Submission to the Reopened Senate Environment and Communications References Committee to oppose the Federal Register of Legislation on Industry Research and Development (Beetaloo Cooperative Drilling Program) Instrument 2021

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Please note this Update supersedes the First Version.

We wish to acknowledge that this work was prepared on the Lands of the Jinibara People (in Queensland) and the Peramangk and Kaurna Peoples (in South Australia). We pay deepest respects to their Elders past, present and emerging.

We also acknowledge the Traditional Custodians of the Lands in regions that are and would be directly affected by the planning drilling activities. We pay deepest respects to their Elders past, present and emerging, reflecting on their loving care and nurturance of these Lands for many tens of thousands of years.

These include the four key clan groups in Borroloola, who are the Garrwa, Yanyuwa, Marra and Gurdanji, where the actual drilling is occurring.

These also include the Peoples of the Beetaloo Basin area, including the Jawoyn, Alawa, Jingili, Walmanpa, Warumungu, Ngandji and Binbinga and others.

These also include the Peoples of the Traditional Lands that are directly downstream from planned drilling activities, including the Mudburra, Garrwa, Yanyuwa and Gurdanji.

We also pay respects to the affected communities in the northern area of the Beetaloo Sub Basin, including Katherine, Barunga, Beswick, Mataranka, Jilkminggan, Minyerri and Ngukurr.

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This submission was reviewed and its principles endorsed by David Schlosberg, MA PhD, Payne-Scott Professor, Professor of Environmental Politics in the Department of Government and International Relations and Director Sydney Environment Institute, University of Sydney.

Executive Summary

The Final Report of the Scientific Inquiry into Hydraulic Fracturing in the Northern Territory acknowledged that extensive research from the United States and other countries around the world had, by 2018, clearly demonstrated that the **unconventional gas industry poses significant risks to human health, water, the environment and the stability of our climate**.

This **submission adds to our multiple previous submissions** by providing some critical updates to the Senate Committee on research published in the last few years (2019-2022). These highlight critical improvements of our understanding, and previous underestimation, of the role of unconventional gas developments in adding to human disease, human deaths, social, psychological and mental health disturbance, foetal development errors, air pollution at regional scales, methane emissions contribution to climate change, rates of progression of climate change, and insufficiencies in water and biodiversity protection in Australia.

The NT Inquiry Report led by Justice Pepper that enabled the Beetaloo Instrument, based on their understanding of the evidence at the time, suggested that the acknowledged significant risks from opening the doors to an unconventional gas industry in the NT 'could' be controlled by 135 regulations. The decisions that followed the NT Inquiry Report to open those doors were made on these conclusions and an assumption that the words 'could be controlled' would be converted to 'would be controlled' into perpetuity. We question both conclusions and assumptions, the latter a belief not supported by evidence.

This submission details recent and new evidence that supports widespread concern that:

1 Unconventional gas development in the Beetaloo would damage climate stability, biodiversity and water security.

2 Unconventional gas developments in the Beetaloo would leave local communities in fear of safety, disappearance, extreme sadness, loss and constant stress and seriously contravenes Australia's obligations to the United Nations Declaration of the Rights of Indigenous People.

3 Unconventional gas development in the Beetaloo would damage health and wellbeing of older people, women, children and the unborn and widen the gap in life expectancy that is already the larger than anywhere else in Australia.

4 Unconventional gas development in the Beetaloo would cause dangerous ozone exposure over vast areas that not only contributes to climate change but also accelerates human deaths and agricultural losses.

Any one of these four areas of concern are sufficient on their own to stop progression of gas developments in the Northern Territory, hence in combination they represent reckless disregard for environmental justice, Indigenous rights and future generations.

Our Submission first discusses the **serious escalation of changes in climate, water and biodiversity in recent years**, arguing that "times have changed and the crises we face are

almost insurmountable" (pages 7-14). Since 2018, it has become eminently clear that the continued expansion of **new gas developments is completely incompatible** with Australia's Paris Agreement targets, and even more to achieve the actual speed and intensity of greenhouse gas emissions reductions required to prevent climate disaster. The Australian Medical Association and many health and medical organisations in Australia and globally have declared **climate change a health emergency**, urging immediate reduction in carbon emissions and transition to renewable energies for domestic and export economies.

The second section of our submission highlights the enormous distress and opposition to the development of a gas industry in the Beetaloo Basin revealed in the 2018 NT Fracking Report and the first phase of this Senate Inquiry (page 15-19). Traditional custodians spoke of **anger at the lack of honest and appropriate consultation, and fear, sadness and anticipated deep loss**. Gas and oil extraction is rejected by Traditional Owners of the Beetaloo region because of the harm it will cause to the air, water and spiritual and cultural links with the Land as it becomes unrecognisable in the extensive industrialisation that accompanies site preparation, road building, drilling and hydraulic fracturing for gas production, wastewater disposal, gas processing and pipeline and truck transportation.

Our submission also extends a severe concern raised in our previous SREBA submission about increased exposure of First Nations women and children to **sexual and physical violence** brought forward in the Canadian Inquiry into Missing and Murdered Indigenous Women and Girls by oil and gas developments and evidence emerging from the United States. The **abhorrent behaviour** uncovered in the very recent West Australian Inquiry (reported in June 2022) into sexual harassment against women in the FIFO mining industry starkly demonstrates that the Australian situation is no different. The threat to Aboriginal women and children from a massive influx of FIFO into remote NT where **police protection is already extremely inadequate** cannot be overstated. The situation offers massive opportunity for unspeakable harm. We gain **no assurance from SREBA** or other documentation that these serious risks are being taken seriously, suggesting they will remain unacknowledged and unaddressed.

The submission then reviews some of the many new seminal studies on health impacts associated with gas extraction, including increased mortality, lower life expectancy and severe birth defects (pages 20-24). These add weight to previous research examining contributions of the industry to **increased hospitalisation rates for heart failure, heart attacks, asthma, and increase mortality (death) from cardiovascular and respiratory diseases**. These new studies extend the range of developmental impacts linked to gas developments, which include **lower birth weights and severe birth defects** linked to interference with the brain and nervous system and placement of digestive organs. The peer reviewed literature now contains extensive evidence of **psychological and mental health loss** as people witness extensive transformation and degradation of deeply held social and environmental values that support their wellbeing. As previously emphasised, Aboriginal Territorians already experience the **nation's highest inequalities and vulnerabilities** to these health conditions.

