

15<sup>th</sup> March 2018

To whom it may concern,

My name is Hayley Rundell.

I would like to take the opportunity to write in a submission to the WA Inquiry on Fracking and let you know that I'm totally opposed to the prospect and certainly do not support any form of onshore unconventional gas mining (including High-volume hydraulic fracturing (HVHF), coal seam gas, tight gas, shale gas & underground coal gasification) in Western Australia or anywhere in Australia for that matter. I understand through thorough scientific investigation that it would be detrimental to us all, our environment, our water (ground and aquifers) and our air quality just to name a few, if this toxic, invasive industry was allowed to go ahead.

Western Australians are demanding they remain Gasfield free, forever.  
These people are local farmers, business owners, and everyday citizens.  
They declare there is no social license for unconventional gas extraction in WA permanently.  
NO matter what restrictions or regulations the government says they will put in place.  
We just don't want it.  
Our wellbeing is simply too important to risk.  
Here is my submission to you.

The environmental, land productivity and public health risks, risk mitigations and residual risks of onshore unconventional gas activities;

Ok, where do we start here?

Water firstly. As without H<sub>2</sub>O. Life on this planet would cease to exist.

Water is the most precious commodity on the Earth.

With Australia being the driest continent on the planet. It baffles me as to why our government's are hell bent on giving away our most precious resource to mining companies for free, as if we have water in abundance.

We do not.

- 'Ninety-eight percent of the water on the planet is in the oceans, and therefore is unusable for drinking because of the salt. About 2 percent of the planet's water is fresh, but 1.6 percent of the planet's water is locked up in the polar ice caps and glaciers. Another 0.36 percent is found underground in aquifers and wells. Only about 0.036 percent of the planet's total water supply is found in lakes and rivers.'<sup>1</sup>
- 'Australia is the smallest of the world's continents. It is also the lowest, the flattest and (apart from Antarctica) the driest. Nearly 20 per cent of Australia's land mass is classified as desert. As well as having a low average annual rainfall, rainfall across Australia is also variable.'<sup>2</sup>

APPEA insists that there has yet to be a proven case of water contamination due to Fracking worldwide. They have no proof of this. They just say it. I would say, they are telling non truths. Lies in fact. Nothing new for APPEA it seems.

#### **'Water Supply Determination Letters**

The following list identifies cases where DEP determined that a private water supply was impacted by oil and gas activities. The oil and gas activities referenced in the list below include operations associated with both conventional and unconventional drilling activities that either resulted in a water diminution event or an increase in constituents above background conditions.

- Many of the water supply complaints listed below have either returned to background conditions, have been mitigated through the installation of water treatment controls or have been addressed through replacement of the original water supply. '<sup>3</sup>
- 243 cases are on this list(court records). Please take the time to look this up on the internet.

<sup>1</sup> <http://science.howstuffworks.com/environmental/earth/geophysics/question157.htm>.

<sup>2</sup> <http://www.australia.gov.au/about-australia/our-country/the-australian-continent>.

<sup>3</sup> [http://files.dep.state.pa.us/OilGas/BOGM/BOGMPortalFiles/OilGasReports/Determination\\_Letters/Regional\\_Determination\\_Letters.pdf](http://files.dep.state.pa.us/OilGas/BOGM/BOGMPortalFiles/OilGasReports/Determination_Letters/Regional_Determination_Letters.pdf)

The findings speak for themselves and prove that APPEA don't always tell the truth .

**All aspects of UCG extraction hold risks. Huge risks to humans and their environment.**

- “Unconventional oil and gas (UOG) operations have the potential to increase air and water pollution in Communities located near UOG operations. Every stage of UOG operation from well construction to extraction, operations, transportation, and distribution can lead to air and water contamination. Hundreds of chemicals are associated with the process of unconventional oil and natural gas production. Volatile organic compounds (VOCs) [including benzene, toluene, ethyl benzene, and xylene (BTEX) and formaldehyde] and heavy metals (including arsenic, cadmium and lead) are just a few of the known contributors to reduced air and water quality that pose a threat to human developmental and reproductive health. The developing foetus is particularly sensitive to environmental factors, which include air and water pollution. Research shows that there are critical windows of vulnerability during prenatal and early postnatal development, during which chemical exposures can cause potentially permanent damage to the growing embryo and foetus. Many of the air and water pollutants found near UOG operation sites are recognized as being developmental and reproductive toxicants; therefore there is a compelling need to increase our knowledge of the potential health consequences for adults, infants, and children from these chemicals through rapid and thorough health research investigation.”<sup>4</sup>
- **‘Drilling and fracking emissions often contain strikingly high levels of benzene.** A potent human carcinogen, benzene has been detected in the urine of wellpad workers (at levels known to raise risks for leukemia), in private drinking water wells contaminated by fracking operations, and in ambient air at nearby residences. In some cases, concentrations have far exceeded federal safety standards. Such exposures represent significant public health risks.’<sup>5</sup>
- September 23, 2014 – In a two-part audit of records, the U.S. Government Accountability Office (GAO) found that the EPA is failing to protect U.S. drinking water sources from fracking-related activities such as waste disposal via injection wells. Nationwide, 172,000 injection wells accept fracking waste; some are known to have contaminated drinking water. And yet, both short-term and long-term monitoring is lax, and record-keeping varies widely from state to state. The EPA neither mandates nor recommends a fixed list of chemicals for monitoring on the grounds that “injection fluids can vary widely in composition and contain different naturally occurring chemicals and fluids used in oil and gas production depending on the source of the injection fluid.”<sup>6</sup>
- Disposal of oil and gas waste via injection wells is, in fact, subject to regulation under the Safe Drinking Water Act, but, in practice, no one knows exactly what the waste contains, and regulations are deficient. In the United States, at least two billion gallons of fluids are injected into the ground *each day* to enable oil and gas extraction via fracking or to dispose of liquid waste from fracking operations.<sup>7 8</sup>
  - This same problem is and will occur in Australia, due to the secret nature of the fracking chemicals used in the fracking process. By law, Halliburton and other drilling/fracking

