that the quality of the water within the aquifer is unchanged as a result of our operations.

Check two is all about building a well that ensures that whatever goes down the well, or comes out of the reservoir into the well, is contained within the well and is isolated from the aquifer. This all starts with design. The wells are designed and constructed to have multiple barriers in place to protect the aquifers. You'll notice this schematic showing a well bore where there's multiple layers of steel casing and engineered cement that covers off of the aquifer. Fit for purpose materials are selected that take into account our expected operating conditions. We assess all parameters, parameters such as pressure, temperature, and fluid composition when it comes to our material selection. Next, the designs and resulting work programmes are then thoroughly risk-assessed both internally and against specs and



standards, and with external partners like our service providers to ensure that all the necessary controls and barriers are in place to ensure safe operations and well integrity. Lastly, we test and verify the integrity of the well bore we constructed prior to fracture stimulation. This is accomplished with cement bond logs and casing pressure tests. Cement bond logs are there to ensure that there's casing behind cement, and pressure tests are there to ensure that the mechanical integrity of the casing exists. These tests are then submitted to the regulator, who review it prior to us proceeding to stimulate the well.

Check three is all about understanding barriers to fracture height growth. Fracture height is primarily controlled by stress differences between geological layers. We collect a lot of well data from logs, core, and direct stress measurements to build these stress models, to understand how stress changes through rock layers. Fracture stimulation modelling uses the stress model to understand fracture geometry. There's a panel where you'll see in red, fracture geometry, the Amungee North West 1H fracture geometry, and the graphic shows that we expect the fracture to be contained within the lower stressed target interval. The highest stressed rock layer above the target interval has a higher clay content, which changes the mechanical properties of the rock, and thereby increases the stress within the layer. During pumping operations, we also monitor pressures and rates in real times, and look for any abnormal responses. There's a panel showing micro-sized data. This data's collected by Fisher and Warpinski, and the Barnett, and it demonstrates that the fracture height is well-contained around the perforations, and that there has been no observed fracture height growth into aquifers.

This observation is to be expected, as sedimentary basins like the Beetaloo are formed by the layering of materials. The layering creates heterogeneous material properties between layers, which results in large stress contrast. This creates an environment where vertical frack growth is hindered, and lateral fracture growth is the preferred path of least resistance. In the Beetaloo, where there is a substantial offset between the target reservoir and the aquifer, and with numerous sedimentary layers in between with vastly different mechanical properties, this means the likelihood of a fracture propagating into the regional aquifer is essentially physically impossible.

At this point, I'd like to reiterate that there's no fundamental difference between fracking a shale or a tight gas, or out of a horizontal or vertical well. The design, the approach, the checks, and the controls are virtually all the same. I'd like to draw you back to the first figure in the top right of the storyboard, as this summarises the section nicely. It signifies the many controls we put in place to protect the groundwater and the environment, and the fact that we will only proceed to hydraulically fracture stimulate a well if checks one, two, and three are all met. Protecting the groundwater and the natural environment is a critical and core part of our business. On



that note, I'll hand over to Dr. Close, who will take you through our groundwater monitoring programme in more detail.

David Close: Thanks very much, Alex. Good morning, all. As I said earlier, I'm a geologist by background and training, and Origin's Chief Geologist. I've also been working on the Beetaloo project for around four years, since Origin became operator. Prior to that, I had worked in shale and tight gas in USA and Canada, and come to Australia with a perspective of some of those operations. I'd like to provide a bit more detail about the groundwater monitoring that Alex mentioned, as it is one of the key controls we use to ensure that groundwater and the environment are protected. If I could ask you to turn to the second storyboard, it talks specifically to our groundwater monitoring programme around the Amungee NW-1 Well, which we drilled in 2015 and fracture stimulated ...

Hon. Justice
Rachel Pepper: This one?

David Close: Yes, sorry.

Hon. Justice
Rachel Pepper: No, it's all right.

David Close: Our groundwater monitoring programme doesn't exist in isolation. It builds on a really substantial body of pre-existing work on the groundwater resources of the Barkly and Stuart Plateau Region, including a 2015 study that Origin had independently commissioned that reviewed over 800 individual bores. We've shared this with the inquiry, and as mentioned previously, we are collaborating with CSIRO and neighbouring operators such as Santos to begin a more detailed baseline study. However, what we have been doing since 2014 is gathering data as part of groundwater monitoring programme prior to any exploration activities beginning.