Finally, the submission highlights the extensively improved understandings of the implications of gas developments for **ozone pollution** (page 25-28). Gas basins in Texas and

Colorado that share geological, meteorological and human population characteristics with the Northern Territory now **add significantly to existing ozone and PM2.5 levels** across much of the United States. Ground level ozone harms health directly and is also an extremely potent greenhouse gas. This research is critically important to the understanding of what is likely to result from NT gas development – where extreme heat and dry conditions are at least as favourable to ozone formation as those areas researched and where the local Aboriginal populations likely to experience the highest exposures are highly vulnerable to respiratory disease. Climate change will further promote ozone production from gas industry emissions in the NT in the years of operation and beyond, through legacy wells and other infrastructure.

On the basis of this evidence and much more, **we strongly oppose** the Federal Register of Legislation on Industry Research and Development (Beetaloo Cooperative Drilling Program) Instrument 2021. **We implore NT Parliament to re-evaluate** the decision to progress unconventional gas developments in the Beetaloo Basin and other locations in the Northern Territory taking into consideration both previous and new scientific and medical information regarding the multiple harmful impacts of the unconventional gas industry around the world.

Introduction

This Submission adds to many documents we have submitted in an attempt to help the Northern Territory government make the right decision for its people and for the world on unconventional gas development. We have consistently taken the time to compile the rigorous evidence emerging from health research on gas developments to ensure that, when making decisions about its future, **the NT government is provided with clear access to the large body of evidence documenting many serious concerns and losses to health and wellbeing of people, the environment and the climate.**

Critical supporting documents we have authored and provide links to:

- Submission by Haswell and Shearman to the Senate Environment and Communications References Committee to oppose the Federal Register of Legislation on Industry Research and Development (Beetaloo Cooperative Drilling Program) Instrument 2021 (available at https://apo.org.au/node/313370; superseded by this Report).

- Submission by Haswell and Doctors for the Environment Australia to the NT Fracking Inquiry, 2017 (available at https://frackinginquiry.nt.gov.au/?a=424231; https://frackinginquiry.nt.gov.au/?a=423139).

- Oral Presentation by Haswell to the Inquiry, PowerPoint slides (available at https://www.youtube.com/watch?v=jd6kvLLuoSg; https://frackinginquiry.nt.gov.au/?a=445251).

- Additional letters sent to the Chief Minister by Haswell and/or Shearman through Doctors for the Environment Australia with links to new health studies (available at https://frackinginquiry.nt.gov.au/?a=452121 ; https://frackinginquiry.nt.gov.au/?a=484976; https://frackinginquiry.nt.gov.au/?a=457141).

- Updated and highly sourced report by Haswell and Shearman summarising the evidence on health and environmental impacts of gas extraction, 2019 (available at https://apo.org.au/node/208281).

- Submission by Shearman and Haswell to the SREBA Draft, 2020 (available at https://www.researchgate.net/publication/349537526_Expert_comment_on_the_Strategic_Regional_Environmental_and_Baseline_Assessment_SREBA_Framework_in_the_NT_Consultation_Draft_Authors_of_this_Review).

As can be seen from these reports, between 2017 and 2021, a significant body of evidence had already accumulated, with over 1500 peer reviewed publications, most of which intensified concerns about potential harms of unconventional gas developments.

Assessment of recent literature, now numbering more than 2300 publications (Repository for Oil and Gas Research, August 2022), shows that the main messages in our previous submissions still stand. Evidence of risks and harms to human health, human foetal development, community and ecological wellbeing, water and air quality, land contamination and especially the climate has substantially grown not diminished. As the impacts of continued use of fossil fuels, especially gas, is accelerating the rate of change, the urgency now felt globally to rapidly shift from fossil fuels to clean energy – clearly justifies a substantial rethink of the progression of developments for gas extraction in the NT.

We highlight some of the most important new knowledge in four key areas of extreme concern, namely:
1. Damage to climate stability, biodiversity and water security
2. Damage to Aboriginal Rights and safety of Aboriginal women
3. Damage to Health and wellbeing and foetal development
4. Damage from ozone pollution

These values are seriously threatened by the proposed "Program" in the Beetaloo and in other basins in the NT.

1. Unconventional gas development damages climate stability, biodiversity and water security

In this section we detail issues and new studies on climate, biodiversity and water which have arisen since the SREBA in 2019. They are all critical for the sustainability of Australia; therefore, we hope the Senate Committee will regard them as sufficiently compelling to request reconsideration of the need for support or permission for this project to proceed.

Times have changed and the crises we face are almost insurmountable.

The concept of sustainable development is defined by the 1987 Bruntland Commission Report as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." Australia's gas developments do not fulfil these needs on climate, biodiversity or water security.

The Beetaloo project defies all these life support parameters necessary for the future of Australia. Most of all, it defies the global need to urgently reduce methane emissions. The climate forcing impact of gas developments may well determine the (un)controllability of climate change during the next few decades. The short term and perceived temporary financial gain linked to the Beetaloo project pales in comparison.

The overriding issue is the urgent need to cease fossil fuel mining, and particularly unconventional and offshore gas extraction. The IEA (2021) has indicated that there should be no new gas or oil projects if net zero emissions by 2050 are to be attained.

We would go further (Byrne, 2022). We ask the Senate Committee to be aware that climate modelling of the expected rise in world's temperatures for each increase in greenhouse emissions has been remarkably accurate for many decades, but modelling has repeatedly underestimated the degree of impact of each temperature rise. The last three years of drought, followed by bushfires, floods and storms, around the world are becoming likely to be the new normal; devastating entire regions of the world. We cannot afford any further rise in greenhouse emissions - this must become a World and Australian aim **right now**.

1.1 Climate Change

As detailed above, even since the SREBA assessment, scientific research indicates that global heating is accelerating even more rapidly than projected in recent IPCC reports (Loeb et al 2021).