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<sup>4</sup> Ellen Webb, Sheila Bushkin-Bedient\*, Amanda Cheng, Christopher D. Kassotis, Victoria Balise and Susan C. Nagel\*  
Developmental and reproductive effects of chemicals associated with unconventional oil and natural gas operations.

<sup>5</sup>Board, G. (2014, November 3). September drilling accident contaminated water in Doddridge County. *West Virginia Public Broadcasting*. Retrieved from <http://wvpublic.org/post/dep-september-drilling-accident-contaminated-water-doddridge-county>

<sup>6</sup> U.S. Government Accountability Office. (2014, September 23). Drinking water: characterization of injected fluids associated with oil and gas production. GAO-14-657R. Retrieved from <http://www.gao.gov/products/GAO-14-857R>.

<sup>7</sup> Sadasivam N. (2014, July 29). Report criticizes EPA oversight of injection wells, *ProPublica* Retrieved from <http://www.propublica.org/article/report-criticizes-epa-oversight-of-injection-wells>

<sup>8</sup> U.S. Government Accountability Office. (June 27, 2014). EPA program to protect underground sources from injection of fluids associated with oil and gas production needs improvement. GAO-14-555. Retrieved from <http://www.gao.gov/products/GAO-14-555>

companies are protected from disclosing the recipe of chemicals used due to a worldwide patent on their products.

- September 9, 2014 – A research team from Stanford and Duke Universities discovered that fracking wastewater processed by sewage treatment plants contributes to the formation of carcinogenic chemical by-products. These raise public health risks when downstream surface water is used for drinking. Even when fracking wastewater was diluted by a factor of 10,000, the bromides and iodides in the waste reacted with organic matter to create highly toxic halogenated compounds—at troublingly high concentrations. These toxic compounds are not filterable by municipal wastewater treatment plants. Halogenated disinfection by-products in drinking water are linked to both colon and bladder cancers.<sup>9</sup>
  - Water from the Chinchilla/Tara gasfields in QLD are currently being treated and then released back into the weirs, Chinchilla weir, used for human consumption. I have tried to no avail to find out the reading of the water that has been through a treatment process. CEO of Cooper Energy David Maxwell had told me in person in Penola, SA that these data sheets are available for the public to see. I have never been able to track these down.
  - What is this water tested for, and what levels are in the water are still questions that need to be answered. Is this water tested for the toxic chemicals stated in the above comment?.....
- August 13, 2014 – A team from Lawrence Berkeley National Laboratory reported that scientific efforts to understand the hazards of fracking continue to be hampered by industry secrecy. A comprehensive examination of the chemical formulations of fracking fluid—whose precise ingredients are protected as proprietary business information—revealed that no publicly available toxicity or physical chemical information was available for one-third of all the fracking chemicals surveyed. Another ten percent of chemicals, including biocides and corrosion inhibitors, were known to be toxic to mammals.<sup>10,11</sup>
- July 21, 2014 – An investigation by the *Columbus Dispatch* showed that Halliburton delayed disclosure to federal and state EPA agencies of the full list of chemicals that spilled into a creek following a fire on a its well pad in Monroe County, Ohio. Although the creek is an important supply of drinking water for downstream communities and the spill precipitated a mass die-off of fish and other aquatic wildlife, five full days passed before EPA officials were provided a full inventory of chemicals used at Halliburton’s operation. As a result, the public was denied knowledge of potential chemical exposures.<sup>12</sup>
- May 4, 2012 – A report for the Canadian Government, released under the Access to Information Act, reviewed the process, the regulatory framework globally, the health hazards related to water and air contamination, and evaluated sub-processes for potential impacts, risks, regulations, and summarized the data knowledge and data gaps. Regarding water contamination, the report

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<sup>9</sup> Parker, K.M., Zeng, T., Harkness, J., Vengosh, A., and Mitch, W.A. 2014. Enhanced formation of disinfection byproducts in shale gas wastewater-impacted drinking water supplies. *Environ. Sci. Technol.*, 48(19), 11161–11169. doi: 10.1021/es5028184

