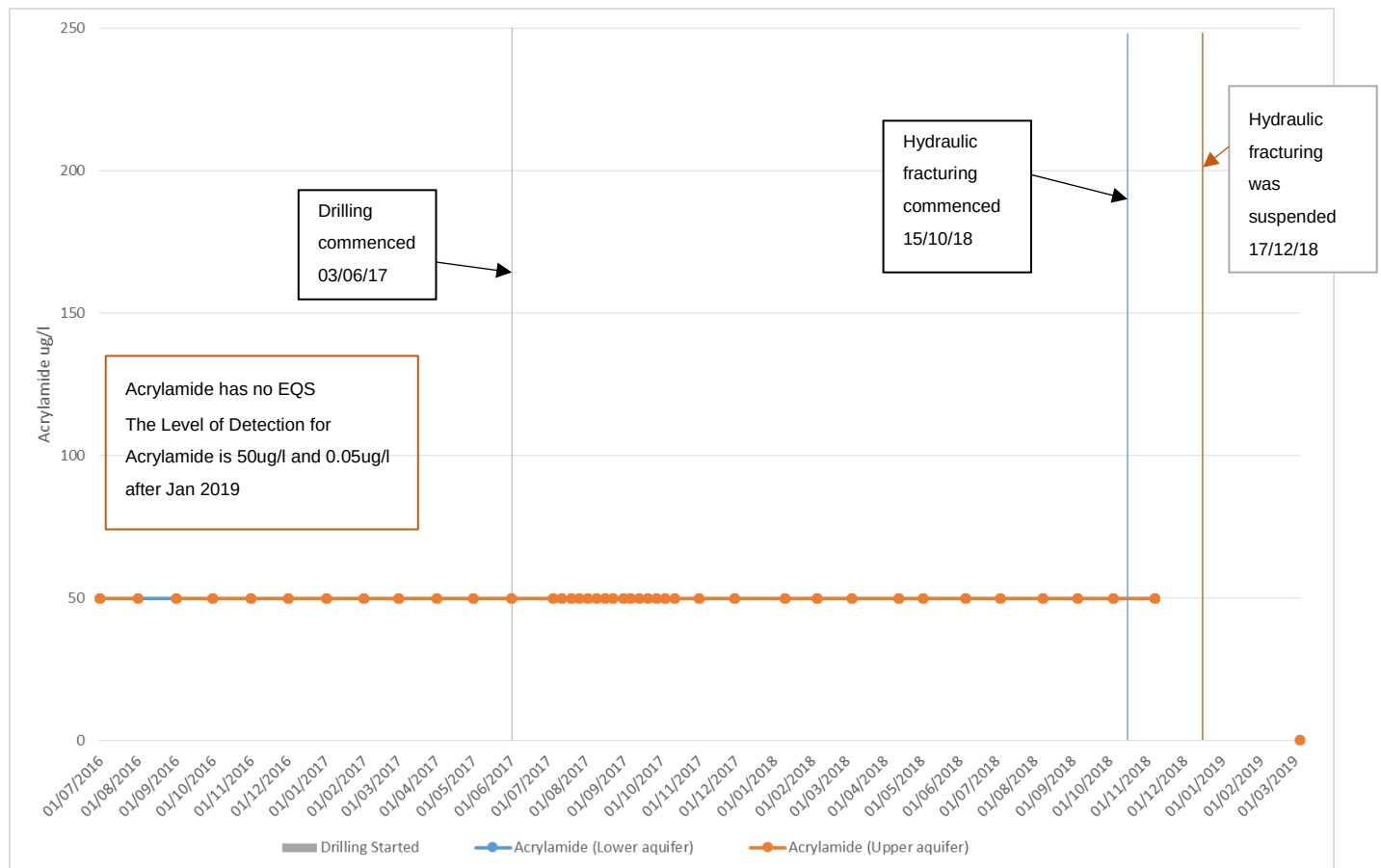


Preston New Road Groundwater Monitoring Data Q1 2019

The following report includes Cuadrilla's quarterly groundwater monitoring data for Q1 2019 (January-March 2019).