The primary objectives of our programme can be summarised as providing baseline data for the region prior to development, improve understanding of the natural variability of the groundwater, and support and improve understanding of the hydrogeology ecosystem of the Beetaloo Basin. It's focused on the regionally important Cambrian Limestone Aquifer, where over 80% of the wells in the region are accessing groundwater from, but also does include Cenozoic and Cretaceous aquifers that are also used in the region. Monitoring includes twice shaley sampling for a range of water quality indicators, so these data will be critical to showing the integrity of the quality of water over the life of an exploration activity or development activity.

In addition to the discrete sampling programme, approximately half of the wells we're monitoring are equipped with loggers, and what they do is provide a continuous recording of standing water level. These data will measure natural variability in water level, and be available to demonstrate that exploration activities are not adversely impacting water supply for other users of the Cambrian Limestone Aquifer. The data being acquired



through the groundwater monitoring programme will be critical to proving the effectiveness of our controls. We'll share these data with interested stakeholders. We already provide them to government. We can provide them to this inquiry, and we will make them publicly available through our website. We will share the data with ... And that is part of proving that coexistence model that we've referenced.

I should like to talk a bit more about that theme of coexistence in the next storyboard that looks a bit like this ... Has some information background that I'll talk through as I discuss that coexistence model. For Origin and our partner landholders, shared value and coexistence, the proven proposition. By way of example, our experience with the APPEA LNG development in Queensland demonstrates this successful coexistence. Of the first 100 landholders to enter agreements, 100% are still on their farms coexisting with the gas industry today, and approximately 400 million dollars of compensation is committed to this group of landholders. All of these agreements have been secured voluntarily through engagement, collaboration, and negotiation. On the right of your storyboard, you'll see our community's charter. It's focused on relationships, communication, and earning trust, the key principles of how we've achieved those negotiations over time. There are many broader community benefits too that are spoken to in that infographic, but I'll move on to our Northern Territory experience.

Although a much smaller presence in the community in the Northern Territory today, we've been able to provide emergency assistance in multiple instances from major car accidents to snake bites. We've also built relationships and we recognise that this is essential, and Stephanie will speak further to this, shortly. I'll talk a little bit more about our understanding that relationships are critical, so is a clear framework for land access. We have negotiated access agreements over the course of our activities and provided financial support for legal representation in each case to ensure fair representation whether any access agreement is finalised or not. Every landholder agreement provides insurance against loss, damage, or environmental harm, and of substantive values. This is guaranteed under binding contractual terms.

The ability to negotiate land access is critical, not just for on-shore gas, but for the entire resources sector. We believe that it's government's role to determine whether a resource is developed and balanced the public good against other factors. A landholder veto would undermine this responsibility and put individual leaseholder rights above those of the public good. It would also put great responsibility and a burden on any individual to decide whether a project of potentially national significance should proceed or not. This is the role of government. A simple, clear land access framework creates a base which supports collaborative and equitable negotiations between companies and landholders.

The current Northern Territory regulations have enabled the negotiation of dozens of such agreements. Core to the negotiations and discussions of



access and fair compensation is the area of land that is impacted by exploration and development activities. The success of our Amungee NW1-H fracture stimulation extended production test in 2016 allows us to start adding real data to our models for what a successful development scenario could look like. I should emphasise that there is much work to go to prove such a scenario is commercial, but what we ask that in to build is the technical database that shows it could be a technical reality, and I think that goes to one of the earlier questions that you posed.

What we're showing in the lower left side of the same storyboard is a schematic of what a development scenario could look like with pad drilling and horizontal wells. It's a really efficient development scenario that requires a relatively small surface footprint. In this example, around 50 well pads over an area of approximately 500 square kilometres, which equates to one to two percent of that area. We would anticipate that six to 10 wells could be drilled and completed from a single pad. This maximises efficiency, minimises environmental impacts, and minimises interference with pastoral business. Hence, a multi-decade development that potentially three to five trillion cubic feet of natural gas, which is a huge resource, requires only one to two percent of a 500 square kilometre area to be impacted by gas development infrastructure. That's very different to some of the scenarios that are mapped out by those that don't understand how oil and gas developments go ahead, particularly in an unconventional or shale gas type development.