<sup>10</sup> Stringfellow, W.T., Domen, J.K., Carmarillo, M.K., Sandelin, W.L., Tinnacher, R., Jordan, P., Houseworth, J., and Birkholzer, J. (August 13, 2014). Characterizing compounds used in hydraulic fracturing: a necessary step for understanding environmental impacts. Presentation before the American Chemical Society conference, San Francisco. Abstract retrieved from [http://abstracts.acs.org/chem/248nm/program/view.php?obj\\_id=262051&terms=](http://abstracts.acs.org/chem/248nm/program/view.php?obj_id=262051&terms=)

<sup>11</sup> Robinson, P. (2014, August 19). Fracking fluid survey shows missing information. *Scientific American*. Retrieved from <http://www.scientificamerican.com/article/fracking-fluid-survey-shows-missing-information/>

<sup>12</sup> Arenschiold, L. (2014, July 21). Halliburton delayed releasing details on fracking chemicals after Monroe County spill. *The Columbus Dispatch*. Retrieved from <http://www.dispatch.com/content/stories/local/2014/07/21/details-on-chemicals-trickle-in-after-spill.html>

determined, “Although quantitative data are lacking, the qualitative data available indicate that potential contamination of water related to the shale gas industry may present hazard to the public health, especially for local population.” And, “it can be concluded that air emissions related to the shale gas industry present health hazards since the air pollutants originating from the vehicles and engines fuelled by diesel are toxic to the respiratory and cardiovascular systems and can cause premature mortality, volatile organic compounds have been associated to neurotoxicity and some of these compounds (e.g. benzene) as well as NORMs are known or possible human carcinogens.” The report concluded, “Any step of shale gas exploration/exploitation may represent a potential source of drinking water and air contamination; Hydraulic fracturing and wastewater disposal were identified as the main potential sources of risk.”<sup>13</sup>

- July 3, 2013 – *ProPublica* reported that the EPA was wrong to have halted its investigation of water contamination in Wyoming, Texas and Pennsylvania—where high levels of benzene, methane, arsenic, oil, methane, copper, vanadium and other chemicals associated with fracking operations have been documented.<sup>14</sup> Although numerous organizations and health professionals around the country have since called on the agency to resume its investigation, no action has been taken.
- May 17, 2011 – The state of Pennsylvania fined Chesapeake Energy Corp. \$900,000 for an incident in which improper cementing and casing in one of the company’s gas wells allowed methane to migrate underground and contaminate 16 private drinking water wells in Bradford County.<sup>15</sup>
- April 26, 2009 – Officials in three states linked water contamination and methane leaks to gas drilling. Incidents included a case in Ohio where a house exploded after gas seeped into its water well and multiple cases of exploding drinking water wells in Dimock, PA.<sup>16</sup>
- June 6, 2013 – *Bloomberg News* reported, In cases from Wyoming to Arkansas, Pennsylvania to Texas, drillers have agreed to cash settlements or property buyouts with people who say hydraulic fracturing, also known as fracking, ruined their water according to a review by Bloomberg News of hundreds of regulatory and legal filings. In most cases homeowners must agree to keep quiet. The strategy keeps data from regulators, policymakers, the news media and health researchers, and makes it difficult to challenge the industry’s claim that fracking has never tainted anyone’s water.
- *Bloomberg* quoted Aaron Bernstein, associate director of the Centre for Health and the Global Environment at the Harvard School of Public Health, saying that non-disclosure agreements “have interfered with the ability of scientists and public health experts to understand what is at stake here.”<sup>17</sup> The EPA also long ago noted how non-disclosure agreements challenge scientific progress and keep examples of drilling harm secret from the public. In a 1987 report, the EPA wrote,
  - *Very often damage claims against oil and gas operators are settled out of court, and information on known damage cases has often been sealed through agreements between landowners and oil companies. This is typical practice, for instance, in Texas. In some cases, even the records of well-publicized damage incidents are almost entirely unavailable for review. In addition to concealing the nature and size of any settlement entered into between the parties, impoundment curtails access to scientific and administrative documentation of the*

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<sup>13</sup> Louis, S. (2012, May 4). Potential health hazards from shale gas exploration and exploitation—Drinking water and ambient air. Presented to Health Canada by SANEXEN Environmental Services; 0/Ref.: RA11-410. Document released under the (Canadian) Access to Information Act.

<sup>14</sup> Lustgarten, A. (2013, July 3). EPA’s abandoned Wyoming fracking study one retreat of many. *ProPublica*. Retrieved June 9, 2014, from <http://www.propublica.org/article/epas-abandoned-wyoming-fracking-study-one-retreat-of-many>

<sup>15</sup> Levy, M. (2011, May 18). DEP fines Chesapeake \$1 million. *Pressconnects.com*. Retrieved June 9, 2014, from <http://www.pressconnects.com/viewart/20110517/NEWS01/105170345/DEP-fines-Chesapeake-1-million>

<sup>16</sup> Lustgarten, A. (2009, April 26). Officials in three states pin water woes on gas drilling. *ProPublica*. Retrieved June 9, 2014, from <http://www.propublica.org/article/officials-in-three-states-pin-water-woes-on-gas-drilling-426>