Acrylamide

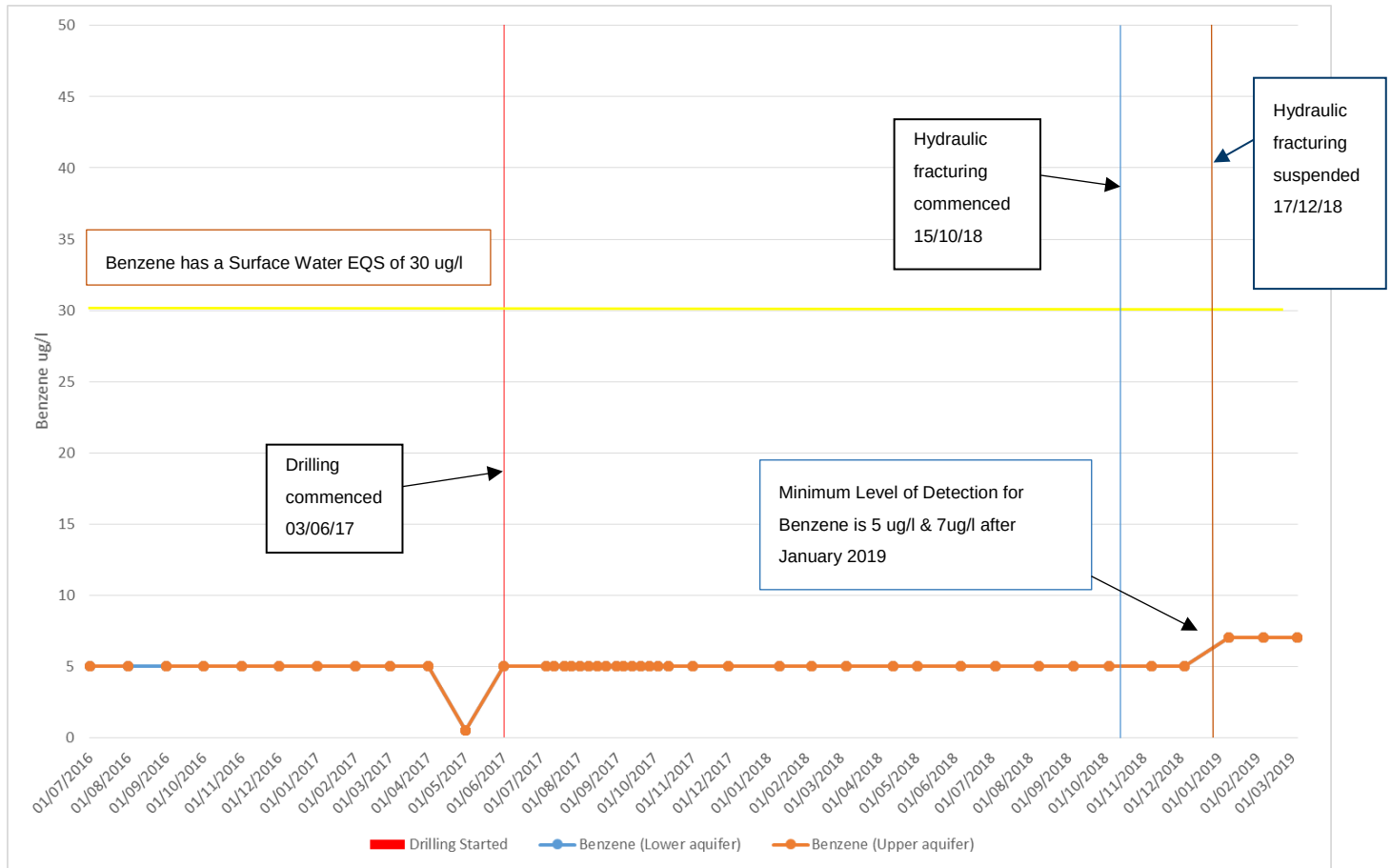
Groundwater Monitoring Preston New Road Acrylamide in 2 aquifers Quarter 1 2019



No results for acrylamide were received for December 2018, January and February 2019. Please see CAR Form UP3431VF/0337394 for our investigation into this.