As noted by leading scientist James Hansen (2022) in his Aug 25 newsletter, people in Central and Southern Europe, Northern Africa, and the Middle East realize that their summer climate is becoming noticeably hotter. And there is already more warming "in the pipeline" due to existing greenhouse gases. Moreover, these gases will continue to increase for decades because the gases are primarily a product of energy use and other activities that are essential to the health and well-being of a still-growing global population.

The position of humanity is precarious because increasing evidence indicates that climate change and biodiversity are near tipping points at which climate change and damage to other life supporting mechanisms will become self-perpetuating (Shearman 2022).

It is recognised that net zero emissions by 2050 will be neither achievable nor effective without drastic reductions already in place by 2030. Hence scientists are urging immediate action on gas developments, because of their substantial contribution to methane emissions, as their potency in climate forcing is 72 times greater than that of carbon dioxide.

Presently no country has mitigation policies to prevent a rise in temperature of at least 2-3 degrees Celsius. As reported by Mazengarb (2021), Australia was singled out in a major United Nations-backed Sustainable Development Solutions report for the absolute poorest performance on climate action amongst the 193 members of the United Nations.

Australian policy of emissions and fossil fuels has been out of step with the G7, G20 and the UN. Australia with its leadership in coal and gas exports and extremely high per capita emissions is a pariah on the world stage, which is increasingly affecting our trade and international arrangements. The Beetaloo project, if it proceeds, will be viewed as an indication to the world of Australia's intransigence.

With the election of the Labor government this year there are policy changes to increase the reduction of emission target to 43% by 2030 which is commendable and necessary to achieve net zero by 2050. Even these targets will require a huge national effort involving all aspects of the economy.

The transition to renewable energy has been so delayed by the Australian government that it will now be impossible to complete transition by 2050 to achieve et zero, without a 50% reduction in energy usage (Diesendorf 2022). The task before us is huge and difficult.

The enormous climate and health impacts of a Beetaloo development

Writing as health workers and scientists we ask the Senate Committee to consider one impact of the Beetaloo project above all others. It will cause preventable deaths. Qi Zhao et al (2021) in the Planetary Health Study find that more than five million extra deaths a year

can be attributed to abnormally hot and cold temperatures arising from the extremes of climate change. The development of the Beetaloo will contribute to these deaths from heat.

A recent study reported in the scientific journal Nature explains why tropical climates like that in the north of the Northern Territory will suffer most from increases in temperature, and human existence there will become problematic (Zappetello et al 2022).

Also contributing to this dire situation are the many other major gas projects in operation and planning around the nation. Government thinking that we can develop ten further offshore gas fields listed in the statement by Minister King (2022) is a devastating blow, not only for the increase in emissions, but also because it indicates a government mind-set that is unable to grasp the urgency and seriousness of the issue. It is a reactive and dangerous move that threatens Australia's long-term energy future (Hepburn 2022).

In this regard, we note that Australia has yet to join 100 countries which have signed the pledge to cut global methane emissions 30 per cent by 2030. To sign this pledge would carry the responsibility for no new gas development onshore or offshore.

We oppose the Industry Research and Development (Beetaloo Cooperative Drilling Program) Instrument 2021, particularly on the basis of its direct impact on climate change and its indirect effects on water security and natural capital. **On these grounds alone the case for stopping the development is overwhelming.**

1.2 Damage to biodiversity and ecological services

An abundance of previous and new research confirms beyond reasonable doubt that gas extraction, processing, transport and combustion are a major accelerator of the rapidly increasing temperature rise and breakdown of planetary climate systems, enhancing the impact of other environmental degradation and causing global biodiversity collapse.

The IPBES Global Assessment (2019) concludes that one million of the world's species are threatened with extinction due to human activities. Clearly this requires urgent transformative change to human civilisation, requiring fundamental, system-wide reorganisation across technological, economic and social factors.

The deterioration of the world's biodiversity is so great that eminent economists now accept that it is severely impacting economic growth. The Economist (2021) confirms the link between loss of biodiversity and climate change; and posing equal risks to humanity.

The report "Economics of Biodiversity" by Emeritus Professor Sir Partha Dasgupta (2021) recognised biodiversity as natural capital that must be accounted for in such measurements as GDP.

The crisis in loss of biodiversity and ecological services is upon us. To feed ourselves we have used the ingenuity of science to drive food production but this is now falling and scientists are describing regions where living soil dies and blows or washes away in the more extreme weather events.

In Australia the 274 page government Australia State of the Environment (2021) released in 2022 was a litany of devastating deterioration and consequences. It assessed every aspect of Australia's environment and heritage, rivers, oceans, coastal regions, air, land, soil and urban areas. It painted a vivid picture of nature crumbling under the combined pressure of climate change, prodigious land clearing, habitat loss, invasive species, mining and pollution.

Australia has a loss of mammals greater than any other continent and many other losses of wildlife due to land clearing for sheep and cattle grazing, with 7.7 million hectares (about 19 million acres) of land cleared between 2000 and 2017 with only 7 percent assessed under federal legislation by Australia's Environment Protection and Biodiversity Conservation (EPBC) Act.

This act failed over many years to safeguard Australia's vulnerable plants, animals and ecological communities. The Samuel Review (Samuel 2020) has detailed many vital reforms but they have not yet been instituted.

The crux of these changes is that in Australia, nineteen ecosystems have been showing signs of collapse or near collapse during the past five years. Furthermore, intensive cultivation techniques have resulted in the third largest cumulative loss of organic soil carbon of any country, behind only China and the United States. Australia is a significant exporter of meat and grain to a world increasingly seeking access to them.

In proposing and enacting oil and gas projects we have failed to recognise that the threat and damage to human health described in later sections of this submission will affect all other life in the region, causing declines in biodiversity and ecological services (Deziel et al, 2022).

As with other major gas developments, such as those in the Surat and Bowen Basins, Northern Territory gas developments would cause multi-factorial damage to biodiversity through land clearing, the prolific use of water at multiple stages, chemical contamination of air, land and water and cause loss of agricultural water and native vegetation (Doctors for the Environment Australia, 2019).

Again we reiterate our opposition to the Industry Research and Development (Beetaloo Cooperative Drilling Program) Instrument 2021 on the basis of unacceptable risk to natural capital of the Beetaloo region.