<sup>17</sup> Efstathiou, J., Jr., & Drajem, M. (2013, June 5). Drillers silence fracking claims with sealed settlements. *Bloomberg*. Retrieved June 9, 2014, from <http://www.bloomberg.com/news/2013-06-06/drillers-silence-fracking-claims-with-sealed-settlements.html>

*incident.*<sup>18</sup>

- Too much evidence is available to physically enter it all into this submission. America has covered up the dangers of this industry for too long. But the cracks are showing and the evidence is coming out at an alarming pace.
- Australia is very early into its Unconventional gas industry, but it's already had its fair share of major accidents and contamination issues. And like America, Australia has had problems with secrecy and obtaining truthful and up front information about accidents or possible dangers from the Industry when they arise. Killing the industry claims that it is transparent and willing to oblige by enforcing a high standard of industry regulations.  
Here are just a few.....
- **February 10, 2012 - Arsenic and lead found in contaminated water leak at coal seam gas drill site – Santos**<sup>19</sup>
- **Environment Protection Authority issued a \$1,500 fine to Santos following Narrabri Gas Field operations in the Pilliga in NSW's northwest. An aquifer was contaminated with uranium at levels 20 times higher than safe drinking water guidelines.**<sup>20</sup>
- **May 28, 2012 - Methane Migration Affects 5 km stretch of Condamine River – Origin Gas is bubbling to the surface on a five-kilometer stretch of the Condamine River near Chinchilla** on the Western Downs. The incident is unprecedented. Landowners say they've never seen this happen before. It's quite a lengthy stretch of the river – there's very strong bubbles coming to the surface. A new phenomenon for this section of the river. **The river is close to CSG wells operated by Origin Energy.**<sup>21</sup>
- **July 20, 2012 - CHINCHILLA beef producer David Hubbard has seen his property impacted four times by QGC spillages this year – GGC**  
"Drilling fluid from a QGC mining rig had twice spilled into the Condamine River, a few hundred metres from where he accessed water for stock, and fluid also had spilled twice across a boundary fence into his paddock. The accidents, which had occurred at a neighboring property, had taken place over a single month. While he expressed his annoyance these incidents were occurring in the first place – a familiar story for many across rural Queensland – Mr Hubbard said his ongoing frustration was that he was not being adequately informed by the company about the discovery of the incidents and the follow-up investigations into the impacts. He said he had only learnt about two of the incidents following his own initiative and questions."<sup>22</sup>
- 28 January, 2015;  
AGL suspended fracking at its Waukivory project after detecting BTEX chemicals in four pilot wells and a water storage tank. NSW EPA has slammed AGL for its lack of transparency. "AGL informed the EPA that it was aware of these elevated levels of BTEX chemicals on 15 January, but it did not make these results known to the EPA or the public until today," EPA chief environmental regulator Mark Gifford said. "The EPA is very concerned at AGL's lack of timeliness and transparency in informing us of these results and we will be conducting a full investigation."<sup>23</sup>  
\*\*\*\*\* Update: AGL have now cancelled this Drilling in Gloucester altogether.
- **Fri 19 Dec 2014, 2:35pm. Company fined for dumping CSG fracking water from AGL site in**

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<sup>18</sup> Environmental Protection Agency. (1987). *Report to Congress: Management of wastes from the exploration, development, and production of crude oil, natural gas, and geothermal energy* (Rep.). 137-138. Washington, D.C.: U.S. Environmental Protection Agency.

<sup>19</sup> <http://www.smh.com.au/environment/water-issues/arsenic-and-lead-found-in-contaminated-water-leak-at-coal-seam-gas-drill-site-20120209-1rx7s.html>

<sup>20</sup> <http://www.theguardian.com/world/2014/mar/08/santos-fined-coal-seam-gas-contaminates-aquifer-uranium>

<sup>21</sup> <http://www.abc.net.au/news/2012-05-30/claim-csg-river-leak-caught-on-video/4041298>

<sup>22</sup> <http://aidanricketts.com/contaminated-sites-and-accidents-related-specifically-to-csg-logging-in-australia/>

<sup>23</sup> <http://www.miningaustralia.com.au/oil-gas/news/agl-suspends-fracking-after-harmful-chemicals-detected>

**Gloucester, into Newcastle sewer system.**

AGL recently completed fracking at four CSG test wells just outside Gloucester, but has been vague on the detail of what would happen to the flow-back water from the operation. Hunter Water says in October it refused an application from waste contractor, Transpacific to discharge treated flow-back water from the AGL site. But Transpacific discharged the prohibited substance into the sewer system on Newcastle's Kooragang Island. **The company has since been penalised \$30,000 and warned that any further breaches would result in the termination of its commercial agreement with Hunter Water.** <sup>24</sup>

- We could go on for years about the geological, health, environmental, and social dangers of this industry.
- The evidence is plain for all to see, who wish to see it that is.
- It should take a large team of people years and years to do extensive research into this industry. And when that is done. You will see clearly what the outcome to your findings should be.

\*\*\*\*\* Update: AGL have now cancelled this Drilling in Gloucester altogether.

- ***the coexistence of onshore unconventional gas activities with existing land and water uses, including —***

APPEA and the federal Government think that farming and high-volume hydraulic fracturing (HVHF) /Unconventional gas extraction can exist side by side.

