
DON'T
FRACK
THE NT

BAN FRACKING, PROTECT COUNTRY

Statement from the Aboriginal Fracking Forum, 19 November 2017

We speak from Aboriginal communities right across the Territory. And we have come together to take a stand against fracking.

And we say no. We say no to fracking on our land, on our country.

We are concerned about the damage to our water, our country, our dreaming and our songlines.

This damage would be irreversible.

We don't want to see our rivers and waters poisoned. We want to be able to fish and hunt, gather bush tucker and bush medicines now and for all generations of people to come.

We have been told lies by gas companies, telling us there will be no impacts. That there will be one or two frack wells, not a gas field with hundreds or even thousands of wells.

Other states in Australia have banned fracking and so have many nations around the world because it's so risky.

We refuse to be lied to anymore.

We know that fracking will bring chemicals that will contaminate our water and damage our health. Drilling in one area has a bigger impact than just that place. It will damage neighboring language groups on country and the entire water system.

We want our water to be clean and healthy. For all of us.

People and country are one and the same, any damage to our country impacts us, our identity and who we are.

We will not be divided by others who do not understand the lore of the land.

We will stand strong and stand together. We will do what it takes to see a permanent ban on fracking, there will be no sacrifice zones.

We represent a growing movement of Aboriginal people coming together to stop fracking and protect country.

We call on this Government to hear us and to take action.

We stand together, and we will do what we must to protect our country for future generations. Because without water and without clean country none of us can survive.

We are here and we are not going away until you hear us.


FRACK OFF from BORROLOOLA
NO FRACKING


FOR COUNTRY, FOR WATER, FOR US
BORROLOOLA IS PROUDLY
FRACKING GASFIELD FREE
96.8%
AGREE

FOR COUNTRY, FOR WATER, FOR US.

BORROLOOLA IS PROUDLY FRACKING GASFIELD FREE

96.8% AGREE

ARTWORK BY NANCY McDINNY

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Brine Spills Associated with Unconventional Oil Development in North Dakota

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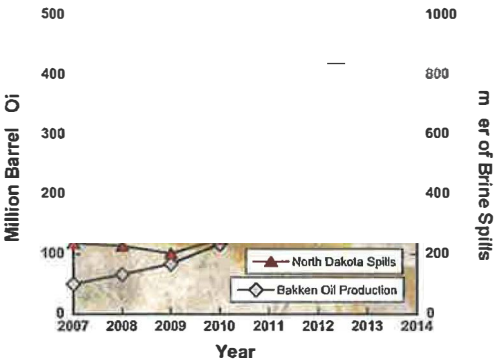
Supporting Information

ABSTRACT: The rapid rise of unconventional oil production during the past decade in the Bakken region of North Dakota raises concerns related to water contamination associated with the accidental release of oil and gas wastewater to the environment. Here, we characterize the major and trace element chemistry and isotopic ratios ($^{87}Sr/^{86}Sr$, $\delta^{18}O$, $\delta^{2}H$) of surface waters (n = 29) in areas impacted by oil and gas wastewater spills in the Bakken region of North Dakota. We establish geochemical and isotopic tracers that can identify Bakken brine spills in the environment. In addition to elevated concentrations of dissolved salts (Na, Cl, Br), spill waters also consisted of elevated concentrations of other contaminants (Se, V, Pb, NH_4) compared to background waters, and soil and sediment in spill sites had elevated total radium activities (^{228}Ra + ^{226}Ra) relative to background, indicating accumulation of Ra in impacted soil and sediment. We observed that inorganic contamination associated with brine spills in North Dakota is remarkably persistent, with elevated levels of contaminants observed in spills sites up to 4 years following the spill events.



INTRODUCTION

With the discovery of new oil fields and advances in drilling technology, notably hydraulic fracturing and horizontal drilling, unconventional oil and gas production from the Bakken region in North Dakota has been rising significantly since 2007. In 2014, the Bakken region was producing an average of over 1 million barrels of oil per day, compared to production levels that consistently lingered at approximately 100 thousand barrels per day before 2007.[1] This rapid rise in production has been made possible by intense development of oil and gas infrastructure in western North Dakota, including approximately 9700 unconventional wells that have produced an estimated 31.4 × 10^9 gallons (118.9 × 10^9 L) of oil and gas wastewater (OGW).[2]

OGW includes highly saline produced and flowback waters that, in the Bakken region, can exceed 300 g/L of total dissolved solids (TDS).[3,4] In addition to high salinity, OGW often contains a number of toxic trace elements and naturally occurring radioactive materials (NORM) in elevated concentrations that can be threatening to local water quality if released to the environment.[5−11] Previous studies have shown contamination of local surface water resources from unconventional oil and gas development due to the release of OGW to the environment in the form of (1) effluents to local streams and rivers following inadequate treatment by water treatment facilities,[5−7,9] (2) dust suppressants and deicing agents,[11] and (3) leaks and spills.[8,12] The release of OGW to the environment has been linked to salt, trace metal, and NORM contamination of local surface water, shallow groundwater, and stream sediments.[8,13−15]

In North Dakota, the high occurrence of OGW spills is potentially threatening the quality of surface and drinking water resources. Since the beginning of the rise of unconventional oil extraction and hydraulic fracturing in 2007, there have been approximately 3900 brine spills reported to the North Dakota Department of Health by well operators (Figure 1); brine spills are defined as the accidental release of brine that may potentially impact groundwater or surface water.[16] In North Dakota, OGW is primarily transported by pipes or trucks and stored in enclosed containers onsite prior to disposal via deep well injection. Reported spills often occur during transport to injection sites via pipelines or during filling or emptying of storage tanks. Unlike other areas in the U.S. where decades of conventional oil and gas exploration have generated a legacy of contamination, the exploration rates of conventional oil and gas in North Dakota were significantly lower than recent unconventional operations. Therefore, recent OGW spills are directly associated with recent unconventional oil extraction. Previous research on the impact of hydraulic fracturing in the Bakken region has been limited to two studies showing groundwater contamination from one site[17] and temporal changes in surface water and shallow groundwater quality from

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Table 1. Major Chemistry and Isotopic Ratios of Bakken Produced Waters, Spill Waters, and Background Waters

sample	Cl (mg/L)	Br (mg/L)	SO_4 (mg/L)	HCO_3 (mg/L)	Ca (mg/L)	Mg (mg/L)	Sr (mg/L)	Na (mg/L)	NH_4 (mg/L)	$^{87}Sr/^{86}Sr$	$\delta^{18}O$	$\delta^{2}H$
Type A Spills												
ND102	14795	72.5	1713	279	1953	684	52.6	6003	9.14	0.70973	−10.6	−82.5
ND103	16032	74.0	3210	247	1773	902	51.1	6754	42.4	0.70960	−5.9	−73.8
ND113	996	5.5	4090	668	576	376	5.67	1513	0.62	0.70787	−14.3	−109.0
ND123	1487	5.2	3025	880	156	235	3.48	2029	21.0	0.70968	−7.5	−90.5
ND126	1900	5.9	3117	941	212	258	4.70	2282	17.0	0.70971	−8.9	−97.8
avg	**7042**	**32.6**	**3031**	**603**	**934**	**491**	**23.5**	**3716**	**18.0**	**0.70932**	**−9.5**	**−90.7**
Type B Spills												
ND120	207	0.22	464	306	111	101	0.46	102	0.76	0.70980	−6.3	−66.6
ND128	269	0.56	946	466	187	148	0.89	298	0.40	0.70999	−3.3	−74.9
ND129	5833	5.8	856	116	1225	475	5.94	1876	<0.01	0.70923	−2.4	−54.8
ND130	189	0.17	387	345	109	91	0.49	99.3	0.19	0.71029	−6.7	−67.9
ND131	18703	20.5	2739	110	1381	2220	8.53	6829	0.32	0.71011	−6.8	−71.9
avg	**5040**	**5.5**	**1078**	**268**	**603**	**607**	**3.26**	**1841**	**0.42**	**0.70989**	**−5.1**	**−67.2**
Produced Water												
PW1	119989	558	128	35.0	12033	1001	774	47217	2110	0.71044		
PW2	75892	384	102	169	8573	741	551	34745	1200	0.71046		
PW3	21728	91.6	0.0	856	372	118	33.1	12271	44.8	0.70939		
PW4	136220	601	293		15346	1299	970	60571	2520	0.71044		
avg	**88457**	**409**	**131**	**353**	**9081**	**790**	**582**	**38701**	**1469**	**0.71018**		
Background Sites												
avg[a]	**21.0**	**0.73**	**1658**	**687**	**121**	**104**	**1.41**	**733**	**0.93**	**0.70820**	**−10.5**	**−101**

[a]Reflects the average of data from 19 samples.