1.3 Water Security threatened by the Beetaloo Drilling Program

People who have trouble obtaining water resources are nearly three times more likely to face food insecurity than those who have reliable access to hydration. About one-tenth of the global population is suffering from hunger, while nearly a third is facing food insecurity.

Furthermore water scarcity is further factor in the causation of the collapse of biodiversity and ecological services accentuated by the prodigious use and contamination of water in gas developments. Currently, according to the UN World Water Development Report (2022)

agriculture accounts for approximately 70% of all groundwater extraction and this increasingly limits water available to biodiversity.

National and state reports on water security since SREBA in 2019 mostly demonstrate that the utmost protection of our scarce water resources in a rapidly drying climate is fundamental to Australia's environmental sustainability upon which our economy, health and continued existence depends. However, some reports reveal that many people making decisions and regulations do not grasp the magnitude of problems we must face now.

Water is the key life support system which, along with climate change and biodiversity, will determine if Australia has a sustainable future. This will depend largely on whether humanity can control climate change – which conversely depends on the rapid cessation of any new gas developments and replacement of our enormous coal and gas export industries with clean energy and other exports that, unlike fossil fuels, are conducive to continued human quality of life, health and survival.

In our submission to the SREBA assessment process (Shearman and Haswell, 2019), and other previous submissions and reports, we strongly warned the NT government that water is a critical commodity for future survival and wellbeing, and it should not be placed at risk for short term (at best) gain from progressing shale gas developments.

Since then our concerns have increased because of significant inadequacies of national water policy, as evident in the Draft Report "National Water Reform" (2020) by the Productivity Commission (Shearman 2021a).

Inadequacies of current water policy in the States are demonstrated in the recent SA Water Security Statement, Water for Sustainable Growth (2021), which fails to fully consider environmental sustainability in the drive for economic growth, neglects urgent needs of Aboriginal people and ignores impacts of gas extraction in the state's north (Shearman 2021b).

We conclude that national and state water policy is generally inadequate to offer guidance on the principles of water use in the Beetaloo, but on our scientific understanding of environmental sustainability, water usage for gas development in the NT is unacceptable.

Furthermore, our submission to the SREBA review (Shearman and Haswell 2019) detailed numerous inadequacies in national and NT policy which have not been addressed and we summarise below. We ask the Committee to revisit our recommendations, particularly to establish priorities for the use of water from major basins and aquifers, including the Cambrian Limestone Aquifer, which is the major water resource for the Beetaloo Basin.

We found that the SREBA Framework treated water only as a "given" for use in development. The main concern for the sustainability of Australia is the potential contamination of a basin or aquifer with toxic chemicals some of which are long lasting and which could prevent human use of this water for decades either directly or through agricultural production. The dangers from contamination will increase progressively with water spillage due to more climate change related extreme weather events.

In this regard, Australian industry and regulatory authorities have ignored evidence of increased human diseases associated with residence near unconventional gas operations in the US and Canada (see Section 3) from chronic stress and contaminating chemicals which may be conveyed by water. Of particular concern is the potential endocrine-disrupting activity of added and naturally occurring chemicals that may be related to increased risk of preterm birth, miscarriage, and birth defects, particularly of the heart. In this regard we ask the Committee to be aware of the inappropriate methodology proposed for health assessment in SREBA.

The introduction section to the health study in SREBA implies that the scope of health impacts is broad and complex (clearly requiring a Health Impact Assessment approach), but the baseline studies of pre-drilling information used a simplistic and limited Health Risk Assessment.

We urge the Senate Committee to identify this compelling health issue in its report so that the warnings of these harms can be used in future litigation should the need arise.

Finally, there is no mention of volumes of water to be used in a milieu when scarcity is increasing due to climate change and is a critical issue for the sustainability of the region. Clearly the special provision for water take out-with the special provision of the National Water Reform Initiative (2020) will need to be rescinded if Australia is to be sustainable.

We oppose the Industry Research and Development (Beetaloo Cooperative Drilling Program) Instrument 2021, particularly on the basis of unacceptable risk to water quantity and quality in the Beetaloo region. As explained in the climate section above, these risks are increasing rapidly with flooding events which increase distribution of pollutants and endanger water security for future human and agricultural use.

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2. Unconventional gas development in the Beetaloo is likely to leave local communities in fear of safety and disappearance of Aboriginal women and children, extreme sadness, loss and constant stress and seriously contravene Australia's obligations to the United Nations Declaration of the Rights of Indigenous People.

Decisions to progress gas and oil extraction in the Beetaloo and beyond in the Northern Territory would fly in the face of future partnerships being formed between the Federal government and Aboriginal groups. We are at a very important time, with the nation appearing ready to come together to establish an Aboriginal Voice and constitutional change with strong support from the federal government. These honourable steps would be badly sullied by progression of the Beetaloo Drilling Program in the NT given extreme levels of known risk – and demonstrated by the Open Letter to Parliament from Traditional Owners with over 35,000 signatures and their statements on Beetaloo (Knowles 2021):

Our connections to Country have been established and proven time and time again by the white man's law. We hold the Native Title and Land Rights — a system that is meant to protect and enforce our rights. These have been denied to us… For years, we have been told lies by the gas and oil corporations. That there would be no damage to the Country or poison in our waters. These companies won't even answer the most basic of questions — where they plan to drill or how many wells they want to build.

The Traditional Owners noted the lack of respect shown to them by gas corporations, saying they have failed to "follow proper process in consultation with us, failed to acquire consent, failed to provide transparency in their dealings with us, and have systemically excluded our voices from the decision-making process for activities on our Country."

The letter to Parliament also noted their feelings regarding the behaviour of the Federal Government. "This Federal Government coming in over the top of what little processes we have undermines our land rights as Northern Territory Traditional Owners," and "The same Government who has never come out to our communities to sit with us or meet with us. They are failing to represent us."

Our studies detailed in a submission to the Senate on the UN Declaration on the Rights of Indigenous Peoples (2007) (UNDRIP) indicates that the behaviour of mining companies is a significant factor damaging reconciliation for it damages Indigenous Peoples' close relationship to Earth and Nature which is inherent to their health and wellbeing.