I'm sorry, but they don't live on a farm, in a Gasfield.

They wouldn't have to worry about skin rashes, nervous system disorders, sore eye's headaches, blood noses, etc, due to the air pollution emitted from living in an Unconventional Gasfield.

They wouldn't have to skirt around all the invasive infrastructure placed in their paddocks by the gas mining companies.

They don't have to worry about gates being left open, Stock being poisoned by drinking contaminated waters.

Significant adverse impacts on wildlife habitat caused by fragmentation of forest and grasslands.

Or the fact that the mining companies may bring in foreign soil diseases, weeds and other bio-logical hazards due to unclean and un-thorough on the job practices.

They also don't live with noise pollution 24/7.

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<sup>24</sup> <http://www.abc.net.au/news/2014-12-19/company-fined-for-dumping-csg-fracking-water-from-agl-site-in-n/5978776>

Light pollution 24/7

Air pollution 24/7

About unknown workers accessing the farm at all hours of the day or night.

Air quality that has been adversely affected, due to venting stacks and flaring on their farming land.

They certainly wouldn't have to worry about a huge de-valuation to their property due to becoming a 'Gasfield'.

Or the possibility of their neighbours suing them for millions due to land, or water(bore/aquifer)contamination.

Not to mention the possibility of leaking well heads or fissures in the ground.(Leading to contamination of water (flammable water) with toxic chemicals.)

They don't have to worry about dropping water levels in their water bore, because of the massive amounts of water sucked out of the ground, due to this water intensive industry.

And they wouldn't have to worry about their main water supply, or aquifers being contaminated due to fracking/or drilling activities.

It's quite obvious APPEA or the Federal and State governments don't have these worries.

They seem to adopt the NIMBY philosophy. "Not in my back yard". But like to push the farmers of this country to abide by their set of rules.

Well, that's quite simply, not good enough.

Here's some more evidence substantiating the above concerns.

Why wells leak, and just how much they do:

"New techniques of high-volume hydraulic fracturing (HVHF) are now used to unlock oil and gas from rocks with very low permeability. Some members of the public protest against HVHF due to fears that associated compounds could migrate into aquifers. We report a case where natural gas and other contaminants migrated laterally through kilometers of rock at shallow to intermediate depths, impacting an aquifer used as a potable water source. The incident was attributed to Marcellus Shale gas development. The organic contaminants—likely derived from drilling or HVHF fluids—were detected using instrumentation not available in most commercial laboratories."<sup>25</sup>

- "High-volume hydraulic fracturing (HVHF) has revolutionized the oil and gas industry worldwide but has been accompanied by highly controversial incidents of reported water contamination. For example, groundwater contamination by stray natural gas and spillage of brine and other gas drilling-related fluids is known to occur. However, contamination of shallow potable aquifers by HVHF at depth has never been fully documented. We investigated a case where Marcellus Shale gas wells in Pennsylvania caused inundation of natural gas and foam in initially potable groundwater used by several households. With comprehensive 2D gas chromatography coupled to time-of-flight mass spectrometry (GCxGC-TOFMS), an unresolved complex mixture of organic compounds was identified in the aquifer. Similar signatures were also observed in flowback from Marcellus Shale gas wells. A compound identified in flowback, 2-n-Butoxyethanol, was also positively identified in one of the foaming drinking water wells at nanogram-per-liter concentrations. The most likely explanation of the incident is that stray natural gas and drilling or HF compounds were driven 1–3 km along shallow to intermediate depth fractures to the aquifer used as a potable water source. Part of the problem may have been wastewaters from a pit leak reported at the nearest gas well pad—the only nearby pad where wells were hydraulically fractured before the contamination incident. If samples of drilling, pit, and HVHF fluids had been available, GCxGC-TOFMS might have fingerprinted the contamination source."<sup>26</sup>
- "The risk of a significant adverse impact to water resources from spills of chemical additives, hydraulic fracturing fluid or liquid wastes associated with high-volume hydraulic fracturing secondary containment, spill prevention and storm water pollution prevention has been evaluated in the SGEIS. However, because of the unique aspects of multi-well pad development associated with high-volume hydraulic fracturing, the existing Department engineering controls and management practices that would be required are untested for the scale of this activity and, consequently, it remains uncertain whether they would be adequate to prevent spills and mitigate adverse impacts if a spill occurs. Compounding this risk is the current uncertainty, as identified by NYSDOH, regarding the level of risk high-volume hydraulic