TCEA and Delta + XL mass spectrometer. Strontium isotopes ($^{87}Sr/^{86}Sr$) were measured by thermal ionization mass spectrometry (TIMS) using a Thermo Fisher Triton. The average $^{87}Sr/^{86}Sr$ of NIST SRM-987 was 0.710264 ± 5.8 × 10^{-6} (1σ) over the course of this study.

Radium isotopes (^{226}Ra and ^{228}Ra) were measured in spill waters, produced waters, and grab soil and sediment samples at the Duke University Laboratory for Environmental Analysis of Radionuclides (LEARN) using a Canberra broad energy germanium gamma detector calibrated with a standard reference ore (DL-1a). Ra was extracted from spill waters (2−25 L) and concentrated on ~10 g of MnO fiber.[21] Prior to γ analysis, fibers, filtered brines, and oven-dried soils and sediments were packed in 40 mL snap lid Petri style dishes that were then wrapped with electrical tape and coated with wax to prevent the escape of gaseous ^{222}Rn ($t_{1/2}$ = 3.8 days). Samples then incubated for at least 21 days in order for ^{226}Ra to reach radioactive secular equilibrium with its short-lived daughter ^{214}Pb ($t_{1/2}$ = 27 min). ^{226}Ra was analyzed through the ^{214}Pb (351 kEv) peak and ^{228}Ra was analyzed through the ^{228}Ac (911 kEv) peak. Samples were counted for 12−24 h to minimize statistical counting error, which was typically less than 5% (1σ).

■ RESULTS AND DISCUSSION

Chemical Characterization of Water Sources. Evaluation of the chemical data reveals background water and two types of spill water (defined as type A and type B spills) in the study area. Background water is highly saline (mineralized) water (TDS up to 5000 mg/L) with Na-SO_4−HCO_3 composition, high pH (up to 9.3), high TOC (300 mg/L), low Cl (typically <35 mg/L), high Br/Cl (~3 × 10^{-2} molar ratio), and relatively low $^{87}Sr/^{86}Sr$ ~0.70824 ± 0.0006 (n = 19) (Table 1). The high salinity observed in background waters in the study area cannot be explained by halite dissolution, given the low Cl concentrations and high Br/Cl ratios. Additionally, the chemical composition of the saline surface water is different from the composition of the Bakken brines, ruling out the possibility of naturally occurring brine seeps. HCO_3 is highly correlated to TOC concentrations (Figure S3), suggesting that the majority of the DIC in the highly mineralized background water is derived from oxidation of organic matter. This is consistent with low δ^{13}C-DIC values (mean = −11 ± 2.9‰) that reflect oxidation of C4 type plants that are typical in arid environments (Table S4). Saline waters with elevated sulfate were previously reported for surface waters and wetlands in North Dakota,[18−20] and Sr isotope ratios measured in background waters in this study are consistent with Sr isotope ratios previously reported for uncontaminated North Dakota groundwaters.[17]

USGS data[22] and new data generated in this study (Tables 1 and 2) indicate that produced water from the Bakken formation is highly saline (TDS of 35000−330000 mg/L) and characterized by a typical Na−Ca−Cl composition. The Bakken brines have high Br/Cl (~2 × 10^{-3} molar ratio; Figure 2, Table 1) and high $^{87}Sr/^{86}Sr$ (0.71018 ± 0.0005; Figure 3). Although the number of produced water samples analyzed in this study is relatively limited (n = 4), our data are consistent with previously unpublished Bakken produced water data from the USGS (n = 12; mean $^{87}Sr/^{86}Sr$ = 0.71039; Br/Cl ~ 2 × 10^{-3}; mean $\delta^{18}O$ = +3‰ and mean $\delta^{2}H$ = −44‰)[22] as well as isotope data reported by Rostron and Holmden (mean $^{87}Sr/^{86}Sr$ = 0.70956; mean $\delta^{18}O$ = +5‰ and mean $\delta^{2}H$ = −40‰).[23] In addition to the elevated concentrations of major elements (Na, Cl, Br), our data show that the Bakken brines are enriched in metals, metalloids, and other potential contaminants (Se, V, Sr, B, Mn, Ni, Cd, Cu, Zn, Ba, Pb, Ra, NH_4) that have human and ecological health implications (Figure 2, Table 2).

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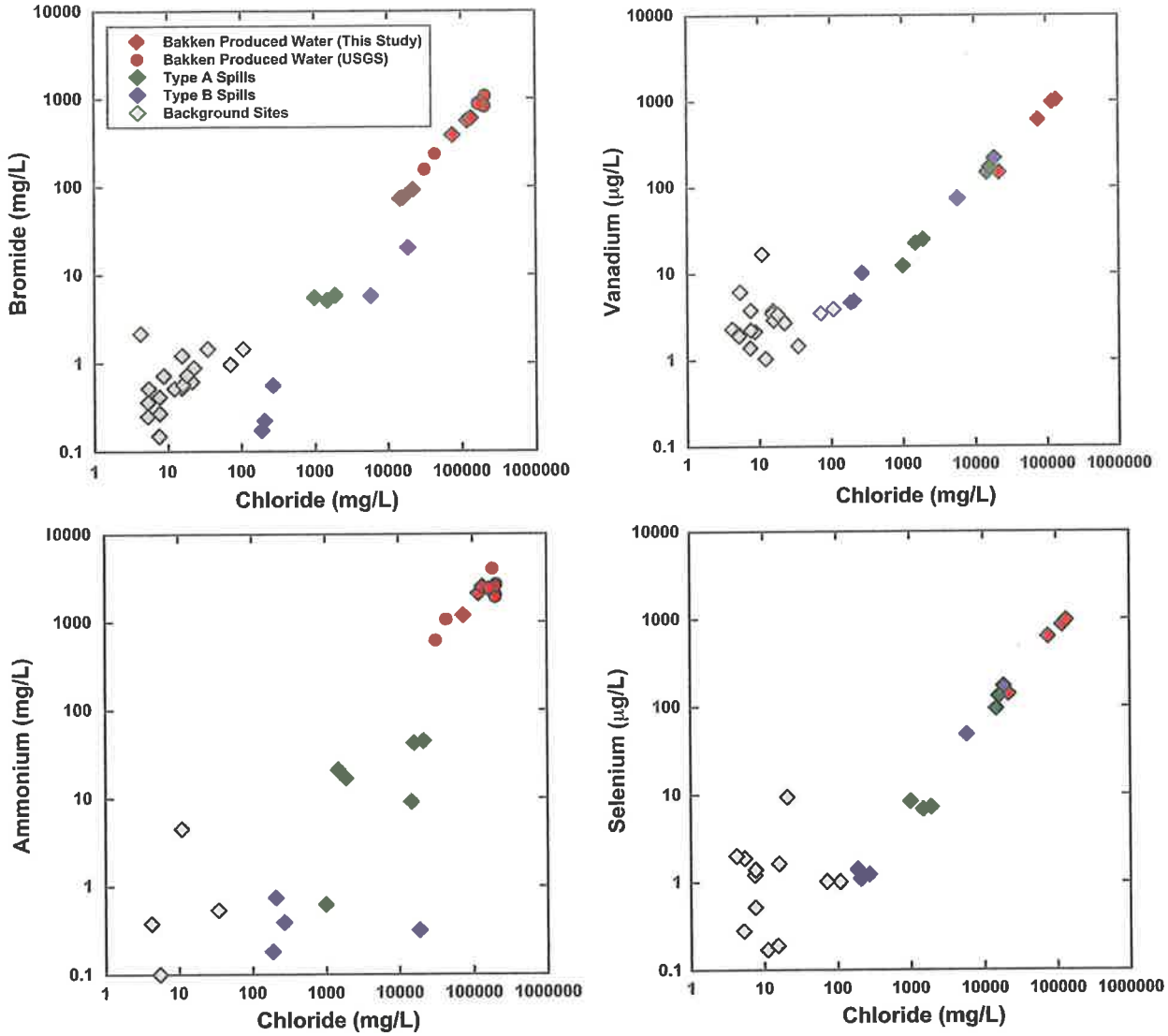

Figure 2. Bromide, selenium, vanadium, and ammonium versus chloride concentrations (log scale) in Bakken produced waters, spill waters, and background waters. Spill waters were defined on the basis of their chemical composition and resemblance to the Bakken brines (type A spills) relative to chemical fractionation induced from recycling of the Bakken brines (type B spills). Note that type A spills show linear correlations between bromide, vanadium, and selenium to chloride, indicating a conservative mixing relationship between the Bakken brines and background water.