The health, safety and environmental risks faced by Aboriginal people with progression of major gas developments in the Beetaloo and elsewhere was encapsulated in our article (Haswell et al 2021) which states, "Aboriginal and Torres Strait Islander people have been repeatedly harmed by policies and decisions that drive systematic dispossession, disempowerment, over-incarceration and poverty". These processes are clearly linked to

the enormous gap in life expectancy, health statistics and quality of life that is ***particularly acute*** in the Northern Territory.

In addition to extensive damage to the atmosphere, waters, lands and health reviewed in other sections of this submission, research and experience in the US and Canada, and among women working within the FIFO industry in Australia, allow little doubt that an unconventional gas industry in remote regions brings acute safety concerns to Aboriginal women and children living in its path.

In our submission to SREBA (Shearman and Haswell, 2019) we reported:

Arguably the most horrifying direct health and wellbeing losses that have been associated with the oil and gas industry in the US and Canada are sexual violence and the findings of the Missing and Murdered Women and Girls Inquiry in Canada.

The SREBA framework does not mention, much less provide a convincing argument, that it will prioritise or protect women's safety and security in areas affected by gas development and activities. The conditions existing in remote NT are very similar, if not even more precarious for Aboriginal women compared to their counterparts in with gas and oil development in Canada and the United States.

The SREBA does not mention that shale gas extraction in North America has brought man camps of fly-in fly-out workers, men working in stressful and sometimes dangerous conditions, enormous inequality between highly paid workers and local communities, massive increases in truck movements through communities, possibilities for drug trafficking similar to that experienced in rural and remote NSW – and circumstances that have been linked to higher levels of violent crime, sexual assaults, traffic accidents and fear of safety among women and girls.

Our submission documented the connection between extreme extraction and sexual violence against Native women in the Bakken oil fields of North Dakota and Montana, and the Tar Sands region of Alberta, Canada, where vast "man camps" of temporary labor have become lawless hubs of violence and human trafficking. It also contextualizes this epidemic within the history of colonization, genocide, and systemic violence against Indigenous peoples, which has always disproportionately affected women and girls.

For example, the "National Inquiry into Missing and Murdered Indigenous Women and Girls" in Canada in 2019 "Reclaiming Power and Place": includes a statement by *Melina Laboucan Massimo,* of the Lubicon Cree First Nation (page 586):

The industrial system of resource extraction in Canada is predicated on systems of power and domination. This system is based on the raping and pillaging of Mother Earth as well as violence against women. The two are inextricably linked. With the expansion of extractive industries, not only do we see desecration of the land, we see an increase in violence against women. Rampant sexual violence against women and a variety of social ills result from the influx of transient workers in and around workers' camps.

Industries that create “boom town” and “man camp” environments are implicated in increased rates of drug and alcohol-related offences, sexual offences, domestic violence, and gang violence, as well as sex industry activities in the host communities. These occurrences disproportionately impact Indigenous women, girls, and 2SLGBTQQIA people. Furthermore, the influx of people near or within Indigenous, remote communities stresses already limited social infrastructure, such as policing, health, and mental health services.

A lack of incident reporting and police vigilance regarding missing and harmed women hampers research, however mixed methods research using both qualitative and quantitative approaches are most powerful in documenting trends and linkages. Ruddell et al. (2014) reported higher crime rates and an 18.5% increase in violent crime reported between 2006 and 2012 in oil–impacted communities, and a decrease of 25.6% in a matched sample of counties that had no oil or gas production. Martin et al. (2019) reported 45% to 70% increases in rates of reported violent victimisation, including unlawful sexual contact, in the Bakken region of North Dakota before and after shale oil extraction began, with decreases evident in regions without gas operations.

A First Peoples Worldwide (2019), University of Colorado at Boulder, report welcomed the release of these data but urged the disaggregation of these and updated data to allow for the likely much high increases in violent victimisation revealed in a range of reports (Martin et al, 2012; Finn et al., 2017; Jayasundara et al., 2018). It is also important to recognise that there is serious underreporting of these crimes, especially among Indigenous people, due in part to mistrust of government agencies and fear of reprisal.

With no attention given to these international reports by the NT government or its instruments regarding need for enhanced protection of Aboriginal women and girls in the areas near gas developments despite very similar circumstances, the conditions for these tragic outcomes are very likely to be replicated in remote NT.

Way Forward

In 2009 Australia formally committed our nation, including state and territory governments, to all the principles embedded in the UNDRIP. In signing, Australian government committed to *recognising the urgent need to respect and promote the inherent rights of Indigenous peoples which derive from their political, economic and social structures and from their cultures, spiritual traditions, histories and philosophies, especially their rights to their lands, territories and resources*.

Australians expected improved understanding and action to protect the spiritual and cultural needs of Aboriginal peoples in relation to their attachment and custodianship of Lands and waters, which in turn benefit the health and wellbeing of their communities.

The commitments also supposed to ensure that Aboriginal women and children will be protected from industries shown to bring fear, violence and trauma to ensure enactment of Article 22 of UNDRIP that states:

1. Particular attention shall be paid to the rights and special needs of indigenous elders, women, youth, children and persons with disabilities in the implementation of this Declaration.

2. States shall take measures, in conjunction with indigenous peoples, to ensure that indigenous women and children enjoy the full protection and guarantees against all forms of violence and discrimination.

We reiterate that since our submission to the draft SREBA framework regarding protection of women and children appears to have been completely ignored, we must once again emphasise our concern that there is no acknowledgement of the risk of sexual violence and disappearances linked with the oil and gas industry. This is despite the obvious parallels and the abhorrent propensity clearly signalled in the West Australian Inquiry into sexual harassment against women in the FIFO industry.

With these attitudes and behaviours now in the open, it doesn't take too much imagination to predict that the stronger the protection and penalties finally instituted within industry confines via enhanced OHS measures, the greater the risk to people in surrounding communities with very little voice and much lower risk of being caught and convicted.

Twelve years after signing the UN Declaration on the Rights of Indigenous Peoples a report on "Implementing UNDRIP" from the Australian Human Rights Commission (2021) showed that the Australian Government has not taken steps to implement UNDRIP into law, policy and practice; has not negotiated with Indigenous peoples a National Action Plan to implement the UNDRIP; and has not audited existing laws, policies and practice for compliance with the UNDRIP.