We're committed to maintaining open and transparent relationships with our stakeholders, communicating these exact principles that are shared with you today, and ensuring that value is shared, and coexistence can be achieved. But we do recognise that value needs to be shared more broadly and recognised more broadly than just our impact at stakeholders, and I'll let Stephanie talk to that a little bit further.

Stephanie Stonier:

Thanks, David. I provide support to our organisation's assets in Northern Territory and Western Australia. I'm based in the Northern Territory, and I'm accountable for engaging with our project's directly impacted stakeholders. They are the Northern Territory government, our host traditional owners, and our host landholders. Being open and honest and transparent in our engagement is fundamental to our success. It underpins our ability in achieving informed consent with our directly impacted stakeholders. It is these stakeholders who will be our partners for many decades to come, and it is for this reason that they have been the key focus of our engagements to date. We have in place an exploration agreement with traditional owners, supported by their representative body, the Northern Land Council, and we have access and compensation agreements in place for all activities that have taken place on pastoralist properties. These agreements include, but are not limited to, commitments around compensation, insurance and indemnity, schedule, quantum and type of activities, weed control, water and environmental management, protection of pastoralist infrastructure, and they are set for prescribed periods.



Post-exploration, new agreements will need to be negotiated for a development and production scenario. We have made and we continue to make genuine attempts at maximising local and regional participation in our exploration project. Local and Northern Territory businesses have, together with traditional owners, provided services to our project in areas of civil and road construction, maintenance and monitoring, accommodation, environmental services, cultural heritage clearances, medical and charter flight services. The continuance of our exploration and appraisal activities will ensure that these immediate benefits are able to continue.

I'd like to talk briefly to our relationship with our host traditional owners. Informed by our geological understanding of the basin, traditional owners are involved and have been an integral part of guiding us in acceptable locations for planning and executing activities. They have participated in works associated with environmental scouting, cultural heritage clearance works, and denoting sacred site exclusion zones. They tell us very early and upfront where we cannot go. This work is fundamental to supporting our applications to the Aboriginal Areas Protection Authority for approved works. This process is followed for each and every activity involved with each and every well. Traditional owners have also participated in the industry accredited drilling and completion induction, which accredits those participants with the basic certifications to be able to be employed and secure work at multiple operator sites. We also recently contracted the services of the local aboriginal company from Elliott to provide prescribed maintenance and monitoring services for the next 12 months.

Looking more broadly at public benefits, both territory-wide and nationally, our production development on significantly less than half a percent of the Territory's landscape in the Beetaloo has the potential to deliver an estimated cumulative role to benefit to the Northern Territory government of approximately billion dollars between 2020 and 2040. It will contribute to reducing the forecast gas supply on the East Coast, has the ability to deliver shared infrastructure and improved services such as roads, airstrips, health services, and telecommunications. It will make available, locally, much needed jobs and business opportunities for those regional and remote communities. Indirectly, opportunities further present for territory-wide investment and stimulus in the NT economy.

We've been listening carefully to the community's interests and concerns about avoiding boom and bust cycles, and we heard them again during this week's public hearings. An important distinction to note is the development scenario in the Beetaloo is that we don't anticipate to be building processing and export facilities, as was experienced in Queensland with three major projects were being developed simultaneously, nor would an upstream development project in the Beetaloo be akin to a commissioning and construction project, as people would be familiar with, with the impacts project. Should we arrive at a point where sustainable development is to proceed, we commit to finding the right balance for residential, FIFO, and DIDO employment opportunities within our workforce. We commit to



working with our host community and government on finding what that right balance is. The Northern Territory has one of the lowest carbon emission footprints in the country, with over 90% of its electricity being generated from natural gas. As a fully integrated energy company, Origin is excited about a future where both renewables and natural gas provide the majority of Australia's power. It is such an energy partnership that can achieve material reductions in carbon emissions both here and abroad, and we all have an important role to play in that regard. I'd like, now, to hand back to Ross Evans.

Ross Evans:

Thanks, Steph. I'll just take another minute to conclude. We hope we've given you deeper insights into three key topics that the fracking checks and controls protect groundwater and the environment, that this is not a choice. This does not have to be a choice between agriculture or resources, and that coexistence is a proven proposition. Lastly, that a successful and well-regulated shale gas industry will deliver significant public benefits. At Origin, we believe that a veto on land access would prioritise the rights of an individual over the rights of the public. Instead, we believe it is the role of government to provide a regulatory framework that enables resources to be developed for the benefit of all. At Origin, we believe the existing regulations are suitable for the current exploration and appraisal phase. We would also support improvements to the regulations that would be beneficial in the development or production scenario.