<sup>25</sup> <http://www.pnas.org/content/112/20/6325.abstract>

<sup>26</sup> <http://www.pnas.org/content/112/20/6325.abstract>

fracturing activities pose to public health.”<sup>27</sup>

- December 2, 2014 – “Problems with structural integrity have been documented in a well at the only hydraulically fractured site in the United Kingdom. Email messages obtained under freedom of information laws reveal that problems with wellbore integrity emerged in April of 2014 and attempts were made to remediate the problem, although nothing was reported at that time to regulators. The drilling company, Cuadrilla Resources, continues to deny that any problems exist with the well, emphasizing that “no leak of fluids” occurred and that “the issue” was resolved during the abandonment process. Cuadrilla had previously been reprimanded for failing to disclose a more minor deformation in the well casing. The well was abandoned at the end of last year, following two earthquakes in 2011, which scientists determined to have been caused by fracking at the site.”<sup>28</sup>
- May 22, 2014 – “In a 69-page report, University of Waterloo researchers warned that natural gas seeping from 500,000 wellbores in Canada represents “a threat to environment and public safety” due to groundwater contamination, greenhouse gas emissions and explosion risks wherever methane collects in unvented buildings and spaces. The report found that 10 percent of all active and suspended gas wells in British Columbia now leak methane. Additionally, the report found that some hydraulically fractured shale gas wells in that province have become “super methane emitters” that spew as much as 2,000 kilograms of methane a year.”<sup>29,30</sup>
- “They further explain as to why well bores leak:
  - *Cement may crack, shrink, or become deformed over time, thereby reducing the tightness of the seal around the well and allowing the fluids and gases ... to escape into the annulus between casing and rock and thus to the surface.... The challenge of ensuring a tight cement seal [will] be greater for shale gas wells that are subjected to repeated pulses of high pressure during the hydraulic fracturing process than for conventional gas wells. This pressure stresses the casing and therefore the cement that isolates the well from surrounding formations repeatedly.*<sup>31</sup>
- 2009 – A study published by the Society of Petroleum Engineers of more than 315,000 oil, gas and injection wells in Alberta, Canada, found that 4.5 percent of the wells had unintended gas flow to the surface. In one designated area, officials required testing for gas migration outside the well casings in addition to routine testing for gas leaks within the rings of steel casings (annuli). Within this special testing zone, 15.5 percent of wells (3,205 of 20,725) leaked gas, and the incidence of gas leaks was four times percent higher in horizontal or deviated wells than in vertical wells.<sup>32</sup>
- Autumn 2003 – ‘Schlumberger, one of the world’s largest companies specializing in hydraulic fracturing and other oilfield services, reported in its in-house publication, *Oilfield Review*, that more than 40 percent of approximately 15,500 wells in the outer continental shelf area in the Gulf of Mexico were leaking gas. These included actively producing wells, in addition to shut-in and temporarily abandoned wells. In many cases, the gas leaked through the spaces (annuli) between layers of steel casing that drilling companies had injected with cement precisely to prevent such gas leaks. Leakage rates increased dramatically with age: about five percent of the wells leaked immediately; 50 percent were leaking after 15 years; and 60 percent were leaking after about 30 years. 154 Gas leaks pose serious risks including loss of life from explosions and migration of gas

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<sup>27</sup> [http://www.dec.ny.gov/docs/materials\\_minerals\\_pdf/fsgeis2015es.pdf](http://www.dec.ny.gov/docs/materials_minerals_pdf/fsgeis2015es.pdf)

<sup>28</sup> Bryant, B. (2014, December 2). The only fracked site in the United Kingdom suffered structural failure. *Vice News*. Retrieved from <https://news.vice.com/article/the-only-fracking-site-in-the-united-kingdom-suffered-structural-failure>

<sup>29</sup> Dusseault, M. B., Jackson, R. E., & MacDonal, D. (2014, May 22). *Towards a road map for mitigating the rates and occurrences of long-term wellbore leakage*. *Geofirma*. Retrieved June 10, 2014, from [http://www.geofirma.com/Links/Wellbore\\_Leakage\\_Study%20compressed.pdf](http://www.geofirma.com/Links/Wellbore_Leakage_Study%20compressed.pdf)

<sup>30</sup> Nikiforuk, A. (2014, June 5). Canada's 500,000 leaky energy wells: 'Threat to public' *The Tye*. Retrieved June 10, 2014, from <http://www.thetyee.ca/News/2014/06/05/Canada-Leaky-Energy-Wells/>

<sup>31</sup> <http://concernedhealthny.org/wp-content/uploads/2014/07/CHPNY-Fracking-Compendium.pdf>

<sup>32</sup> Watson, T. L., & Bachu, S. (2009). Evaluation of the potential for gas and CO2 leakage along wellbores, society of petroleum engineers. *SPE Drilling & Completion*, 115-126.



and associated contaminants into drinking water supplies. Leaks also allow the venting of raw methane into the atmosphere where it acts as a powerful greenhouse gas.’<sup>33</sup>

- November 2000 – Maurice Dusseault, a professor at the University of Waterloo in Ontario who specializes in rock mechanics, and two co-authors presented a paper published by the Society of Petroleum Engineers, in which they reported that oil and natural gas wells routinely leak gas through cracks in their cement casings, likely caused by cement shrinkage over time and exacerbated by upward pressure from natural gas. According to their paper, in Alberta, it is common for wells to leak natural gas into aquifers. “Because of the nature of the mechanism, the problem is unlikely to attenuate,” they wrote, “and the concentration of the gases in the shallow aquifers will increase with time.”<sup>34</sup>