We now have a new Commonwealth government elected to take urgent action on both climate change and Aboriginal and Torres Strait Islander justice; and we suggest that all jurisdictions quickly reform the ways in which lasting, meaningful and safe partnerships with Aboriginal people can be established. This must include reconsidering some of the NT resource proposals and we urge this Senate Inquiry to take a strong stance to uphold these aspirations in the Beetaloo Development. This development clearly contravenes multiple obligations under the UNDRIP, including the Rights to Health (Article 24(2)), Safety of Women and Children (Article 22(1&2), control of Traditional Lands and Resources (Article 26(1)) and Conservation and Protection of their Lands (Article 29(1)).

This matter must be fully and completely considered, including decisions as to who would pay for a security regime that actually protects Aboriginal women in nearby communities and those along the vast trucking routes during the lifetime of these projects, in relation to Beetaloo before any approvals are considered.

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3. Unconventional gas development damages health and wellbeing of older people, women, children and the unborn and widen the gap in life expectancy that is already the larger than anywhere else in Australia.

Recent studies further strengthen links between living near unconventional gas operations and heart failure, heart attacks, asthma exacerbations, hospitalisations, lighter babies and birth defects. Scientifically plausible explanations for these links are stress and chemical exposures caused by unconventional gas developments and activities through air and water.

Our previous reports highlighted with multiple references,

…accumulating evidence of associations between residence close to gas extraction activities and reports of poorer health, such as asthma exacerbations, sinus conditions and migraines, skin rashes, fatigue and headaches and hospitalisations for heart, neurological, respiratory, immune system diseases and some cancers. While most of these studies have been conducted in the US, exploratory hospital-based studies suggest that similar trends may be emerging between regions with and without coal seam gas mining in Queensland, Australia.

Increasingly consistent observations of higher frequencies of negative birth outcomes, such as low birth weight, extreme pre-term delivery, higher risk births and some birth defects, have been reported to occur in pregnancies spent closer (around 2 or 3 km) to gas extraction and processing activities, compared to pregnancies spent further away, or in the same area before commencement of gas extraction activities.

Increased levels of stress, depression and sexually transmitted infections, aggression, criminal activity and traffic accidents have also been reported among those living near gas developments. These changes likely reflect psychological and social disturbance among individuals and whole communities. Australian researchers have found that stress and worries about coal seam gas mining may contribute significantly to mental health risks among directly affected farmers (Haswell and Shearman, 2019).

In the last three years, the evidence linking unconventional gas developments to higher death rates from all causes and from heart attacks, and to elevated incidence of cancers, heart and respiratory diseases has significantly advanced across many US regions with diversities of geological, chemical and regulatory conditions.

A landmark study in Oklahoma (Asperis et al., 2021) found that a 1% increase in the number of hydraulically fractured wells leads to a 4.2% reduction in life expectancy among residents of exposed communities, reflecting positive associations between residential proximity to wells and cancer, cardiovascular and respiratory deaths. Li et al (2022) confirmed an elevated all cause death rate among Medicare beneficiaries living both nearby and downwind, as compared to those living upwind, of over 2.5 million gas wells. The study was well controlled for timing and socioeconomic variables and points to life-shortening exposures to and impacts of harmful air pollutants emitted from the wells.

McKenzie et al. (2019) observed significant positive associations between intensity of gas development and production near place of residence in Colorado and markers/predictors of cardiovascular disease, including stiffness of the arteries, systolic and diastolic blood pressure and inflammatory chemicals in the blood. Comparing rates of acute myocardial infarctions (heart attacks) and deaths between areas of New York state (where fracking is banned) and Pennsylvania where it has continued, Denham et al (2021) quantified significant increases in hospitalisations among middle aged men and women linked to gas extraction intensity. **The authors found that for every 100 wells added per square mile, a 5% increase in heart attack deaths occurred among resident males aged 45-50 years old.**

Hospitalisations of patients with severe heart failure were found to increase between two and fourfold at every stage of gas production from pad development, drilling, fracking and production, and to a lesser extent during production phase among patients with less severe disease in Pennsylvania (McAlexander et al., 2020).

Willis et al. (2020) **observed a 59% (confidence intervals 46-73%) increase in the likelihood of hospitalisation for asthma** among children living in zip code areas with intense unconventional gas extraction activities compared to those with no drilling activities in Texas. They found this increase occurred after, not before, commencement of drilling and was positively related to production volumes but not with flaring intensity. Similar findings were provided by Bushong et al (2022) in Pennsylvania, with higher asthma hospitalisation rates associated with higher gas well density.

Children growing up near unconventional gas wells are also experiencing greater incidences of cancers, including acute **lymphoblastic leukemia** (McKenzie et al., 2017; Clark et al., 2022).

Developing foetuses are particularly sensitive to exposures that their pregnant mothers experience when living near unconventional gas wells and operations, with lifelong implications. Multiple studies now provide substantial evidence of lower birth weights, and higher incidences of small for gestational age and preterm births associated with their mothers' exposure to gas operations in both the US and in Canada (Hill, 2018; Whitworth et al.,2017; Caron-Beaudoin et al, 2021, Cairncross et al., 2022).

Gas operations are also linked to more birth defects. For example, Tang and colleagues (2021) found significantly (up to three times) higher frequency of infants born with anencephaly (missing large parts of the brain and skull structure), spina bifida (defective spinal cord), gastroschiasis (where intestines are located outside the body at birth), aortic valve and pulmonary valve defects (narrowed or blocked) when their mother lived near gas wells during pregnancy. Cairncross et al (2022) published findings in the Journal of the American Medical Association Pediatrics of a 32% increase in major congenital abnormalities (32% increase) among babies born of mothers living within 10 kilometres of a hydraulically fractured well; a substantially longer distance than previously recognised.

One can only imagine the pain and suffering of these infants and their families that appear to be magnified by living in proximity to oil and gas operations – these otherwise hidden

outcomes now revealed through multiple studies cannot be ignored – they are part of the cost born by communities.