We look forward to working with the panel over the course of the inquiry. We have a great team here and significant expertise available to you, so we extend an open invitation to approach us at any time. We thank the panel for the opportunity to talk today and we're happy to take questions. Thank you.

Hon. Justice
Rachel Pepper:

Thank you. Yes, Dr. Jones.

Dr. David Jones:

This one is best addressed to Mr. Cote. You were talking about checks and balances about hydraulic fracturing and in particular, that full disclosure is related to the composition of frack fluids. One of the really big concerns of course, we've had from the communities up and down the territory is the possibility of contamination of groundwater and the fact that this which brew is totally unknown. They don't know what's in it. What do you actually mean by public disclosure? Is it just disclosure to the regulator, or is it fully transparent to the community in general?

Alexander Cote:

We submit the entire composition from our pre- and post-frack fluid, so what we design the fluid to be and then what we ultimately pump to the regulator. On the regulator's website, you can find full disclosure of all the chemicals that are in the frack fluid as well as, at the moment, they have our pre-frack composition of the fluid and we'll be following up with them to ensure that our post-frack fluids that were actually pumped, which are essentially equivalent to what we design to are also publicly made available on the website.



- Dr. David Jones: It's interesting that other positions that are being put to us is that these compositions are commercially in confidence to the providers. Do you have any issues with that?
- Alexander Cote: No. We ensure that the frack fluids we select are using additives that they're fully able to disclose to us. Part of that is ensuring that all the additives that are selected are additives that are registered on NICNAS.
- Hon. Justice
Rachel Pepper: Yes. Ms. Coram.
- Ms Jane Coram: Just following up on that. It would be good if you could possibly give us details of where we could view that composition. I have a number of questions, okay, probably the most important one first. This week, we've heard widespread scepticism in the community about the commitment of industry and the capacity of government to ensure that there aren't legacy issues into the future. I think there've been many examples cited to us, not of the gas sector, but of previous mines where there are long term issues. Questions still remain around the long term integrity of bore seals and whether the community can have confidence that, notwithstanding the most excellent environmental practises at the time of mine operation, that there won't be long term issues. Would you be able to speak to that issue?
- Ross Evans: Yeah, sure. I'm happy to talk to it, and feel free to chip in. Obviously, we talked about how the well bores themselves, when they're installed we use cement to line the casing. The casing themselves is made out of steel, and through the operational phase, we maintain the quality of that steel and cement to ensure that it is isolating at all times. Then at the end of the project's life, the well bore would be what we call abandoned, which means it's filled with cement and therefore it is no longer able to be a conduit for anything. When you think about it, you would probably find that into the very, very long term ... So we're talking about geologic time now ... We would probably find that the surface is eroding faster than the actual material that the well bore is made out of.
- Hon. Justice
Rachel Pepper: Just following up on that question, one of the figures that has constantly been mentioned during some of the public consultations is that there's this study coming out of the United States that suggests that 6 to 7% of all wells fail, either during the course of drilling or over the term of their lifetime. Can you illuminate us any further about the likelihood of those statistics being accurate?
- David Close: Yeah, look. Statistics are difficult to get, and there are various ones out there. That number typically refers to some type of incident that might require remediation or a change of planning. The statistic for all redundant protections to fail is far, far less. The Western Australian government have done a summary of statistics that I'll try and recover from 2015 and share, and it was much less than 0.5%. There really were no incidents where that had impacted the environment. That idea of multiple and redundant protections is fundamental and required.



I think it would not be an accurate statistic for an absolute well failure, for it to be five to 6%, or we would have a far different ... We have decades and decades of development in North America and the Middle East. Despite the hardest looking, the most diligent searching for contamination, say by the APPEA over a number of years, they have not found any systematic issues involving aquifer contamination. That's using technology that was available for abandonment 50 and 60 and 70 years ago. Fundamentally, the methods are sound and there's ... To some extent, that is an experiment that was put in place in those places that already is proving the robustness, and the massive improvements we've seen in material science make it a proven proposition that we can confirm the long term integrity of these well bores.

Hon. Justice

Rachel Pepper:

Yes, Professor Hart.