The type A spills include the large spills at Bear Den Bay and Blacktail Creek. Type A spill water has a chemical composition that reflects the mixing of the Bakken brines with the saline background water and has relatively high Br/Cl (1.9×10^{-3} molar ratio; Figure 2) and relatively high B/Cl, Sr/Cl, and Li/Cl ratios (Figure S4). In type A spills, the magnitude of contamination depends on the relative mixing proportions of the brine and local surface water. Type B spills were generally much smaller and isolated from other water sources, which would likely promote more intense evaporation and the subsequent precipitation of minerals. Based on the distinctively low Br/Cl (5.5×10^{-4} molar ratio) of the type B spills, we propose that they originated from evaporation of the brines, followed by secondary mineral precipitation, and redissolution. As a result, type B spill water has a chemical composition that is different from simple mixing of the Bakken brines with background saline water.

We simulated the evaporation of type A spill water and evaluated the saturation index (SI) of minerals using PHREEQC software.[24] The SI is defined as SI = log(IAP/K_{sp}), where IAP is the ionic activity product and K_{sp} is the apparent equilibrium solubility product. Our simulation shows that calcite and barite minerals are supersaturated for the Type A spill waters (samples ND102 and ND103), and 5-fold and 30-fold evaporation would generate solutions that are supersaturated for gypsum and halite, respectively. We therefore suggest that extensive evaporation of spill water would result in supersaturation and secondary mineral precipitation. Redissolution of these minerals would generate Na–Cl saline water with relatively low Br/Cl ratios compared to the Bakken brines that is consistent with the chemistry of type B spill water.

Identification of Spill Water in the Environment. Surface waters defined as background waters in this study are relatively saline, which is consistent with previous studies of North Dakota surface waters.[18−20] As a result, high salinity alone cannot necessarily reveal the presence of OGW in the environment. Additionally, we identified two types of spill water, one that mimics the Bakken brines (type A) and another

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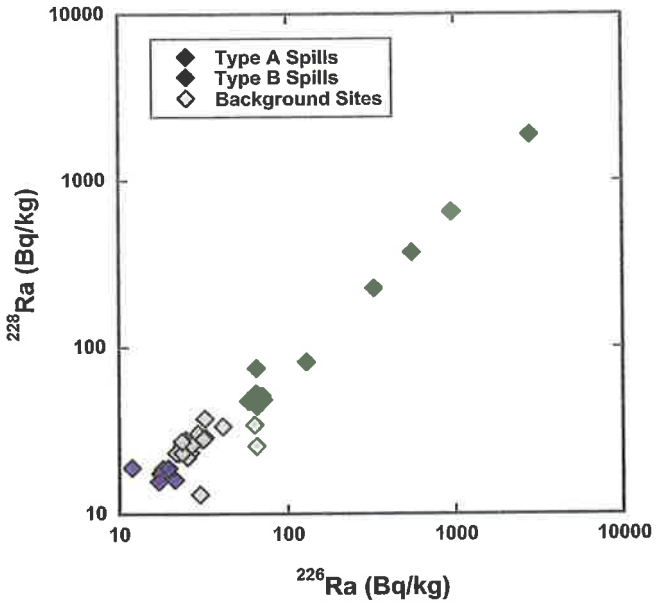

Figure 4. ^{228}Ra vs ^{226}Ra activities in sediments and soils from spill sites and away from spill areas in ND. The greatest accumulation of Ra in soils was found in the large magnitude spills of Bear Den Bay (3.8 million L) and the Blacktail Creek (11 million L) that are defined as type A spills. The high correlation of ^{228}Ra and ^{226}Ra and their ratio (~0.6) in the soils from the spill sites reflect the NORM composition of the Bakken brines and the relatively young age of the spills. Note the high accumulation of radium in the contaminated soil, several orders of magnitude greater relative to the radium level in soil from background sites.

^{228}Ra/^{226}Ra = 0.67–0.69), compared to upstream sediments (45 Bq/kg; 1.1). We also found elevated Ra activities and relatively low ^{228}Ra/^{226}Ra activity ratios in soil samples collected at the Bear Den Bay spill site (total Ra = 106–211 Bq/kg; ^{228}Ra/^{226}Ra = 0.64–0.82) compared to average background soils (58 Bq/kg; 0.85).

The effectiveness of Ra adsorption to sediment or soil depends on several factors such as the relative water to sediment ratio, water salinity, water chemistry (i.e., distribution of bivalent cations), soil type, cation exchange capacity (CEC) on clay minerals, organic matter content, oxide content, and grain size.[27,30,32,33] The high salinity of the Bakken brines may effectively inhibit Ra adsorption to the sediment or soil at the spill site itself; instead, Ra adsorption may be more effective downstream of the spill, when the brine becomes diluted with meteoric water. This phenomenon was observed in the Bear Den Bay site, where total Ra activities increased from ~100 Bq/kg at the original spill site to ~200 Bq/kg at approximately 0.4 km downstream from the original spill site (Figure S1). Parallel to the increase in total Ra activity, the ^{228}Ra/^{226}Ra activity ratios decreased with distance along the flow path of the spill water. We conclude that the impact of the high NORM in the Bakken brines will be reflected in accumulation of Ra in soil, indicated by elevated levels of total Ra and relatively lower ^{228}Ra/^{226}Ra activity ratios in soils and sediments from spill sites compared to background soils and sediments.

Environmental Implications of Brine Spills. In addition to elevated levels of salts, the Bakken brines contain elevated levels of trace elements and other toxic contaminants such as Ba (up to 9 mg/L), NH_4 (2,500 mg/L), Pb (3480 μg/L), Tl (231 μg/L), Cd (31 μg/L), Se (970 μg/L), Cu (365 μg/L), Ni (833 μg/L), V (1020 μg/L), and Mn (16 mg/L). Spill waters and surface waters impacted by spills identified in this study were found to have trace metal concentrations often 1 to 2 orders of magnitude greater than average concentrations in background surface waters (Table 2 and Figure 2). Additionally, these levels exceeded national ecological and drinking water regulations for multiple elements in some spill sites. Environmentally toxic selenium was measured in the majority of spill waters at elevated concentrations up to 172 μg/L, 35 times the National Recommended Criterion Continuous Concentration (CCC) for freshwater aquatic life (5 μg/L).[34] Likewise, high levels of NH_4 in spill waters (up to 42 mg/L) far exceed the US Environmental Protection Agency (EPA) acute and chronic ambient water quality criteria for protecting freshwater organisms from potential effects of Total Ammonium Nitrogen (TAN) of 17 mg/L and 1.9 mg/L, respectively (at pH = 7).[35] Additionally, certain elements were measured at concentrations above the National Maximum Contaminant Level (MCL) Drinking Water (Se, Tl, Ra) and Secondary Drinking Water (Cl, Fe, Mn) standards in some spill waters.[36] Given that spills can be located upstream from drinking water sources, as is the case in the Bear Den Bay spill, long-term monitoring of the waters downstream of spills is necessary in order to assess impacts on drinking water quality. Overall, our data show that the Bakken brines are enriched in numerous toxic elements and their release to the environment could directly affect the quality of the impacted water.

The results of this study indicate that the water contamination from brine spills is remarkably persistent in the environment, resulting in elevated levels of salts and trace elements that can be preserved in spill sites for at least months to years (up to 4 years for ND 128 and 129 samples) following the original spill. The concentrations of Br, V, Se, Li, B and Sr had strong linear correlations with Cl (Figure 2 and S4), which suggests that they behave conservatively and natural remediation is only due to dilution. Other constituents such as NH_4, SO_4, Ba and Mn, had ratios with Cl that are not consistent with those in the Bakken brines (Figure 2 and S6), and could reflect the retention of these elements to the soil or sediment at the spill sites or biological uptake. Additionally, we also observed the accumulation of long-lived isotopes of Ra in the sediments and soils of spill sites. The relatively long half-life of ^{226}Ra (~1600 years) suggests that Ra contamination in spill sites will remain for thousands of years.