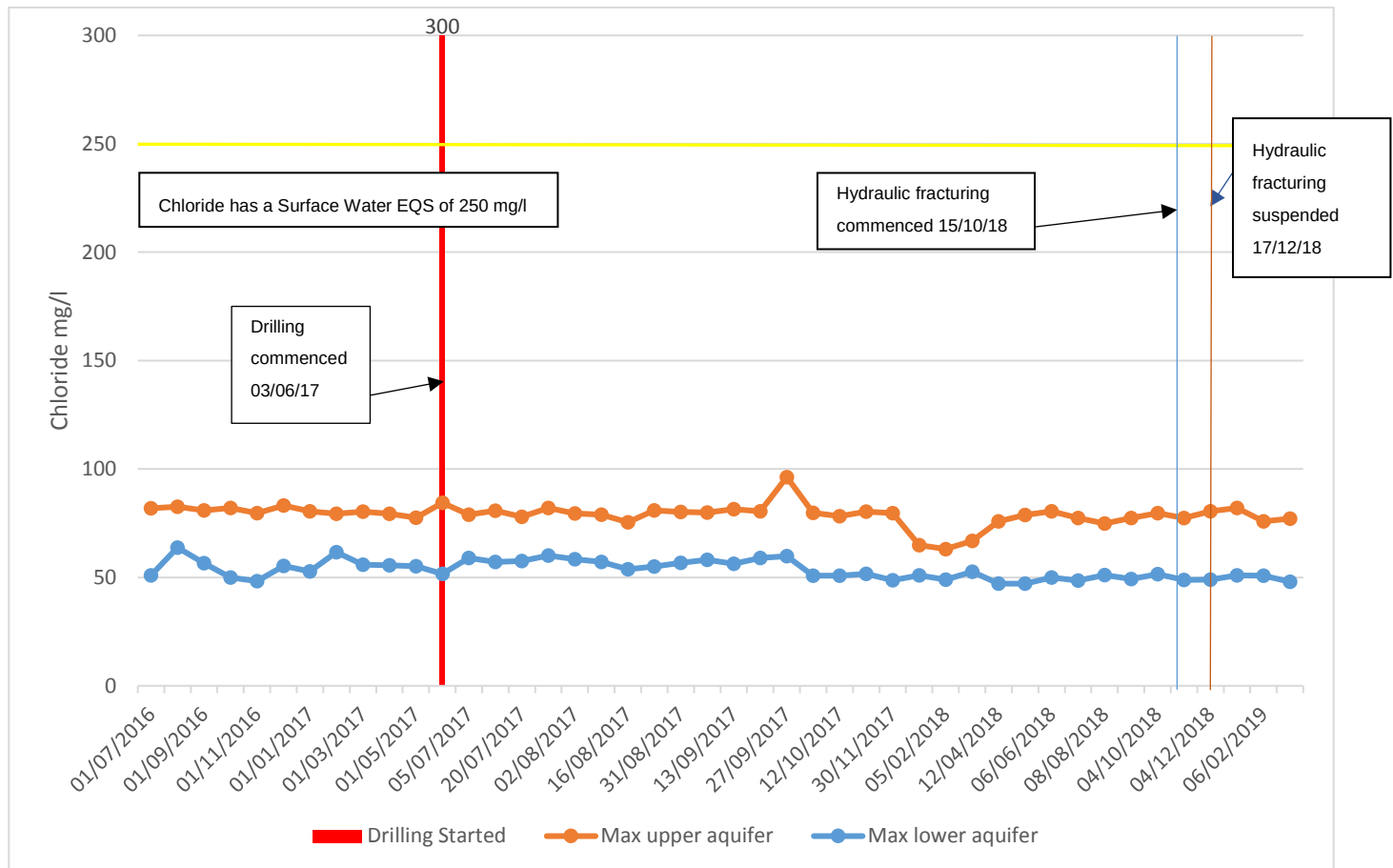
Benzene

Groundwater Monitoring Preston New Road Benzene in 2 Aquifers (Maximum Values) Quarter 1 2019