Prof. Barry Hart AM:

Mr. Cote, you mentioned, in terms of mitigating risk, you used that comforting word, "to acceptable levels," where we're also charged with that. What do you mean by acceptable level?

Alexander Cote:

At Origin, we employ a risk matrix. Obviously, risk is comprised of the likelihood the event will happen, or the consequence of that event. Through some combination of controls, either focusing on the reduction of the likelihood of that event or by reducing or eliminating the consequence of that event, we try to bring everything into what we view as an acceptable level of occurrence or an acceptable level of consequence. We find some things acceptable that we can have a remote likelihood, so less than 0.1% chance of occurring, but it may have a higher consequence associated to it. I think one of the things that we can include as part of our submission is a risk matrix that outlines our risk managing philosophy.

Prof. Barry Hart AM:

That would be good, but you didn't actually answer my question. You said Origin decides what is acceptable. It would be very useful to us since we're going to have to look at what's the meaning of acceptable. If you could develop some more detail?

Alexander Cote:

Yeah, happy to include that as part of our submission.

Prof. Barry Hart AM:

Good, thank you.

Hon. Justice

Rachel Pepper:

Yes, Dr. Beck.

Dr. Vaughan Beck:

As has been mentioned previously, this inquiry is focused on assessing the risks and something that part of your presentation was, and you just mentioned in the context of a risk assessment, we will be looking at accessing overseas data in terms of failures of fracking systems, particularly well bores and failures at surface failures during hydraulic fracturing, and operations. We will need to access a range of data, and for example, the US EPA have recently published a very extensive report on failures that have occurred overseas in the United States. Now, by implication, that's overseas data. You mentioned some data for, I think, abandoned wells. It would be



highly desirable that this panel was provided with data on failures that existed in Australia. The question is can Origin provide such data or direct us to where such data is available for the Australian context, not the US context.

David Close: We'd certainly be very happy to provide that data in regards to Origin facilities, and probably the best way to address that is through APPEA industry body. APPEA, I'm sure, could consolidate that data across industry and provide that to the inquiry.

Dr. Vaughan Beck:
Hon. Justice That would be excellent. Excellent. Thank you very much for that.

Rachel Pepper: Thank you. Yes, Professor Priestly.

Prof. Brian Priestly: Yes, thank you, I have two questions, really. In the information you've provided to us in relation to the Beetaloo project with your landholder projection, you mentioned that every landholder agreement includes insurance. We have been advised at other parts of this consultation that insurance is really impossible to obtain by landholders. Does that insurance only apply to the company, in this case?

David Close: I'll take that one, been involved in the land access negotiations at each step and spoken to our insurance companies and underwriters, and can confirm that while there've been questions, as we would with any standard types of policies only in new areas, but there would be no exclusions associated with hydraulic fracture stimulating. I can categorically state that as a fact, at least as it relates to who we use as an insurance agent and as an underwriter. It protects explicitly the environment in which we work, so it does cover the actual damage if it was to occur. There have been discussions with different landholders, the concepts of consequential loss, so what other impacts there could be, and we've accepted that as a principle in some instances as well. I think there are many people that probably haven't had the privilege, if you consider it a privilege, to be involved in those detailed negotiations and don't speak from a basis of fact. I hope you take it as trust and if we can get confidentiality what happen to those agreements, because they are confidential to that other party as well, we would certainly have no problem in sharing it with you.

Prof. Brian Priestly: Okay.

Hon. Justice

Rachel Pepper: Thank you.

Prof. Brian Priestly: My other question is being partially addressed previously, but in the information you've given us on the protection of groundwater and the environment, you've outlined a number of ways in which you address this particular problem. Yet, if you look at the literature in the United States associated with the shale gas issues, there have been issues, or have been instances of contamination of groundwater and surface water. Some of these have been associated with fugitive hydrocarbons, which usually come



from leakage of wells and so on, and perhaps other sources. Others seem to be associated more with surface spills. How do you respond to the difference between what the history has been in the United States and what you're proposing here is the protection measures you put in place?