The increase in the occurrence of brine spills in North Dakota parallels the rapid rise of unconventional oil production from tight oil in the Bakken region since 2007 (Figure 5). We found that the occurrence of brine spills in North Dakota is correlated with oil well density (Figure 1, Figure S7), indicating that areas of high oil well density are relatively more likely to be impacted by spills. Analysis of the ~3900 documented brine spills in North Dakota[16] shows that spills generally ranged in volume from 200 to 10000 L (Figure S8). Pipeline leaks made up 18% of the spill events and were responsible for 47% of the spilled water by volume. The spatial distribution of oil, gas, and brine pipelines is not currently available in the public domain at the resolution needed to accurately assess the spatial relationship between pipeline network distribution and spill occurrence. Following pipeline leaks were valve/piping connection leaks (20.5% of volume, 24.8% of frequency) and tank leaks and overflows (14.5% of volume, 22.4% of frequency) (Figure S9). In sum, we find that the release of

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EARTHWORKS

MEMO

From: Pete Dronkers, Certified Optical Gas Imaging Thermographer & Southwest Circuit Rider

Subject: Statement on FLIR video evidence featured in Dakota Resource Council report "Oil & Gas Pollution's Impacts on North Dakota Families"

Between July 11th and July 13th, 2017, Earthworks traveled to Dunn and Williams counties, ND to investigate and document emissions from active oil and gas sites using a FLIR GF320 infrared camera. Working together with the Dakota Resource Council, we identified and visited 12 recently well sites in residential areas drilled in the last 2 years. I recorded visible and concerning emissions at 5 of these sites near Williston and the Fort Berthold Reservation.

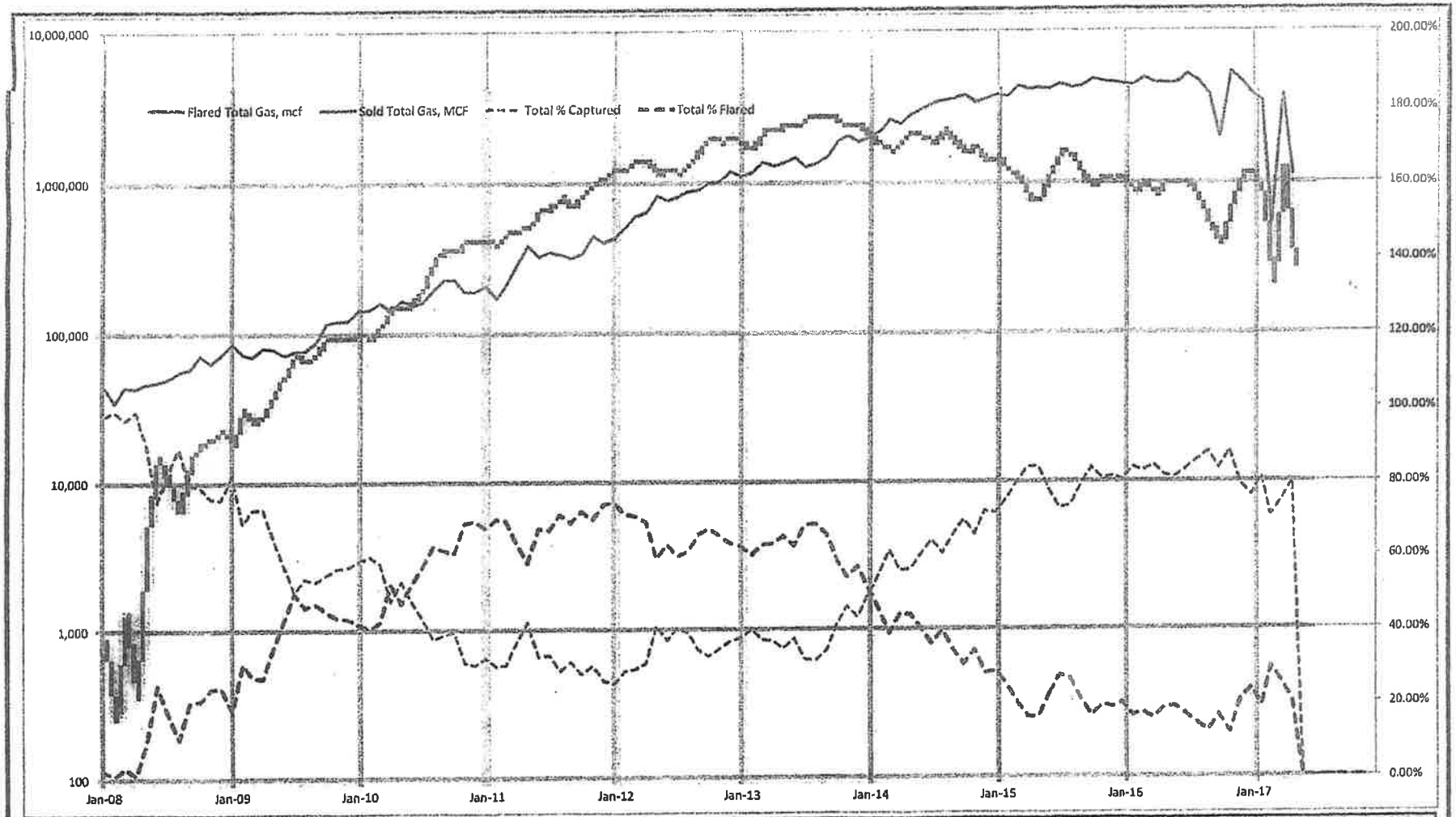
The FLIR GF320 is the oil and gas industry standard in leak detection and repair, and is utilized by state regulatory agencies across the country to monitor emissions from the oil and gas sector. This technology does not speciate or quantify pollutants, but it does make visible hydrocarbons and volatile organic compounds (VOCs) that are normally invisible to the naked eye. As an Infrared Training Center (ITC) certified OGI thermographer (certification #86618), my specific observations on the emissions seen in these videos can be found below.

HRC Operating Fort Berthold 1H Well Site (Fort Berthold Reservation)
Video: https://youtu.be/cY3mfnZEd6o
Tank vapor emissions from a tank battery containing hydrocarbons. These emissions are an unknown blend of hydrocarbons and VOC's. There is likely a significant amount of methane.

HRC Operating Fort Berthold 8-12H Well Site (Fort Berthold Reservation)
Video: https://youtu.be/UEpah9g2JDc
Tank vapor emissions from a tank battery containing hydrocarbons. These emissions are an unknown blend of hydrocarbons and VOC's. There is likely a significant amount of methane.

HRC Operating Fort Berthold 13H Well Site (Fort Berthold Reservation)
Video: https://youtu.be/753lojkdVD0
Tank vapor emissions from a tank battery containing hydrocarbons. These emissions are an unknown blend of hydrocarbons and VOC's. There is likely a significant amount of methane.

Bureau of Indian Affairs - Fort Berthold Agency



Fort Berthold Reservation - Allotted and Tribal Flared/Sold Gas

Date	Flared Allotted Gas, mcf	Sold Allotted Gas, MCF	Total Allotted Gas	Allotted % Flared	Allotted % Captured	Flared Tribal Gas, mcf	Sold Tribal Gas, MCF	Total Tribal Gas	Tribal % Flared	Tribal % Captured	Flared Total Gas, mcf	Sold Total Gas, MCF	Total Total Gas	Total % Flared	Total % Captured
pre-2008	49,047	5,531,477	5,580,524	0.88%	99.12%	-	-	-	0.00%	0.00%	49,047	5,531,477	5,580,524	0.88%	99.12%
2008	59,319	592,007	651,326	9.11%	90.89%	59,550	38,473	98,023	60.75%	39.25%	118,869	630,480	749,349	15.86%	84.14%
2009	487,947	888,094	1,376,041	35.46%	64.54%	217,802	173,892	391,694	55.61%	44.39%	705,749	1,061,986	1,767,735	39.92%	60.08%
2010	2,112,755	1,469,290	3,582,045	58.98%	41.02%	807,740	645,213	1,452,953	55.59%	44.41%	2,920,495	2,114,503	5,034,998	58.00%	42.00%
2011	5,960,159	2,421,912	8,382,071	71.11%	28.89%	2,360,962	1,356,994	3,717,956	63.50%	36.50%	8,321,121	3,778,906	12,100,027	68.77%	31.23%
2012	12,918,581	6,524,579	19,443,160	66.44%	33.56%	5,264,261	2,980,594	8,244,855	63.85%	36.15%	18,182,842	9,505,173	27,688,015	65.67%	34.33%
2013	20,769,935	11,785,825	32,555,760	63.80%	36.20%	8,373,028	5,820,642	14,193,670	58.99%	41.01%	29,142,963	17,606,467	46,749,430	62.34%	37.66%
2014	16,112,345	25,928,417	42,040,762	38.33%	61.67%	6,315,562	10,294,310	16,609,872	38.02%	61.98%	22,427,907	36,222,727	58,650,634	38.24%	61.76%
2015	9,555,230	36,353,354	45,908,584	20.81%	79.19%	4,488,213	14,914,450	19,402,663	23.13%	76.87%	14,043,443	51,267,804	65,311,247	21.50%	78.50%
2016	6,961,122	38,857,730	45,818,852	15.19%	84.81%	3,581,874	13,958,412	17,540,286	20.42%	79.58%	10,542,996	52,816,142	63,359,138	16.64%	83.36%
2017	2,478,995	9,623,029	12,102,024	20.48%	79.52%	1,267,683	3,045,143	4,312,826	29.39%	70.61%	3,746,678	12,668,172	16,414,850	22.82%	77.18%
Total	68,025,318	91,494,955	159,520,273	42.64%	57.36%	27,887,118	36,224,568	64,111,686	43.50%	56.50%	95,912,436	127,719,523	223,631,959	42.89%	57.11%