#### **Proven adverse Health effects Babies, Children and Adults:**

- July 2014 – The British labor journal *Hazards*, identified health concerns in the drilling and fracking industry: increased rate of death on the job, toxic releases, silica exposure,
  - and exposure to hydrocarbons and endocrine disruptors. The union that organizes the construction, rig and transport workers on which fracking would rely, agreed at its July 2014 national conference to lobby for a moratorium on fracking because “(d)elegates want union members to be made aware of the dangers of fracking and be advised not to work on fracking sites.”<sup>35</sup>
- October 30, 2012 – ‘In a policy statement, the American Public Health Association (APHA) asserted that, high-volume horizontal hydraulic fracturing (HVHF) “poses potential risks to public health and the environment, including groundwater and surface water contamination, climate change, air pollution, and worker health.” The statement also noted that the public health perspective has been inadequately represented in policy processes related to HVHF.<sup>36</sup> The policy statement added:
  - *[H]ydraulic fracturing workers are potentially exposed to inhalation health hazards from dust containing silica. There may also be impacts on workers and communities affected by the vastly increased production and transport of sand for HVHF. Inhalation of fine dusts of respirable crystalline silica can cause silicosis. Crystalline silica has also been determined to be an occupational lung carcinogen.’*
- September 10, 2014 – “A Yale University-led study of 492 people found that those who live near gas wells in southwestern Pennsylvania have a higher prevalence of reported skin conditions and upper respiratory conditions than those further away. The conditions were more common in households less than one kilometer from gas wells, compared to those more than two kilometers away. The authors of this study, the largest to date on the link between reported symptoms and natural gas drilling activities, say that their findings are “... consistent with earlier reports of respiratory and dermal conditions in persons living near natural gas wells.” They also cite literature demonstrating the biological plausibility of a link between oil and gas extraction activities and both categories of health effects reported.”<sup>37</sup>

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<sup>33</sup> Brufatto, C. (2003). From mud to cement - Building gas wells. *Oilfield Review*, 15(3). Retrieved June 10, 2014, from

[http://www.slb.com/resources/publications/industry\\_articles/oilfield\\_review/2003/or2003aut06\\_building\\_gas\\_wells.aspx](http://www.slb.com/resources/publications/industry_articles/oilfield_review/2003/or2003aut06_building_gas_wells.aspx)

<sup>34</sup> Dusseault, M. B., Gray, M. N., & Nawrocki, P. A. (2000). Why oil wells leak: Cement behavior and long-term consequences. *Society of Petroleum Engineers*. Retrieved June 10, 2014, from

<http://www.hydrorelief.org/frackdata/references/65704543-Casing-Leaks.pdf>

<sup>35</sup> O’Neill, R. (editor). (July 2014). Chemicals, dust and deaths and the new rush for oil and gas. *Hazards Magazine*. Special Online Report. Retrieved from <http://www.hazards.org/oil/fracking.htm#top>

<sup>36</sup> American Public Health Association. (2012, October 30). The environmental and occupational health impacts of high-volume hydraulic fracturing of unconventional gas reserves. Retrieved June 10, 2014, from <http://www.apha.org/advocacy/policy/policysearch/default.htm?id=1439>

<sup>37</sup> Rabinowitz, P.M., Slizovskiy, I.B., Lamers, V., Trufan, S.J., Holford, T.R., Dziura, J.D., Peduzzi, P.N., Kane, M.J., Reif, J.S., Weiss, T.R. and Stowe, M.H. (2014). Proximity to natural gas wells and reported health status:

- May 21, 2014 – Raising questions about possible links to worsening air pollution from the Uintah Basin’s 11,200 oil and gas wells, health professionals reported that infant deaths in Vernal, Utah, rose to six times the normal rate over the past three years. Physician Brian Moench said, “We know that pregnant women who breathe more air pollution have much higher rates of virtually every adverse pregnancy outcome that exists . . . . And we know that this particular town is the centre of an oil and gas boom that’s been going on for the past five or six years and has uniquely high particulate matter and high ozone.”<sup>38</sup> Although it formerly had pristine air quality, Uintah County, Utah received a grade “F” for ozone in the American Lung Association’s 2013 State of the Air Report.<sup>39</sup>
- January 28, 2014 – “Congenital heart defects, and possibly neural tube defects in newborns, were associated with the density and proximity of natural gas wells within a 10-mile radius of mothers’ residences in a study of almost 25,000 births from 1996-2009 in rural Colorado. The researchers note that natural gas development emits several chemicals known to increase risk of birth defects (teratogens).”<sup>40</sup>
- January 4, 2014 –Preliminary data from researchers at Princeton University, Columbia University and MIT showed elevated rates of low birthweight among infants born to mothers living near drilling and fracking operations during their pregnancies.<sup>41</sup>