David Close:

Yeah. I think our really fundamental difference of most the areas that are being developed in the USA is they've had decades of conventional production. Quite often, from shallower or deeper strata, so there are literally thousands, and in many is tens of thousands of wells, through these areas. It is very difficult to ascertain if any of the baseline data is simply not there. If you're finding methane in the aquifer, which you would find in any basin that has coal in it, for instance, is that associated with any activity that's current today, or is that a legacy issue? It doesn't excuse the fact that there could have been performances that aren't acceptable today, but there are no, as far as I'm aware, instances of hydraulic fracture stimulation causing any aquifer contamination. Surface spills and surface handling and minor events, typically minor events, occur across industries much broader than just our line, and water storage is a challenge handled in many sectors of resource industry.

That is a really fundamental difference between the area we're working, but there really are no other hydrocarbon-bearing intervals, and there are no legacy well bore challenges. We come with the opportunity to get true baseline data, particularly in the Beetaloo area, with through across the Northern Territory. The lack of prospectivity that we reference still, if despite the number of exploration permits is attested to by the lack of conventional on-shore production in the last hundred years in the Northern Territory, the Amadeus Basin being the only producing basin. So very different challenges we'll face that are much more beneficial to a controlled environment in limiting or preventing any adverse impacts on the environment.

Hon. Justice

Rachel Pepper:

Yes, Ms. Coram.

Ms. Jane Coram:

I'm very interested in the process of engagement with traditional owners that you referred to. I'm interested in knowing a bit more about how you undertook consultation, and how informed in representative of the communities was the agreement that you reached to, because we've heard in the submissions that one voice doesn't necessarily speak for all. Also, I'm interested in understanding whether you're confident that there'll be lasting benefits for local communities, rather than just short-term benefits.

Stephanie Stonier:

[inaudible 00:38:05] question, are you talking specifically because [inaudible 00:38:09]? Of course, we engage with traditional representative body, which is the land council. There is a existing agreement in place that was a agreement that we had to honour upon becoming operator of that agreement. There's a number of engagement that take place throughout the year. There's engagements that are bound by agreements, so we have to have on-country meetings each year, and that's for the land council to



actually determine who are the traditional owners that should be invited and should be in attendance at that meeting. For the last three meetings, we've probably had anywhere between 70 to 100 of the traditional owners across our permit acreage at those meetings. It is at those meetings we report back to the full group of traditional owners on the activities that we said we were going to undertake, so it's a reporting back opportunity, as well as during the year, traditional owners have been participating in a number of cultural heritage clearance works, working on the project in other capacities, and it is at that meeting where it's put to the group to approve the work going forward.

We are not present for the entirety of those meetings. We are an invited guest of a coordinated land council meeting, and after we'd leave, traditional owners discuss their business without us. We don't make decisions about whether we need interpreters or we don't need interpreters. We take that advice and guidance from the traditional owners and the land council themselves. I'm cautious to speak about benefits because they are traditional owner benefits, and I think it would be a good question for you to talk to the land council about, but we do have legally binding commitments around royalties. In an exploration scenario, they are typically a percentage of the value that you spent on your project. For our traditional owners, they have been receiving royalty for a couple of years. We advised them at the end of last year that they will no longer be in receipt of those benefits, as the moratorium prohibits us from being able to conduct activities, therefore, their royalty dividend has been ceased until such time as that goes away. They're the royalty benefits, and then of course, I mentioned in the discussion paper a number about the benefits.

A local company's just come on board with us, 12-month contract. It's hundreds of thousands, significant, that are able to ploy out to 14 people in their business to give us that work, as well as other operators in the region. Cultural heritage services, sacred site clearance, where all of that work is funded by Origin through the company which gives people employment, albeit periodic. It's not consistent and it's not throughout the whole year; that work absolutely only happens within the dry season.

Hon. Justice
Rachel Pepper:

Thank you.

Dr. Vaughan Beck:
Hon. Justice
Rachel Pepper:

Yes.

One question here.

Dr. Vaughan Beck:

I've got three sub-questions to one question. Responses to answers that have been given ... We've heard from some aboriginals that there is concern about companies using the aboriginal land councils and the aboriginal communities sometimes being disenfranchised by the land councils. You mentioned quite clearly that Origin's engagement is the land councils, so I'm just wondering how far down you'd go in terms of talking directly with communities, with interpreters.