Source: ONRR

U.S. DISTRICT COURT ORDERS OBAMA-ERA RULE PREVENTING NATURAL GAS WASTE ON PUBLIC LANDS TO BE REINSTATED

***Victory:* Judge says Trump administration illegally suspended rule without necessary public comment**

Judge Laporte reaffirmed the important role the public has in preserving natural resources and protecting public health.

Robin Cooley Attorney, Earthjustice

OCTOBER 4, 2017

San Francisco, CA —

The U.S. District Court for the Northern District of California ruledtoday that the Trump administration illegally suspended the Obama-era rule preventing waste of publicly-owned natural gas on public and tribal lands.

"The Court FINDS and DECLARES that the U.S. Bureau of Land Management violated the Administrative Procedure Act, 5 U.S.C. § 551 et seq., when it issued a notice on June 15, 2017 . . . postponing the compliance date for certain provisions of the Waste Prevention . . . Rule . . . after the rule had already gone into effect," said Magistrate Judge Elizabeth Laporte in her ruling. "The Court hereby VACATES the Postponement Notice and ORDERS Defendants to immediately reinstate the Waste Prevention . . . Rule in its entirety."

The Bureau of Land Management's Waste Prevention Rule's commonsense and cost-effective protections require the oil and gas industry to monitor wells for leaks, repair faulty equipment, reduce noisy and wasteful flaring, and capture natural gas emissions instead of releasing them into the atmosphere.

It went into effect in January 2017 after BLM received extensive public input at public hearings and tribal meetings in New Mexico, Oklahoma, Colorado and North Dakota. BLM received more than 300,000 written comments that overwhelmingly supported the rule during a 74-day public comment period.

Interior Secretary Ryan Zinke suspended provisions of the Waste Prevention Rule in June without engaging in any public process.

"Venting and flaring methane at drilling sites wastes valuable public resources, costing taxpayers millions in lost revenue each year," said Robin Cooley, staff attorney for Earthjustice. "The Waste Prevention rule also has the same greenhouse gas benefits as taking nearly a million cars off the road each year and helps reduce the serious health hazards for surrounding communities."

DONATE

GROUPS SUE OVER TRUMP ADMINISTRATION ROLLBACK OF PROTECTIONS AGAINST METHANE WASTE ON PUBLIC LANDS

Safeguards require reasonable emissions and ban wasteful venting of pollution from oil and gas operations

462

Hazy air covers an active drilling field in California.

CHRIS JORDAN-BLOCH / EARTHJUSTICE

> *We will use every legal tool at our disposal to block the Trump administration from rolling back these important protections for our public lands.*
>
> – Robin Cooley
> Staff Attorney, Earthjustice

DECEMBER 19, 2017

San Francisco, CA — A coalition of conservation and tribal citizen groups today filed a lawsuit in the U.S. District Court for the Northern District of California challenging the Trump Administration's suspension of the Bureau of Land Management's Waste Prevention Rule and seeking to have these protections put back in place. The rule requires companies drilling on public and tribal lands to use common-sense, proven measures to reduce natural gas that is leaked, vented or flared.

This is the latest in a series of unsuccessful attempts by the oil and gas industry and the Trump administration to block the rule, which went into effect in January 2017.

Industry trade groups and several states previously tried, and failed, to get a court to prevent the rule from going into effect. In May 2017, the U.S. Senate voted not to consider repeal of the rule in a bipartisan, 51 to 49 vote. The Trump administration then unilaterally suspended parts of the rule, but that action was struck down by a California court in October.

Despite this ruling, on December 8, the administration once again attempted to stay compliance for one year while it rewrites the rule.

The rule was designed to update waste regulations that were more than 30 years old and did not reflect the dramatic advances in oil and gas drilling

technology or the rapid expansion of drilling operations on public lands in recent years. The rule saves taxpayers millions of dollars in royalties every year, and reduces harmful cancer-causing and smog-forming pollution. It also reduces pollution from methane, a greenhouse gas 87 times more powerful than carbon dioxide.

The rule implements cost-effective strategies used by leading companies to reduce methane waste and already in place in many states like Colorado and Wyoming. These strategies include requiring companies to monitor wells for leaks, repair faulty equipment, reduce noisy and wasteful flaring, and capture unnecessary natural gas emissions.

The rule was the result of years of deliberation and public input, including public hearings in New Mexico, Oklahoma, Colorado and North Dakota. The federal government received more than 300,000 written comments that were overwhelmingly in support of the rule.

"Rather than moving forward to implement this common-sense rule that prevents waste, saves millions of taxpayer dollars, and protects the air we breathe, the Trump administration is wasting everyone's time with yet another attempt to stop the rule from taking effect, all to appease its friends in the oil and gas industry," **Earthjustice attorney Robin Cooley said**. "The public has made its support for this rule crystal clear, and we will use every legal tool at our disposal to block the Trump administration from rolling back these important protections for our public lands."

"Once again, Donald Trump and Ryan Zinke are showing where their priorities lie: pandering to the desires of big polluters above all else, including the health of our communities," **said Lena Moffitt, senior director of the Sierra Club's Our Wild America Campaign**. "BLM's methane rule would help fight climate change and protect our public lands and communities. Undermining these protections is a slap in the face to the majority of Americans who support them, and to the many people who will breathe polluted air as a result. We will continue to fight to ensure that these common-sense protections remain in place."

"This is yet another handout to industry at the expense of the American people," **said Meleah Geertsma, senior attorney at the Natural Resources Defense Council**. "These common-sense measures prevent unnecessary waste that fuels climate change, creates smog, and can cause cancer—all while saving taxpayers money. Once again, when the oil and gas industry says 'Jump,' the Trump administration says 'How high?' "

"Secretary Zinke rushed this attempt to suspend the BLM's waste prevention rule without giving tribal members a meaningful opportunity to comment," **said Lisa DeVille, president of the Fort Berthold Protectors of Water and Earth Rights (POWER)**. "We spent years working with BLM to finalize this rule to reduce wasteful gas flares. What this suspension means is more flaring and degraded air quality on Fort Berthold. Secretary Zinke needs to start listening more to the people, rather than the oil and gas industry."

"The BLM's abandonment of its waste rule is an affront to all Americans. In less than one year, the industry and its allies have unsuccessfully tried three times to eliminate this rule, and we believe they will lose this newest court battle," **said Bruce Pendery, an attorney with The Wilderness Society**. "No matter how many special interests the Trump administration has on its side in its mindless pursuit of energy dominance, it cannot avoid the Interior Department's legal obligations to protect taxpayers and the planet."

Earthjustice represents several of the Conservation and Tribal Citizen Groups that filed the lawsuit challenging BLM's illegal suspension of the Rule: Sierra Club, Fort Berthold Protectors of Water & Earth Rights, The Wilderness Society, Western Organization of Resource Councils and Natural Resources Defense Council.

Read the legal document.

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CONSERVATION AND TRIBAL GROUPS SUE TO BLOCK REPEAL OF FEDERAL FRACKING REGULATIONS

Trump's Bureau of Land Management's repeal of measures that protect water, public health and wildlife

4

Fracking on Bureau of Land Management land in the Colorado River Valley Field Office of western Colorado. The BLM's repeal of the rule eliminates federal protections intended to safeguard more than 700 million acres of public and tribal lands.