Evidence of psychosocial stress and mental health loss has also been accumulating, becoming much more recognised by US researchers, but minimally in Australia. For example, using the Environmental Distress Scale developed by Australian researchers Higginbotham et al (2006), Elser and colleagues (2020) reported significant concerns among a sample of West Texas residents about foul-smelling air, heavy vehicles, noise, vibrations, loss of cultural heritage and environmental damage affecting future generations. Nearly 50% of respondents report symptoms of solastalgia – worries about the loss of clean air, water and scenery (Elser et al., 2020).

For example, Malin (2020) analysed 75 in depth interviews with people living in areas of intensive gas production in Colorado. She reported that the **industrialisation of communities caused people chronic stress, negative mental health outcomes and depression**. Many people spoke in depth about the stress of uncertainty regarding impacts on their health [as verified by research], feelings of powerlessness in the face of extensive environmental change and lack of trust in government regulations and monitoring.

The intensity of drilling seen in multiple locations across the United States is almost impossible to imagine, as shown in the map of gas operations near Fort Collins, Colorado (figure taken from Malin, 2020).

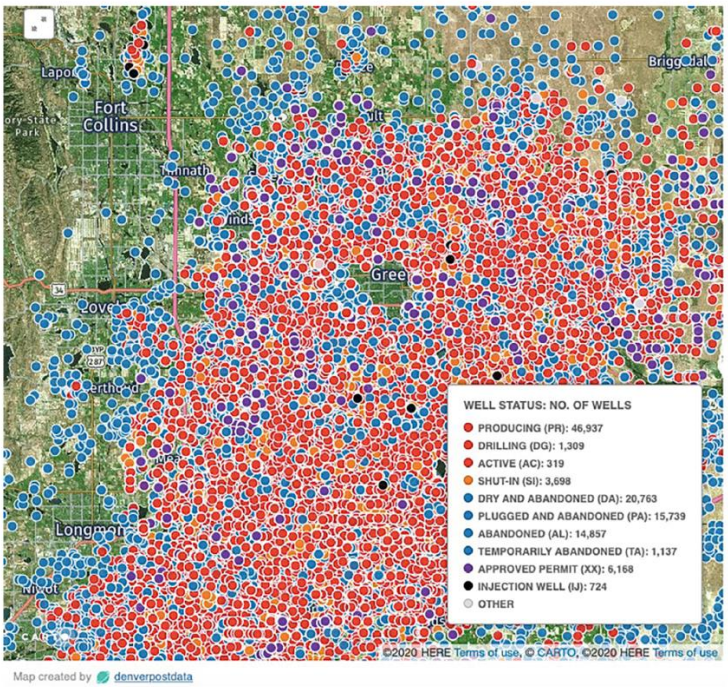

Fig. 1. Map: This map shows the number of wells along Colorado's Front Range in 2017. Greeley can be made out in the center of the map, and Windsor is located northwest of it. The number of operating wells has since increased to over 55,000 across Colorado.

What does this mean for the Northern Territory?

Many Traditional custodians with deep connections to the Land in the Northern Territory, including those of Borroloola within the Beetaloo Basin are already crying out for the protection of the integrity of their Lands. These individuals who have cared for their

Country, acknowledged as a person, family and self, already speak of suffering deeply at the thought the loss of integrity and spirit felt in the Land.

People who do not have these thousands of year old connections with Country under threat should deeply consider that the gas industry is the worst nightmare imaginable for these Custodians (https://www.abc.net.au/news/2020-09-25/beetaloo-gas-development-lands-council-asked-to-withdraw/12701878). A good look at the picture above can help those who don't understand the immense expanse and intensity of mature shale gas operations.

It is important that decision makers regarding fracking must make decisions in light of the impacts on current and future generations of gas developments, not as a few exploration wells, but of mature gas fields of this potential magnitude, as it is now a common site in the United States and increasingly in the Darling Downs of Queensland.

The health studies simply add weight and breadth to previous evidence – and as the findings are supported again and again by research, it is no longer appropriate to say that the precautionary principle needs to be applied. At this time, it is necessary to accept responsibility for the likelihood that development of this industry in the NT will increase stress and exposure to harmful chemicals that will exacerbate heart disease, heart failure, asthma and other respiratory diseases, traffic-related injuries and deaths, mental illness, birth defects and lower birth weights. Our previous submissions have emphasised the concern that Aboriginal people are already particularly vulnerable to all of these hazards, as well as personal safety as discussed below.

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4. Unconventional gas development causes dangerous ozone exposures over vast areas that not only contributes to climate change but can also accelerate human deaths and agricultural losses.

In previous work reflecting studies up to 2018 (Haswell and Shearman, 2019), we reported:

Chemicals reach the atmosphere from flaring (Figure 3), venting, holding tanks, ponds, compressors and other infrastructure. While initially the focus of most public health concern was on risks to water, the US experience to date has indicated that health risks associated with air pollution are at least as serious to the health of people living nearby as the risks mediated through water contamination (Finkel and Hays, 2013; Brown et al., 2014).

Residents living near gas wells and infrastructure and industry workers may be exposed to air-borne pollutants directly, e.g. through diesel exhaust from extensive truck movements, drilling, compressors and other machinery used in the process, flaring and from gases from the coal seam or shale deposits released during well completion and other phases (Petron et al., 2012; Adgate et al., 2014; Field, Soltis and Murphy, 2014). Some gases form secondary atmospheric pollutants such as ground level ozone.

Other exposure pathways involving inhalation of potentially harmful substances occur through the movement of volatile compounds from contaminated water into the air, and some toxins may return to contaminate soil and water bodies through subsequent rainfall, falling on waterways and livestock pastures.

To this summary, we now add describe important new research that quantifies both the contribution of oil and gas extraction to ozone and volatile organic chemical air pollution and predicted numbers of premature human deaths each year as a result.

New important synthesis of evidence of air pollution impacts far from operations

Air pollution is one of the most concerning sources of potential harm to communities in the vicinity of gas and oil developments, both from drilling operations as produced wastewater facilities. The three most concerning pollutants of direct health concern are fine particulate matter (PM2.5) forming secondary organic aerosols, ground level/trophospheric ozone and volatile organic compounds (Fann et al., 2018; Helmig, 2020).