- Stephanie Stonier: Yeah, apologies. Our engagement is with traditional owners, with their representative body present at those engagements.
- Dr. Vaughan Beck: Okay. Thank you. Second one. In terms of a previous response that was given about contamination of aquifers, the US EPA study does report contamination of drinking water from fracking operations. I think we need to understand that there is evidence out there of contamination, some cases. It's not systemic, but there is evidence of contamination of drinking water, and that may seem to be against what I heard previously. Opportunity to respond to that, and thirdly, in terms of the insurance policies that have been given. The panel has heard, quite considerably, concern from various community groups that we've been speaking to is that the legacy issue beyond when the contract terminates, and damage beyond when companies walk away from particular production sites. I'd like to know, with those insurance policies, whether they exist beyond the termination of the land access.
- David Close: The second part, I'll come back to the first, perhaps.
- Dr. Vaughan Beck: Sure.
- David Close: We'll have more insurance detail, specifics of how we manage our policies, perhaps, in our submission. If a development were to go ahead, which is when these closures would be required, would be multiple decades. It's very unlikely that it's a fly by night type operation, and I would say that at a minimum. We'll address that in some detail in our submission.
- Dr. Vaughan Beck: We want to know whether it goes beyond the point when ...
- David Close: The many decades, yes, of course. On the question of the EPA, it is very difficult to stay current with the substantial number of studies in cleared claims and competing counter-claims that are made by the USGS, EPA, government surveys. In Pavilion, Wyoming, for instance, over the course of five, or six, or seven years, five or six different conflicting studies, all legitimate, all scientists with good credibility, best of intents with different interpretation, different understandings of history, and different context. I make no claim to categorically. I cannot speak with scientific background in every individual case, but I'm really interested in understanding that has it come from hydraulic fracture stimulation, and if so, how has it occurred, because we obviously want to understand that as part of any risk assessment, understanding the risks that we deal with. I will certainly look into that in full detail, and we'll provide some specific commentary, perhaps, to examples in that EPA report.
- Dr. Vaughan Beck: That would be useful, thank you.
- Ross Evans: Maybe just to address a little bit more about the question about what happens in the very long term. With any resources project, whether that be gas development or anything else, there comes a time when the project is



finished and the tenure associated with that particular project is no longer required. At that point in time, a conversation occurs between the company that had been granted that tenure, and the regulator, and the company is obliged to demonstrate that everything has been done to rehabilitate or abandon in a suitable way. At that point, it is handed back to the government in effect. From that point forward, if there were, for whatever reason, something to happen, then that would be a matter for the government to manage at the point in time.

Dr. Vaughan Beck: Can I then just note that there is very serious concern in community about that very issue?

Ross Evans: Yeah.
Hon. Justice

Rachel Pepper: Particularly when companies go bankrupt. Absolutely. I think it was one, two, three questions. Four? Four questions. I'm telling you now, you're eating into your own break. Go ahead.

Prof. Barry Hart AM: My question goes back, I guess, to the front end of the question that's just been asked about how do you demonstrate there has been an effect or lack of effect. It comes back to this issue of groundwater monitoring. We heard from, I think Mr. Close, about the groundwater monitoring that's being done, and there are studies underway to look at that. Could some of that information be provided to the committee? Because that's an area which we do need to assess how good that evidence base is moving forward.

David Close: Categorically, yes. We can tell you that it is all at least, stock-quality water, and a lot of it is drinking-quality water. We understand that gradually varies over the region, so you can actually characterise it pretty well with a low number of data points, which is not always true of all systems, but those of you do joint studies understand that, of course. We could provide that and that will hopefully be beneficial in setting a data point today, and we commit to improving it.

Prof. Barry Hart AM: Part two of my question relates to service development. The statement was made that only a very small percent of the total land area service would be impacted. Now, was that just from the well pad areas? Would that include all infrastructure, including park line and roads?

David Close: Roads, gas prices, facilities, it's a small footprint in that entire area, because the nature of the development.

Hon. Justice
Rachel Pepper: You said 1%, didn't you?

David Close: 1 to 2% is a reasonable estimate in the scenario that we've modelled up.

Hon. Justice
Rachel Pepper: Okay, thank you. Yes, Ms. Coram.



Ms. Jane Coram: One of the concerns we've heard this week has been around the fact that shifting to a strong reliance on gas will delay a shift to renewable energies. I just wanted to pick up on a comment that Ms. Stonier made, that you regarded this as a partnership between gas and renewable energy. I would be interested to hear how you see that happening in the light of those comments that we're actually delaying that shift.