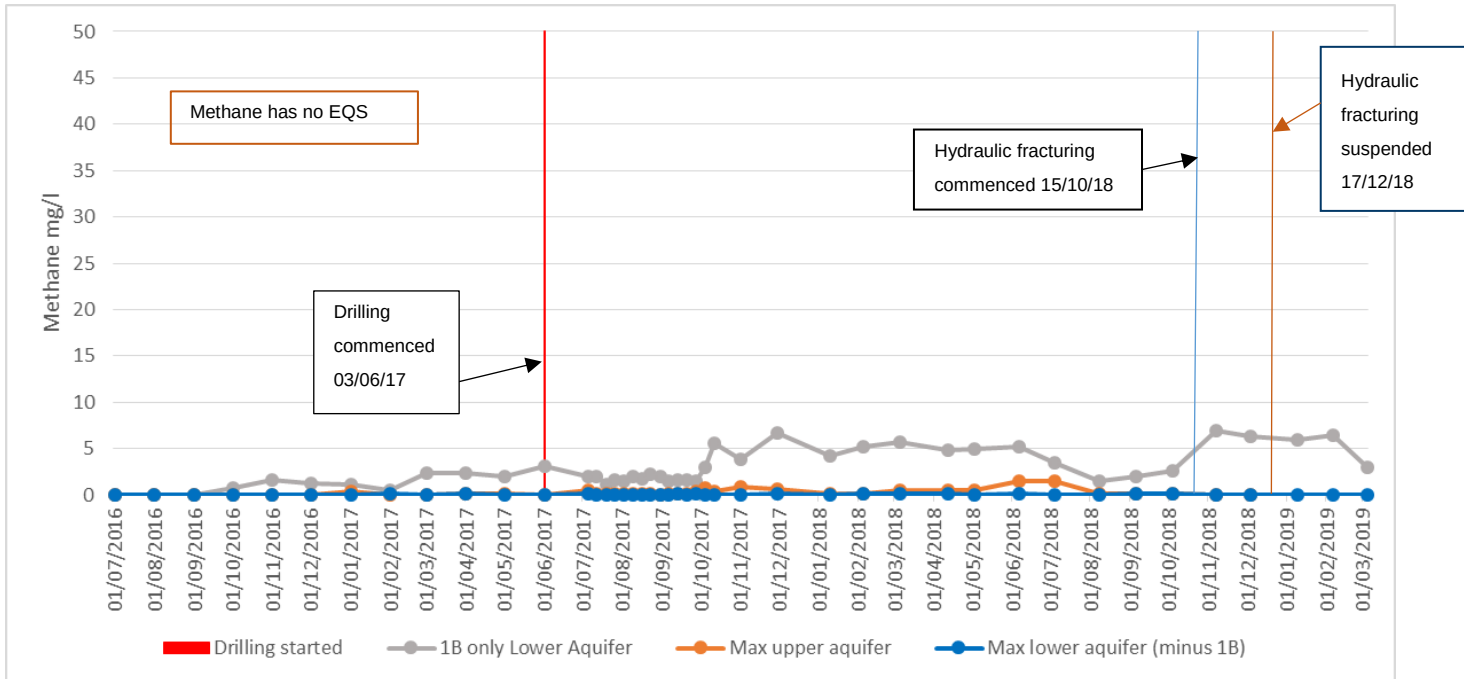
Chloride

Groundwater Monitoring Preston New Road Chloride in 2 Aquifers (Maximum Values) Quarter 1 2019



Methane

Groundwater Monitoring Preston New Road Methane in 2 aquifers (Maximum Values) Quarter 1 2019



Cuadrilla Preston New Road Groundwater Quality Monitoring Q1 2019 - Upper Aquifer