#### Noise pollution, light pollution and stress:

- December 1, 2014 –“ Range Resources Inc. warned supervisors in Pennsylvania’s Donegal Township that a “big burn” natural gas flare will continue for as long as a week and “will produce a continuous noise of as much as 95 decibels at the well pad. Sustained decibel levels between 90 and 95 can result in permanent hearing loss, but workers will be equipped with ear protection.” Township supervisor Doug Teagarden expressed concern for residents, saying, “They told us the flare would be double the size of other well flares, and the noise will be like a siren on a firetruck . . . . There are houses within a couple of hundred yards of the well pad, and those folks are going to hear it.”<sup>42</sup>
- June 20, 2014 – In its discussion of “Oil and Gas Drilling/Development Impacts,” the U.S. Office of Indian Energy and Economic Development detailed noise pollution from bulldozers, drill rigs, diesel engines, vehicular traffic, blasting, and flaring of gas. “If noise-producing activities occur near a residential area, noise levels from blasting, drilling, and other activities could exceed the EPA guidelines. The movement of heavy vehicles and drilling could result in frequent-to-continuous noise . . . . Drilling noise would occur continuously for 24 hours per day for one to two months or more depending on the depth of the formation.”<sup>43</sup> “Exposure to chronic noise can be deadly. The World Health Organization has documented the connection between environmental noise and health effects, including cardiovascular disease, cognitive impairment, sleep disturbance, and tinnitus. At least one million “healthy life years” are lost every year from traffic-related noise in the

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Results of a household survey in Washington County, Pennsylvania. *Environmental Health Perspectives*. Advance online publication. <http://dx.doi.org/10.1289/ehp.1307732>

<sup>38</sup> S Schlanger, Z. (2014, May 21). In Utah boom town, a spike in infant deaths raises questions. *Newsweek*. Retrieved June 10, 2014, from <http://www.newsweek.com/2014/05/30/utah-boom-town-spike-infant-deaths-raises-questions-251605.html>

<sup>39</sup> American Lung Association. (2013). American Lung Association state of the air 2013. Retrieved June 10, 2014, from <http://www.stateoftheair.org/2013/states/utah/uintah-49047.html>

<sup>40</sup> McKenzie, L. M., Guo, R., Witter, R. Z., Savitz, D. A., Newman, L. S., & Adgate, J. L. (2014). Birth outcomes and maternal residential proximity to natural gas development in rural Colorado. *Environmental Health Perspectives*, 122, 412-417. doi: 10.1289/ehp.1306722

<sup>41</sup> Whitehouse, M. (2014, January 4). Study shows fracking is bad for babies. *Bloomberg*. Retrieved June 10, 2014, from <http://www.bloombergtv.com/articles/2014-01-04/study-shows-fracking-is-bad-for-babies>

<sup>42</sup> Hopey, D. (2014, December 1). Gas flare to light up part of Washington County. *Pittsburgh Post Gazette*. Retrieved from <http://powersource.post-gazette.com/powersource/companies-powersource/2014/12/01/Gas-flare-to-light-up-part-of-Washington-County/stories/201411250224>

<sup>43</sup> Oil and Gas Drilling/Development Impacts. (n.d.). *Oil and gas drilling/development impacts*. Retrieved June 20, 2014, from <http://teeic.indianaffairs.gov/er/oilgas/impact/drilldev/index.htm>

western part of Europe.”<sup>44</sup>

**Conclusion:**

At the risk of boring you to death, I think I better pull up stumps. And let you and the government uncover the rest of the relevant information needed to make an informed and important decision on this industry. Not just for us and the immediate future, but for all the future generations to come.

I guess as humans, we all have the intelligence to weigh up all the information at hand. When just looking the fact's, without any outside interference or information from people who have obvious vested interests in the outcome of a result, this is when the right and just decisions can be made.

I'd please ask you and the Current Labor government to keep this in mind when researching your Decision.

Everyday Western Australians , and the at large public, have no vested interest in this outcome. (Unless they own a large farm and may make money from the gas company's offer)

But in general, we have nothing to gain from your decision.

Not like APPEA.

Not like all the gas/energy companies, lining up to sink wells and pour chemicals down into the earth in the name of "Natural"Gas extraction.

We have much better things to do than worry limitlessly about the fact that this maybe allowed to go ahead in the near future. Then we'll continue to worry about what the long term effects will be, what legacy we will leave our children. And for What?

For a fossil fuel to be extracted from the ground, with hundreds of toxic and dire consequences.

To end up with a substance that we already have an abundant supply of already?! Gas.

We do not have a gas shortage, and so long as gas is used the way it should be, and not all shipped overseas to export markets.

There is simply NO good reason for Western Australians and Australians to sacrifice our clean food bowls and rural areas to extract gas to send off shore.

As i said earlier, this industry is simply an insane idea. One created for the greed of share holders over the welfare of humans and their environment.

I simply beg you all to make the right decision for the future of WA and her people.

A Full and complete Ban on this industry, like Victoria has put in Place, is the ONLY sensible option.

As a Government, it's YOUR obligation to serve and PROTECT the public.

Please. Please Protect us from this TOXIC industry, before it's too late.

And i wish to thank you for the opportunity to express my views on this very important subject.

Yours sincerely,  
Hayley Rundell

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<sup>44</sup> Rodier, G. (2011, June 1). Burden of disease from environmental noise - Quantification of healthy life years lost in Europe. *WHO*. Retrieved June 20, 2014, from [http://www.who.int/quantifying\\_ehimpacts/publications/e94888/en/](http://www.who.int/quantifying_ehimpacts/publications/e94888/en/)