Stephanie Stonier: It's well understood that renewables are attractive, and we aspire as an organisation to be progressing in that direction. We are an inter-private company, we do offer our customers solar energy, and we believe that gas has an important role in reducing our carbon emission footprint, reducing our reliance on coal, and continued affordable energy from the gas market allows renewables to actually continue and develop.

Hon. Justice
Rachel Pepper: Okay, thank you. Professor Hart?

Prof. Barry Hart AM: I have a question related to the avoiding boom and bust cycle. Very laudable. I presume, by that you mean a strategic approach to development. If indeed this is allowed, I just wondering if you could elaborate on what would that look like, a strategic, is it open slather? We'd go back to Queensland situation. What's it look like, and who should oversee that?

Stephanie Stonier: I think we'll address this more comprehensively in our written submission.

Prof. Barry Hart AM: Okay.

Stephanie Stonier: But the principle is, once we understand what a plausible scenario might look like, and Dr. Close and Alex have both talked about today; it gives us a better understanding how many wells, how many well pads, what supporting infrastructure we'd need, access roads, et cetera. Then to deliver that success, what's the workforce plan that allows that to happen, then when you have an understanding of what those roles are, you can then ascertain can they be residential? Do they need to be FIFO? Do we want to actually tapping into workforce availability that may be existing in Tennant Creek or Katherine? And you of course need to talk to that community about how they much they want to grow, or how much they don't want to grow. It might well be the case that Newcastle Waters and Daly Waters and Elliott, for example, don't want to turn into a Katherine or a Tennant Creek. It's what's the plausible scenario look like, what delivers that success, and how do we work with government and the host community to design what is an acceptable, right balance and blend of that workforce.

Prof. Barry Hart AM: Thanks. That's talking about Origin. I guess I was thinking more about an industry, where there's more than one player. Perhaps I'm putting that to APPEA as part of your submission to us. What's it look like, and who looks after it?

David Close: One thing I would add that would be different to this is to say, some of the projects are familiar with, like Gorgon or Ichthys, where you reach a final



investment decision, and all of the development progresses from that point forward. There is no more decision point in a project, but you're unsure and you're trying to evaluate the resource as you're producing in the early years. It would be somewhat organic in the way that growth and the ramp-up would occur. It's unlikely that you would have more than one or two of these projects occurring in parallel, purely due to egress restrictions that would take time for the markets to mature and the pipeline connectivity to mature to the point. There is no scenario where in 2022, or any year, you would go from where we are today to some large number of production. It would need to ramp up relatively gradually. We simply wouldn't have the rigs available that other limitations ... So there are some natural limiters, I think, that assist in that prevention of boom-bust. Of course, there will be construction peaks to say, so specific things, but it's very different from some of these other mega-projects.

Prof. Barry Hart AM: I think that's a really important point, and perhaps you can elaborate on that. But that's not what happened in the States. There's many, many reports that start off with a couple of hundred wells, and then there's ten thousand in a particular area. That, I think, is a concern of the community.

David Close: Pipeline connectivity in the North America is pretty ... Very effective.

Prof. Barry Hart AM: It's putting that into our context.

David Close: Of course, okay, that's a good steer, thank you.

Prof. Barry Hart AM: Thanks.

Hon. Justice

Rachel Pepper: One last question. I think might've been you, Mr. Evans. Perhaps not. But somebody indicated that the regulatory governance system here was suitable. I think there was a word used, but it could be improved. What improvements could be made?

Ross Evans: Yeah, look. I think that's really one of the key subjects that we want to have an open dialogue on. As I said at the start, Origin has some really unique insights that we can bring from the successful on-shore gas developments that we have done, and there's quite a distinction between where we are today in the exploration and appraisal phase, which is literally a handful of wells, one or two here or there every year. There's quite a difference between that versus when you're in the production phase, and you have not so much more well heads, but you have a lot more laterals, and a lot more activity going on. There's quite a clear distinction between the two, and there's quite different needs between the two. We're happy to engage in a dialogue as to about what they could be. There are things like, for example, code of practise for well construction, and that was something that was very successful and effective in experiences in other jurisdictions. I think that's something that would be a topic worth discussing.



Hon. Justice
Rachel Pepper:

Thank you. Thank you for that. I appreciate you wanting to engage in an open dialogue, but we are, I suppose, perhaps I could put it the other way, around that we're really looking to you ... You've suggested that there could be improvements, and this might be something you wish to contemplate in your written submissions. We'd like to know what those improvements look like. Thank you.