Cuadrilla Preston New Road Upper Aquifer Groundwater monitoring data Q1 2019																		
January - March 2019																		
Substance/ Parameter	Units	BH01 (A)			BH02(A)			BH03(A)			BH04(A)				Q1 Data		Pre Frack	
		09-Jan-19	06-Feb-19	05-Mar-19	10-Jan-19	06-Feb-19	06-Mar-19	09-Jan-19	06-Feb-19	05-Mar-19	09-Jan-19	06-Feb-19	05-Mar-19		Min	Max	Min	Max
Dissolved Aluminium #	ug/l	<10	<10	189	<10	<10	<10	<10	<10	<10	<10	<10	<10		0	0	20	45
Dissolved Mercury #	ug/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		0	0	1	1
Dissolved Antimony #	ug/l	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		0	0	2	3
Dissolved Arsenic #	ug/l	0.79	<0.5	0.542	0.723	1.89	0.586	1.44	0.892	1.5	0.53	<0.5	0.711	0.534	1.44	2.5	12.7	
Dissolved Barium #	ug/l	241.00	167	176	104	63	110	53.50	50.3	54.1	155.00	153	157	53.5	241	37	421	
Dissolved Beryllium	ug/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0	0	0.5	0.5	
Dissolved Boron	ug/l	37.40	30.1	26.7	42.5	49.8	39.2	48.20	56.2	54.6	26.10	28.6	27.9	26.1	49.8	12	60	
Dissolved Cadmium #	ug/l	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	0	0.5	0.5	
Total Dissolved Chromium #	ug/l	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0	1.5	6.8	
Dissolved Cobalt #	ug/l	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0	2	2	
Dissolved Copper #	ug/l	<0.3	0.395	0.963	<0.3	<0.3	0.438	<0.3	<0.3	<0.3	<0.3	<0.3	0.689	<0.3	0.963	7	8	
Dissolved Lead #	ug/l	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	5	5	
Dissolved Lithium	ug/l	7.88	9.11	9.12	11.9	15	11.2	13.40	14.7	14.5	8.58	9.6	9.06	7.88	14.7	5	48	
Dissolved Nickel #	ug/l	1.20	2.6	0.566	<0.4	0.614	<0.4	0.55	0.941	1.29	<0.4	<0.4	<0.4	<0.4	2.6	2	11	
Dissolved Selenium #	ug/l	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	3	10	
Dissolved Strontium	ug/l	255.00	229	245	274	510	305	569.00	539	606	231.00	216	234	216	569	202	649	
Dissolved Vanadium #	ug/l	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1.5	2.3	
Dissolved Zinc #	ug/l	4.77	8.68	4.91	<1	16.7	1.47	10.40	11.2	7.91	1.93	4.59	3.6	<1	16.7	0	33	
Dissolved Silver	ug/l	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	5	5	
Dissolved Sodium #	mg/l	31.40	32.4	31.5	27.10	33.2	25.9	32.20	32.5	32.5	41.00	44.8	41.2	25.9	44.8	24.1	42.3	
Dissolved Magnesium #	mg/l	37.20	38.5	37	37.20	37.7	35.1	33.90	36.5	35.8	36.30	38.2	36	33.9	38.5	32.1	39.7	
Dissolved Potassium #	mg/l	2.65	2.78	2.85	2.95	2	3.24	3.40	5.83	2.12	1.80	1.81	1.82	1.8	5.83	1.4	3.3	
Dissolved Calcium #	mg/l	128.00	126	126	120.00	125	132	123.00	127	130	126.00	129	128	120	132	101.9	138	
Total Dissolved Iron #	ug/l	21.80	<19	19.00	41.70	<19	<19	<19	<19	<19	<19	<19	<19	19	41.7	20	2012	
EPH (C8-C40) #	ug/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	0	0	10	620	
GRO (C4-C8) #	ug/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	0	0	10	87	
GRO (C8-C12) #	ug/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	0	0	10	18	