BRUCE GORDON / ECOFLIGHT

> "This is another case of the Trump administration putting public lands and waters at risk to fatten the bottom line of the oil and gas industry."
>
> – Mike Freeman
> Staff Attorney, Earthjustice

JANUARY 24, 2018

San Francisco, CA — A coalition of environmental and tribal groups sued today to block the Trump administration's repeal of a 2015 rule designed to protect water, wildlife, and public health from the harmful effects of hydraulic fracturing on federal and tribal lands.

The Bureau of Land Management's repeal of the rule eliminates federal protections intended to safeguard more than 700 million acres of public and tribal lands. The 2015 regulation required companies to disclose the chemicals they used in fracking operations, set standards for well construction, limited the use of waste pits to store fracking wastes, and required common-sense best management practices to protect both surface and ground water from contamination.

The rule, which was targeted by court challenges from the oil and gas industry and its allies, never took effect. After taking office, the Trump administration rescinded the rule in December 2017. The BLM, which manages oil and gas development on more than 700 million acres of public and tribal lands and minerals, is now operating under regulations developed in the 1980s, well before modern fracking techniques became commonplace. In rescinding the Hydraulic Fracturing Rule, the BLM also

eliminated even some of the minimal safeguards that had been part of its 1980s-era regulations.

BLM developed the 2015 regulation through an extensive five-year review process. The agency concluded in 2015 that its 1980s-era regulations were inadequate to protect against the environmental and public health risks posed by fracking. The 2015 rule drew on industry best practices to modernize standards and protect public lands and tribal communities through additional oversight.

Today's lawsuit asks the U.S. District Court for the Northern District of California to declare the repeal in violation of several federal laws—including the Administrative Procedure Act, the Federal Land Policy and Management Act, the Mineral Leasing Act, the Indian Mineral Leasing Act, and the National Environmental Policy Act. The suit also asks that the court reinstate the 2015 Hydraulic Fracturing Rule.

Represented by Earthjustice, the coalition bringing today's suit includes the Sierra Club, the Center for Biological Diversity, Diné Citizens Against Ruining Our Environment, Earthworks, Fort Berthold Protectors of Water and Earth Rights, Southern Utah Wilderness Alliance, The Wilderness Society, and Western Resource Advocates.

"This is another case of the Trump administration putting our public lands and water at risk to pad the bottom line of the oil and gas industry," **said Earthjustice attorney Michael Freeman**. "The agency has abdicated its responsibility under federal law to manage these lands for the good of the public, not just for fracking companies. We're filing this case to force BLM to do its job."

"Attempting to rescind these commonsense safeguards for oil and gas extraction on our public lands is yet another example of this administration refusing to do its job and prioritizing fossil fuel industry profits over the health and safety of our communities," **said Sierra Club Beyond Dirty Fuels campaign director Kelly Martin**. "We have been successful in our work to hold the administration accountable in court, and we will continue fighting to preserve these critical protections."

Mike Freeman, Earthjustice, (303) 996-9615,

Gabby Brown, Sierra Club, (202) 495-3051

Michael Saul, Center for Biological Diversity, (303) 915-8308

Mario Atencio, Diné CARE, (505) 321-9974

Steve Bloch, Southern Utah Wilderness Alliance, (801) 428-3981

Nicole Donaghy, Fort Berthold POWER, (701) 202-0927

Legal Case

DEFENDING THE BLM'S NEW FRACKING RULES

"The people of Dryden stood up to defend their way of life against the oil and gas industry."

– DEBORAH GOLDBERG

Earthjustice managing attorney, on successful fight by Dryden, NY, to ban fracking in their town.

THE STORIES TO READ ON FRACKING

The Trump Administration Wants to Roll Back Fracking Standards, So We're Going to Court

BLM fracking rule reinstated by Court of Appeals

TAKE ACTION

Urgent: Take Action To Defeat Poisonous Budget Riders

WHAT YOU NEED TO KNOW THIS WEEK

Oil & Gas Pollution's Impacts on North Dakota Families

Dakota Resource Council

EPA's Oil & Gas Pollution Standards

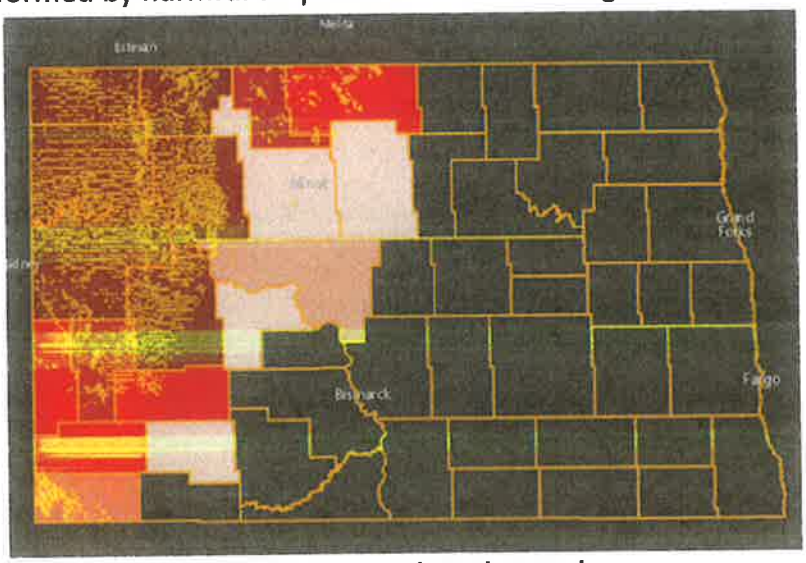
The EPA's Oil & Gas Pollution Standards (officially called the "New Source Performance Standards") curb methane emissions, smog-forming VOCs, and other toxic air pollutants, such as benzene, in new, reconstructed, and modified oil and gas sources (EPA, 2016). The EPA rule is a vital safeguard for American families, especially children, from toxic air pollution. Air pollution knows no borders.

BLM's Methane Waste Rule

The BLM's Methane and Waste Prevention Rule is designed to curb natural gas waste and pollution on American public and tribal lands using a similar set of standards as those finalized in the EPA rule. However, unlike EPA's new source rule, the BLM rule applies to both new and existing wells within the BLM's jurisdiction such as those on the Fort Berthold Reservation in western North Dakota.

Public Health Threat

Ozone, more commonly known as smog, is formed by harmful air pollution from oil and gas activities and is an immediate threat to our communities' health. There are 23 million Americans who suffer from asthma, including an estimated 6.1 million children (EPA,2016). Every year, increased ozone smog resulting from oil and gas pollution during the warm summer months causes 750,000 asthma attacks in children, more than 500,000 days of school missed, nearly 2,000 asthma-related emergency room visits, over 600 respiratory-related hospital admissions, and over 1.5 million days with restricted activity (ND Oil and Gas Threat Map, 2016). Even healthy people who do not already suffer from asthma can be affected by ozone smog including suffering from reduced lung function, coughing, wheezing, and inflammation (EPA,2016).



The North Dakota oil and gas threat map depicts how asthma attacks in children are concentrated in the Northwest portion of the state, in the Bakken Shale.

to the earth...we have a human right to clean air, clean land and clean water." Moving forward, she hopes that the government introduces stronger inspection, rules, and regulations and then holds the oil and gas industry accountable for their enforcement.

North Dakota does not have state level safeguards to curb methane pollution from oil and gas activities, which is why federal standards like the EPA and BLM rules are vital to protecting public health and keeping families and children healthy. For example, if the EPA rule is suspended, or even worse overturned, 11,000 North Dakotans, including vulnerable children, who live in counties in the threat radius will continue to be at risk for serious health impacts including respiratory issues, cancer risk, and even death (ND Oil and Gas Threat Map, 2016)