Because of the sparse populations in the Northern Territory, it was widely considered in the conclusions from the NT Fracking inquiry in 2017 that human exposure to air pollution was not a concern, and all information regarding health impacts of air pollutants from the industry were largely dismissed in the final report. **However, an extensive analysis of air quality data in relation to oil and natural gas operations in Colorado (Helmig et al., 2020) yielded to very important findings for the Northern Territory that must be considered.**

- This study synthesised evidence from 50 studies demonstrating that oil and gas operations contribute significantly to levels of volatile organic compounds (VOCs)

and ozone production in the atmosphere forming from VOCs, methane and particulate matter. Ozone, unlike VOCs, is transported in the atmosphere away from gas extraction operations, and daytime peak maximum ozone levels were often found to be tens of kilometres away. Given the significant harms associated with unsafe levels of ozone, the authors concluded that, "These downwind air quality impacts from O&NG industries should be a strong consideration in the design of monitoring networks and decision-making on regulating existing and new O&NG development in the region" *(*Helmig, 2020, p 25)*.*

- The study also found levels of ozone pollution from oil and gas operations were sufficiently high to significantly damage ecosystems and agricultural productivity and argued these losses should be quantified and farmers compensated (Helmig, 2020). Global agricultural losses of staple crops to ozone in are estimated at US$14-26 billion per year; hence efforts to reduce ozone formation by reducing methane and nitrogen oxide emissions is also an urgent food security challenge (Emberson, 2020).

- A further in-depth study by Pozzer et al. (2020) examined the specific contribution of oil and gas operations to summer (Figure 3 below) and winter ozone levels, days of exceedances over safe ozone levels (Figure 4 below), as well as estimated excess premature deaths due to exposure to across the entire United States.

The authors estimated that the ozone footprint caused by oil and gas operations is likely to have caused an estimated 320 (298-344; 95% confidence intervals) excess premature deaths per year in the United States (Pozzer et al., 2021). Adding similar estimated numbers of premature deaths linked to fine particulate matter emissions from oil and gas operations (Fann et al., 2018) indicates the industry causes over 600 premature deaths per year.

- Additional studies by Pollack and colleagues (2021) found that oil and gas operations also contributed significantly to benzene, ethane and hexane levels, with concentrations in production regions often far exceeding those in major urban areas.

- A study by Li et al. (2020) added weight to concerns about radioactive particles emitted during unconventional, but not conventional, gas extraction with raised concentrations of airborne radioactive particles as far as 20kms downwind of operations. These particles are associated with decreased lung function, increased blood pressure and inflammatory markers.

- Finally, a very recently published article by Francoeur et al. (2021) used an improved fuel-based oil and gas industry technique to reveal that methane, non-methane volatile organic compound and oxides of nitrogen emissions from oil and gas basins are two to three times higher than previous estimates.

This work clarifies once again the substantial, underestimated contribution that natural gas production is making to progression of global warming (from fugitive methane released and from the formation of ozone; both are very potent greenhouse gases) as well as to human disease and death across the United States.

So, what does this mean for the Northern Territory?

This information is extremely relevant to the NT, with a number of essential points.

Firstly, ozone is a seriously harmful pollutant that is formed by a chemical reaction between nitrogen oxides and volatile organic compounds which are both emitted in vast quantities during gas production. The reaction is increased in warmer temperatures; hence the hot and dry regions of the United States (see maps) are ideal locations for ozone production (Helmig, 2020). The Northern Territory is already a very hot and dry environment, with predicted temperatures increases and longer, hotter heat waves more frequent with climate change. Ozone formation increases an estimated 3-6ppb for each degree in temperature rise (Rasmussen et al., 2012). **We can therefore predict that ozone levels resulting from mature gas extraction operations in the NT will significantly accelerate deaths in rising numbers across, the Beetaloo Basin, Central Australia and well beyond.**

Secondly, Aboriginal people already experience a substantially higher mortality rate from respiratory conditions and are likely to be even more affected by increased ozone concentrations in their living environment should gas production proceed in the Beetaloo Basin and other parts of the NT than predictions used for the general population. **We can therefore predict that ozone levels resulting from mature gas production operations in the NT will particularly accelerate deaths among Aboriginal people in the Beetaloo Basin, Central Australia and beyond.**

Thirdly, fifty studies were conducted in the United States between 2012 and 2019, showing concerns about ozone formation linked to gas extraction and waste processing activities. Industry practices apparently did not change to protect people from ozone exposures. In fact, during the Trump administration, regulations about to be put in place to capture methane emissions into the atmosphere, which would have simultaneously reduced ozone emissions, were scrapped due to industry pressure. **This synthesis of information only occurred after infrastructure for approximately 56,000 wells were put in place, exposing millions of people to these risks and likely causing thousands of premature deaths.**

In contrast in Australia, almost no studies of air pollution have been done despite mass proliferation of gas wells in Western Queensland, apart from a small handful of comparatively simplistic, non-peer reviewed work funded and conducted by the Gas Industry through the Gas Industry Social and Environment Research Alliance. **It is simply flawed to suggest that the one limited and hastened SREBA will be able to match the sophistication of the international research.**

This is one very important example of the enormous burden being placed on the Australian public to host an industry that progressed without heeding these signs. There is a past absence of independent non-gas industry research funding on impacts of gas production, plus poor compliance monitoring with activities as simple as housing construction in remote areas. The likelihood of funds being placed into independent hands by government sources to do the research and ensure compliance of the industry that ensures the safety of Aboriginal people and pastoralists living near or even tens of kilometres away from oil and gas operations must be recognised as being very low.

We consider ozone pollution alone to be sufficient to reject proposals to allow drilling, hydraulic fracturing and gas extraction in the Northern Territory.

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5. Overall Conclusion

Collectively severe and serious, evidence-based concerns across all four areas outlined in this submission are overwhelmingly sufficient to reject the proposed drilling program in the NT. Please do not allow, nor provide public funds, to assist an industry that is likely to:

1. expose people to early death from its air and water pollution
2. impair human development in the womb
3. impact on climate, water and biodiversity at an extraordinary vulnerable time
4. cause pain, suffering and injustice to Aboriginal Australians and
5. harm the health and wellbeing and shorten the lives of foetuses, infants, children, adult and elderly Territorians directly and all Australians indirectly via environmental damage.