GRO (C4-C12) #	ug/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	0	0	10	101	
MTBE #	ug/l	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	0	0	0.1	5	
Benzene #	ug/l	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	0	0	0.5	5	
Toluene #	ug/l	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	0	0	5	5	
Ethylbenzene #	ug/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	0	0	1	5	
m/p-Xylene #	ug/l	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	0	0	2	5	
o-Xylene #	ug/l	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	0	0	1	5	
Fluoride	mg/l	-	-	<0.5	-	-	<0.5	-	-	<0.5	-	-	<0.5	0	0	0.03	0.4	
Bromide	mg/l	0.18	0.165	0.151	0.158	0.233	0.151	0.152	0.162	0.169	0.188	0.177	0.184	0.151	0.233	0.05	0.18	
Chloride #	mg/l	65.1	61.6	61.9	54.5	55.4	50.6	57.1	53.6	55.1	82	75.9	77.1	50.6	82	24.6	96.3	
Nitrate as NO3 #	mg/l	8.89	8.11	8.8	10.2	<0.0677	9.74	0.459	0.544	0.474	7.19	7.16	7.46	0.459	10.2	0.2	46.5	
Nitrite as NO2 #	mg/l	<0.0152	<0.0152	<0.0152	<0.0152	<0.0152	<0.0152	0.0265	0.0295	0.0304	<0.0152	<0.0152	<0.0152	<0.0152	0.0265	0.02	0.7	
Ammoniacal Nitrogen as NH4 #	mg/l	<0.2	<0.2	<0.2	0.425	<0.2	<0.2	<0.2	<0.2	0.589	<0.2	<0.2	<0.2	<0.2	0.425	0.03	0.66	
Dissolved Ethene #	ug/l	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0	0	1	1	
Dissolved Ethane #	ug/l	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0	0	1	1	
Dissolved Butane	ug/l	-	-	-	-	-	-	-	-	-	-	-	-	0	0	1	2	
Dissolved Propane	ug/l	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0	0	1	2	
Dissolved Methane	mg/l	0.0016	<0.00225	<0.00225	0.00103	<0.00225	<0.00224	0.0433	0.0327	0.0359	0.00125	<0.00225	<0.00225	0.00103	0.0433	0.01	1.45	
Dissolved Carbon Dioxide	mg/l	41.1	23.8	41.4	26.3	20	29.4	24.1	21.5	21.7	31.1	29.5	32.7	20	41.1	17.4	63.2	
613C - CH4	ppm % VPD8	-	-	-	-	-	-	-	-	-	-	-	-	0	0	-74.6	28	
613C - CO2	ppm % VPD8	-	-	-	-	-	-	-	-	-	-	-	-	0	0	-63.9	29.16	
Total Alkalinity as CaCO3 #	mg/l	-	-	-	-	-	-	-	-	-	-	-	-	0	0	250	600	
Acrylamide	ug/l	-	-	<0.05	-	-	<0.05	-	-	<0.05	-	-	<0.05	0	0	50	50	
Laurylamine	ug/l	-	-	-	-	-	-	-	-	-	-	-	-	0	0	50	50	
Hydroxyethyl ethylene diamine	ug/l	-	-	-	-	-	-	-	-	-	-	-	-	0	0	50	50	
Myristyl dimethylamine	ug/l	-	-	-	-	-	-	-	-	-	-	-	-	0	0	50	50	
Octyldimethylamine	ug/l	-	-	-	-	-	-	-	-	-	-	-	-	0	0	50	50	
para phenylene diamine	ug/l	-	-	-	-	-	-	-	-	-	-	-	-	0	0	50	50	
BOD (Settled) #	mg/l	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0	0	1	32	
COD (Settled) #	mg/l	13.3	33.2	56.7	10.5	7.07	9.01	10.9	<7	<7	7.67	<7	<7	7.67	33.2	5	22	
pH #	pH units	7.49	7.99	7.45	7.83	8.01	8	7.69	7.85	7.87	7.37	7.64	7.54	7.37	8.01	6.81	7.95	
Salinity	%	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	0	0	0.1	11.2	
Total Dissolved Solids #	mg/l	574	544	592	558	545	561	584	564	565	579	581	588	544	592	384	2242	
Total Suspended Solids #	mg/l	20.2	30.8	259	<2	26.7	<2	<2	<9	4.45	<2	<9	<2	<2	259	10	7669	