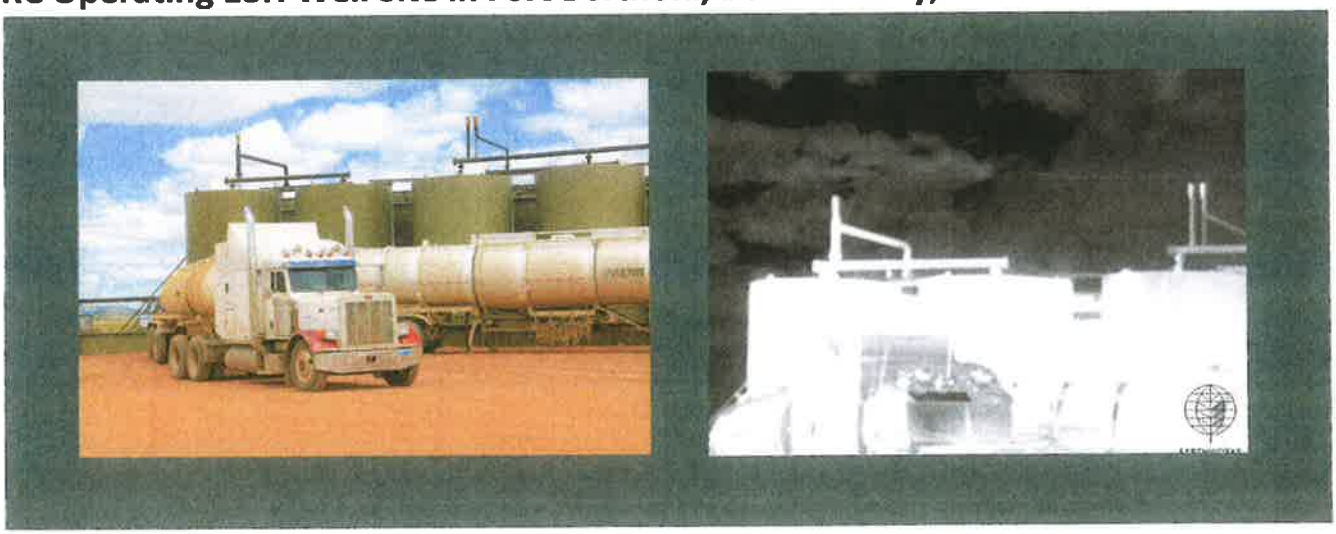
Tom Abe lives in New Town, North Dakota and, like Lisa, lives on Fort Berthold Reservation. Tom lives in the epicenter of the Bakken shale formation, which is an area where wells drilled have a 98 percent chance of being successful. Tom has learned firsthand how decreased air quality is impacting his community, noting, "I have heard many complaints by people about things like upper respiratory issues and asthma problems increasing." On top of air quality, he is also concerned about how carbon and methane emissions from oil and gas well leaks and flares affect the local climate. Raw methane gas is a huge concern, because it "is considered over 80 times worse for the climate than carbon, so methane venting and leaks are a real problem."

Optical Gas Imaging Thermographer & Southwest Circuit Rider, who captured the FLIR footage featured in this report describes his specific observations on the emissions seen in these videos in a statement here.

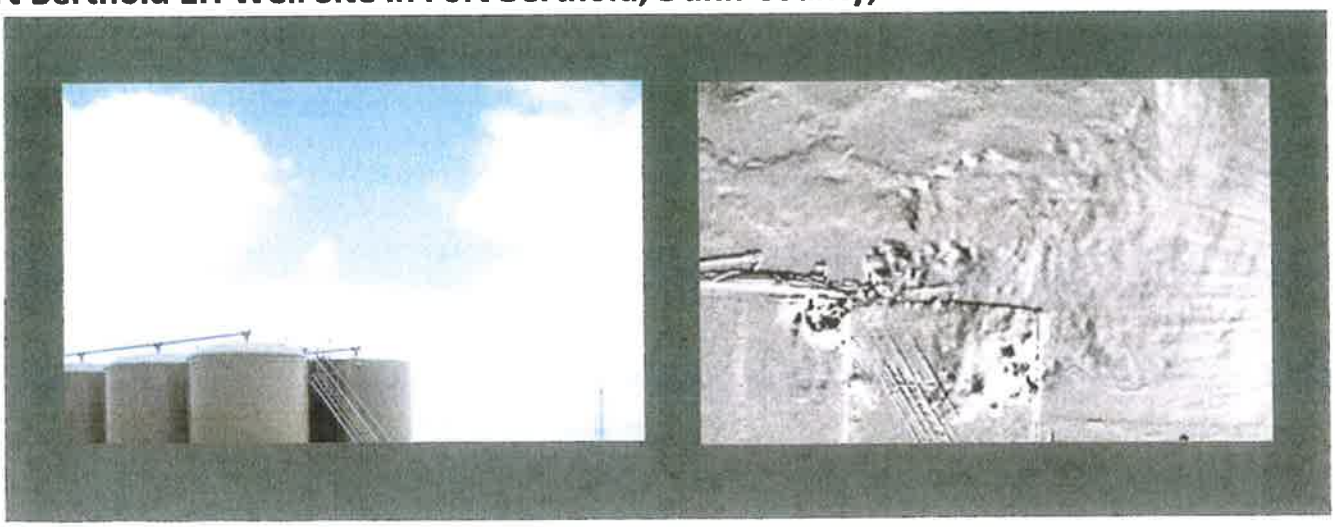
Appendices

The following are side-by-side visual comparisons of wells under NSPS rule jurisdiction. On the left are images of methane releases, which to the naked eye, are invisible. On the right are images of the same methane releases using Forward-Looking Infrared (FLIR) technology, which captures and depicts the methane gas as it is released into the atmosphere.

HRC Operating 13H Well Site in Fort Berthold, Dunn County, North Dakota



Fort Berthold 1H Well Site in Fort Berthold, Dunn County, North Dakota



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Case Studies:
In order to highlight the need for strong waste minimization plans that emphasize preventing waste as soon as a well is producing we investigated two examples of out of control flaring that are presently occurring in North Dakota. Case example one is the Buffalo Pad in Mandaree North Dakota on the Fort Berthold Reservation and Case example two is the Mollet well located near Tioga, ND. Both case examples will emphasize the need for waste minimization planning, but also help counter the industry argument that oil and gas operators are doing everything imaginable to capture gas.

Case Example 1: Buffalo Pad (Mandaree, ND Fort Berthold)

At present oil and gas wells are flaring in some cases continuously for years on public and tribal lands. In order to illustrate this problem we investigated a leasehold on the Fort Berthold Indian Reservation, which has ten producing oil wells. For the purposes of this section we will call this leasehold the "Buffalo Pad". Buffalo Pad has ten producing wells, five of which were drilled in February of 2013, and five of which were drilled in September 2013[1]. The reason we decided to highlight Buffalo Pad was because locals alerted us about it as a leasehold that had been flaring since it was first drilled.

By searching through production data on the North Dakota Department of Mineral Resources website corresponding to the wells on the leasehold we were able to ascertain what months wells on the leasehold were flaring and how much they were flaring. The Buffalo Pad began drilling for oil and gas in February 2013 when the first five wells were drilled. This means that between February 2013-February 2016 there are 36 months where the Buffalo Pad was producing oil and associated gas. We found that since the leasehold was first drilled in February 2013 there was only one month where all the wells on the leasehold were capturing 100 percent of their associated gas, that month was November 2014. This means that flaring/venting has occurred on at least one well on the leasehold for the other 35 of 36 months in which the Buffalo Pad has been producing oil and gas. We also also found that flaring occurred continuously on at least one well on the Buffalo Pad for the first 21 months of its existence based on the production data we looked at from the Department of Mineral Resources[2].

This finding is alarming and highlights the need for waste minimizations plans, which force companies to show how they are going to capture as soon as production occurs. In our comments regarding waste minimization plans we advocate for waste minimization plans that show that at worst a company will maximize gas capture.

Buffalo Pad also further highlights the need for the provision in the rule under section 3179.10(b), which allows the BLM to delay APDs or put conditions on ADPs including production restrictions on APDs if gas-gathering capacity is not available for a given leasehold. In the case of Buffalo Pad it is clear that when the wells were drilled there was

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not sufficient gas gathering capacity to ensure the gas on the leasehold was captured. If the BLM was given the discretion under 3179.10(b) to delay APDs until sufficient gas capture infrastructure is in place when prior to the permitting of the the Buffalo Pad, the BLM could have delayed the approval of the majority of the ten wells on Buffalo Pad until sufficient gas capture infrastructure was in place, or put production restrictions on the wells until sufficient gas gathering infrastructure was put in place.
Table showing when wells are flaring/venting on Buffalo Pad:

Key to chart:
Red- flaring,
Green-no flaring
Blank- well not drilled yet

Month of Production	NDIC # 23093	NDIC # 23094	NDIC# 23095	NDIC# 23096	NDIC# 23097	NDIC# 23098	NDIC# 23099	NDIC# 23100	NDIC# 23101	NDIC# 23102
2-2013										
3-2013										
4-2013										
5-2013										
6-2013										
7-2013										
8-2013										
9-2013										
10-2013										
11-2013										
12-2013										
1-2014										
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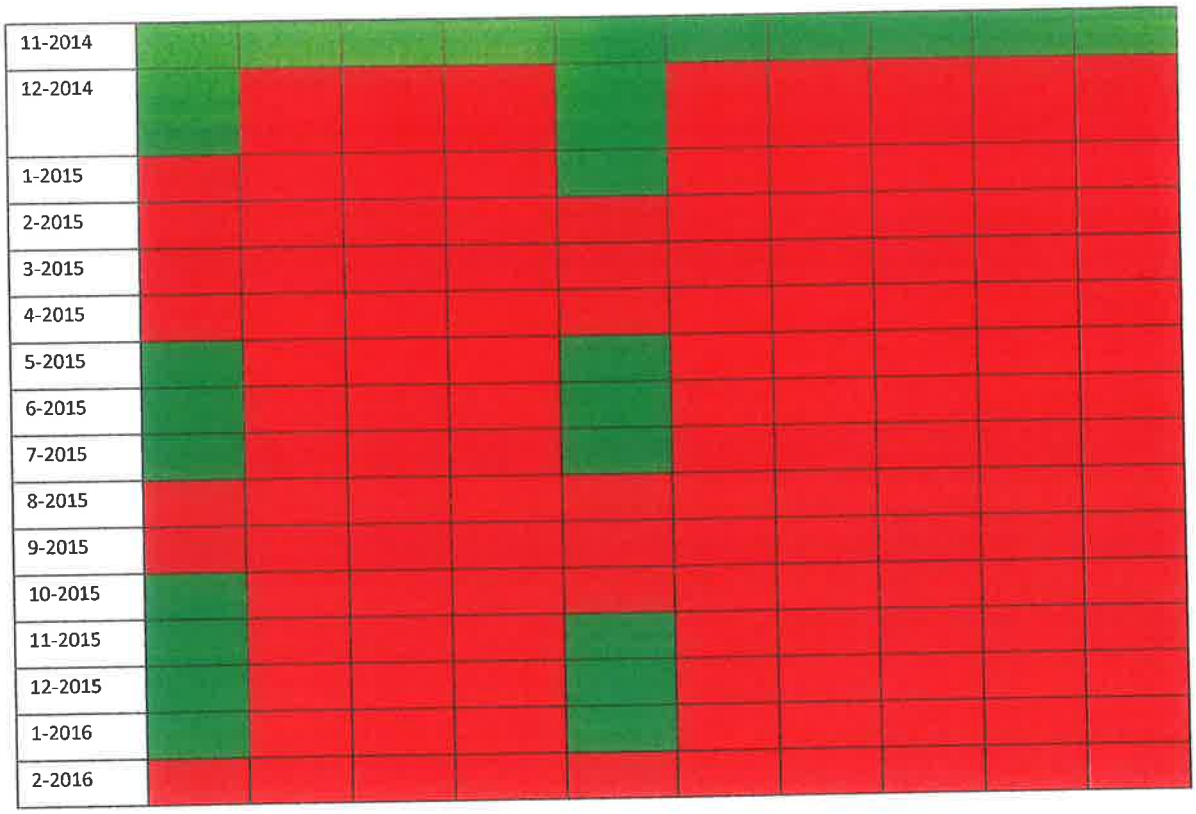

Case Example Two: Mollet Well (East Tioga Field North Dakota):

We were given another tip from a local in North Dakota that had to do with a well that had been flaring for more than 7 years near Tioga in the East Tioga Oil Field. The well named the Mollet well is owned by Hess Corporation and was drilled in May of 2008. Since May 2008 the Mollet well has been flaring almost non-stop. There are many similarities to the Buffalo Pad wells and the Mollet well in that flaring in both instances is occurring in almost every month since the leasehold was drilled. The Mollet well like the Buffalo Pad is in an established field and though it is not under the jurisdiction of the BLM, if it were it would not meet the criteria for a flaring exemption because it is in close proximity to the Tioga Gas Processing plant, which is less than 10 miles away from the well[3]. Interestingly this well has been continually given flaring exemptions even with the existing North Dakota flaring policy in effect, which allows the North Dakota Industrial Commission to curtail offenders that have been flaring 100 percent of their associated gas. Though this well is not under the jurisdiction of BLM, it highlights why requiring waste minimization plans is effective. If the Mollet well were under the jurisdiction of the BLM, and the BLM required the submission of detailed waste minimization plans, which require companies to provide a methane capture strategy, which contained detailed actions and timetables for capture infrastructure, the use methane emissions reduction equipment, and detailed operating practices to minimize waste, as we set out in our comments, there is no way that the Mollet well would have been permitted because

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clearly there has been zero thought about the possibility of gas capture by the wells operator since the well was drilled in 2008.

Below showing the months of production associated with the Mollet well and when the well was flaring or not.

Key to chart:
Red-flaring
Purple- No Oil Production
Blue-Less than 10 Barrels of Oil Production
Green- no flaring

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Month of Production	Mollet Well (NDIC # 17074)	Month of Production	Mollet Well (NDIC # 17074)
2/16		3/12	
1/16		2/12	
12/15		1/12	
11/15		12/11	
10/15		11/11	
9/15		10/11	
8/15		9/11	
7/15		8/11	
6/15		7/11	
5/15		6/11	
4/15		5/11	
3/15		4/11	
2/15		3/11	
1/15		2/11	
12/14		1/11	
11/14		12/10	
10/14		11/10	
9/14		10/10	
8/14		9/10	
7/14		8/10	
6/14		7/10	
5/14		6/10	
4/14		5/10	
3/14		4/10	
2/14		3/10	
1/14		2/10	
12/13		1/10	
11/13		12/9	
10/13		11/9	
9/13		10/9	
8/13		9/9	
7/13		8/9	

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6/13		7/9	
5/13		6/9	
4/13		5/9	
3/13		4/9	
2/13		3/9	

1/13		2/9	
12/12		1/9	
11/12		12/8	
10/12		11/8	
9/12		10/8	
8/12		9/8	
7/12		8/8	
6/12		7/8	
5/12		6/8	
4/12		5/8	

The mission of DRC is to promote sustainable use of natural resources and family-owned and operated agriculture by building enduring, democratic local groups that empower people to influence decisionmaking processes that affect their lives and communities.

FOR IMMEDIATE RELEASE: April 27, 2016

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Note: Avner Vengosh is available for additional comment at 919.681.8050 or vengosh@duke.edu.

Contamination in ND linked to fracking spills

Duke University study shows evidence of "widespread and persistent" contamination, with clear effects on downstream water and soil

BISMARCK, N.D. – Accidental wastewater spills from fracking-related oil production in North Dakota have caused widespread water and soil contamination, a new Duke University study finds.

Researchers found high levels of ammonium, selenium, lead and other toxic contaminants as well as high salts in the brine-laden wastewater, which primarily comes from hydraulically fractured oil wells in the Bakken region of western North Dakota.

In 2015, members of Dakota Resource Council accompanied Dr. Avner Vengosh and others from Duke University to spill sites to collect samples, also taking them on a tour of the Mandaree area. At one site, the researchers were still able to detect high levels of contaminants in spill water four years after the spill occurred.

Streams polluted by the wastewater contained levels of contaminants that often exceeded federal guidelines for safe drinking water or aquatic health.

Soil at the spill sites was contaminated with radium, a naturally occurring radioactive element found in brines, which chemically attached to the soil after the spill water was released.

"Until now, research in many regions of the nation has shown that contamination from fracking has been fairly sporadic and inconsistent," said Dr. Avner Vengosh, professor of geochemistry and water quality at Duke's Nicholas School of the Environment. **"In North Dakota, however, we find it is widespread and persistent, with clear evidence of direct water contamination from fracking."**

"Many smaller spills have also occurred on tribal lands, and as far as we know, no one is monitoring them," Vengosh added. "People who live on the reservations are being left to wonder how it might affect their land, water, health and way of life."

"No matter what jurisdiction these spills are happening in, we must figure out both how to handle them and how to prevent them," DeVille said. "This kind of contamination is an immeasurable cost to tribal members across North Dakota who face virtually unregulated oil and gas development that has clear and lasting impacts downwind and downstream." Ph.D. student Jennifer Harkness co-authored the study with Vengosh and Lauer.

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Photos from the collection study can be found here:
https://nicholas.duke.edu/about/news/ContaminationinNDLinkedtoFrackingSpills

A copy of the report can be found here:

CITATION: "Brine Spills Associated with Unconventional Oil Development in North Dakota," Nancy E. Lauer, Jennifer S. Harkness, Avner Vengosh. *Environmental Science & Technology*, April 27, 2016. DOI: 10.1021/acs.est.5b06349

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