customer service line
03708 506 506

incident hotline
0800 80 70 60

floodline
03459 88 11 88

Interpretation of Data

The data highlighted in yellow show marginal increases over the background monitoring undertaken in the first year, but are not considered to be statistically significant. Data was not received for the following substances:

Acrylamide and fluoride from December 2018 to February 2018 (inclusive), total alkalinity, $\delta^{13}\text{C-CH}_4$, $\delta^{13}\text{C-CO}_2$ (isotopic analysis) and dissolved butane from December 2018 to April 2019 (inclusive).

Our investigation into this missing data is reported in CAR Form UP3431VF/0337394.

Cuadrilla Preston New Road Groundwater Quality Monitoring Q1 2019 - Lower Aquifer

Cuadrilla Preston New Road Lower Aquifer Groundwater monitoring data Q1 2019																	
January - March 2019														Q1 Data		Pre Frack	
Substance/ Parameter	Units	BH01(B)		BH01(B)		BH02(B)		BH03(B)		BH04(B)		BH04(B)		Aquifer B lower		Background	
		09-Jan-19	06-Feb-19	05-Mar-19	10-Jan-19	06-Feb-19	06-Mar-19	09-Jan-19	06-Feb-19	05-Mar-19	09-Jan-19	06-Feb-19	05-Mar-19	Min	Max	Min	Max
Dissolved Aluminium [#]	ug/l	<10	<10	49.1	<10	25.9	<10	<10	<10	<10	<10	<10	<10	0.00	49.10	20	45
Dissolved Mercury [#]	ug/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0	0	1	1
Dissolved Antimony [#]	ug/l	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0	0	2	4
Dissolved Arsenic [#]	ug/l	1.05	1.18	1.65	13.5	0.562	16.8	1.55	1.59	1.61	13.90	14.2	14.8	0.562	16.8	2.5	21.2
Dissolved Barium [#]	ug/l	116.00	89.7	133	68.8	106	77.9	67.00	64.2	68.1	71.30	70.5	73.9	67	116	49	397
Dissolved Beryllium	ug/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0	0	0.5	0.6
Dissolved Boron	ug/l	43.10	46.9	37.5	46.8	37.7	44.7	42.80	47.6	43.1	44.00	44.7	44	37.5	47.6	19	55
Dissolved Cadmium [#]	ug/l	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	0	0	0.5	0.6
Total Dissolved Chromium [#]	ug/l	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0.0	0.0	1.5	6.6
Dissolved Cobalt [#]	ug/l	0.53	<0.5	0.508	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.53	2	2
Dissolved Copper [#]	ug/l	<0.3	<0.3	0.577	<0.3	1.2	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	1.20	7	22
Dissolved Lead [#]	ug/l	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.0	0.0	5	6
Dissolved Lithium	ug/l	11.10	13.8	10.8	14.3	12.5	13.3	13.20	14.4	14.2	12.60	14.7	14.6	10.80	14.70	5	55
Dissolved Nickel [#]	ug/l	<0.4	0.482	1.3	<0.4	1.36	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	1.36	2	20
Dissolved Selenium [#]	ug/l	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0.00	0.0	3	4
Dissolved Strontium	ug/l	230.00	203	270	530	304	629	523.00	484	533	572.00	532	597	203	629	207	683
Dissolved Vanadium [#]	ug/l	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0	0	1.5	2.7
Dissolved Zinc [#]	ug/l	9.07	1.92	4.68	1.21	11.4	1.56	2.00	1.94	1.57	1.25	11.2	2.01	1.21	11.40	0	28
Dissolved Silver	ug/l	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0	0	5	5
Dissolved Sodium [#]	mg/l	50.30	58.5	37.2	29.30	28.8	28.1	26.50	28.3	27.6	28.00	31.3	27.5	26.50	58.50	24.9	53.1
Dissolved Magnesium [#]	mg/l	37.10	39.9	38.8	36.80	39.1	34.8	33.10	35.5	34.2	35.70	37	37.1	33.10	39.90	31.4	40
Dissolved Potassium [#]	mg/l	1.88	1.65	2.15	1.79	3.07	1.95	2.05	2.08	2.09	1.93	1.92	1.97	1.65	3.07	1.6	3.7
Dissolved Calcium [#]	mg/l	105.00	102	120	120.00	124	125	122.00	122	124	126.00	127	131	102.00	131.00	98.2	136
Total Dissolved Iron [#]	ug/l	<19	<19	169.00	568.00	<19	664.00	532.00	525.00	540.00	695.00	658.00	737.00	169.00	737.00	20	3472
EPH (C8-C40) [#]	ug/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	0	0	10	11
GRO (C4-C8) [#]	ug/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	0	0	10	60
GRO (C8-C12) [#]	ug/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	0	0	10	51
GRO (C4-C12) [#]	ug/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	0	0	10	97
MTBE [#]	ug/l	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	0	0	0.1	5
Benzene [#]	ug/l	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	0	0	0.5	5
Toluene [#]	ug/l	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	0	0	5	5
Ethylbenzene [#]	ug/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	0	0	1	5
m/p-Xylene [#]	ug/l	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	0	0	2	5
o-Xylene [#]	ug/l	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	0	0	1	5
Fluoride	mg/l	-	-	<0.5	-	-	<0.5	-	-	<0.5	-	-	<0.5	0	0	0.3	1.1
Bromide	mg/l	0.1	0.106	0.16	0.2	<0.06	0.2	0.1	0.144	0.169	0.1	0.156	0.137	0.132	0.166	0.05	0.17
Chloride [#]	mg/l	39.5	30.1	46	51.0	50.8	45.1	49.8	47.1	48	45.6	43.2	44.2	39.5	51	10	63.8
Nitrate as NO3 [#]	mg/l	1.3	1.07	1.87	0.1	8.5	<0.0677	<0.0677	<0.0677	<0.0677	<0.0677	<0.0677	<0.0677	0.117	1.32	0.2	15.1
Nitrite as NO2 [#]	mg/l	<0.0152	0.0323	0.0219	<0.0152	<0.0152	<0.0152	<0.0152	<0.0152	<0.0152	<0.0152	<0.0152	<0.0152	0	0	0.02	0.24
Ammoniacal Nitrogen as NH4 [#]	mg/l	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0	0	0.03	0.41
Dissolved Ethene [#]	ug/l	<19.3	<19.7	<19.7	<1	<1	<1	<1	<1	<1	<1	<1	<1	0	0	1	1
Dissolved Ethane [#]	ug/l	<20.7	<21.1	<21.1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0	0	1	1
Dissolved Butane	ug/l	-	-	-	-	-	-	-	-	-	-	-	-	0	0	2	2
Dissolved Propane	ug/l	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0	0	2	2
Dissolved Methane	mg/l	6.0	6.4	3.0	0.0	<0.00225	<0.00224	0.0	0.0	0.0	0.0	0.0	0.0	0.00118	6.39	0.01	6.66
Dissolved Carbon Dioxide	mg/l	30.5	30.5	29.6	25.7	20.3	24.4	23.9	20.6	21.3	26.7	26.7	29.4	23.9	30.5	9.8	47.9
δ13C - CH4	ppm ‰ VPDB	-	-	-	-	-	-	-	-	-	-	-	-	0	0	-73.6	0
δ13C - CO2	ppm ‰ VPDB	-	-	-	-	-	-	-	-	-	-	-	-	0	0	-35.3	27.2
Total Alkalinity as CaCO3 [#]	mg/l	-	-	-	-	-	-	-	-	-	-	-	-	0	0	262	510
Acrylamide	ug/l	-	-	<0.05	-	-	<0.05	-	-	<0.05	-	-	<0.05	0	0	50	50
Laurylamine	ug/l	-	-	-	-	-	-	-	-	-	-	-	-	0	0	50	50
Hydroxyethyl ethylene diamine	ug/l	-	-	-	-	-	-	-	-	-	-	-	-	0	0	50	50
Myristyl dimethylamine	ug/l	-	-	-	-	-	-	-	-	-	-	-	-	0	0	50	50
Octyldimethylamine	ug/l	-	-	-	-	-	-	-	-	-	-	-	-	0	0	50	50
para phenylene diamine	ug/l	-	-	-	-	-	-	-	-	-	-	-	-	0	0	50	50
BOD (Settled) [#]	mg/l	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0	0	1	15
COD (Settled) [#]	mg/l	7.4	8.9	7.12	10.7	9.17	8.5	<7	10.4	13.2	<7	7.41	7.41	7.39	13.2	7	26
pH [#]	pH units	7.5	7.92	7.67	7.7	7.71	7.9	7.8	8.08	8.05	7.5	7.88	7.68	7.45	7.85	6.84	8.06
Salinity	‰	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	0	0	0.1	10.2
Total Dissolved Solids [#]	mg/l	558.0	537	557	545.0	550	555.0	521.0	525	547	577.0	558	551	521	577	393	901
Total Suspended Solids [#]	mg/l	<2	35	3.7	<2	55.3	4.6	2.0	<9	6	<2	<9	2.4	2	4.55	10	8891

customer service line
03708 506 506

incident hotline
0800 80 70 60

floodline
03459 88 11 88

Interpretation of Data

The data highlighted in yellow show marginal increases over the background monitoring undertaken in the first year, but are not considered to be statistically significant. Dissolved methane is seen to increase against the background maximum recorded within the 1st year in BH 1(B). The British Geological Survey have also detected methane in other parts of the aquifer and stated that methane (CH₄) is also often detected, though rarely at high concentrations. The composition of methane, where present, suggests that it has been produced in the superficial sediments by microbial reaction of organic matter.

Data was not received for the following substances:

Acrylamide and fluoride from December 2018 to February 2018 (inclusive), total alkalinity, $\delta^{13}\text{C-CH}_4$, $\delta^{13}\text{C-CO}_2$ (isotopic analysis) and dissolved butane from December 2018 to April 2019 (inclusive).

Our investigation into this missing data is reported in CAR Form UP3431VF/0337394.