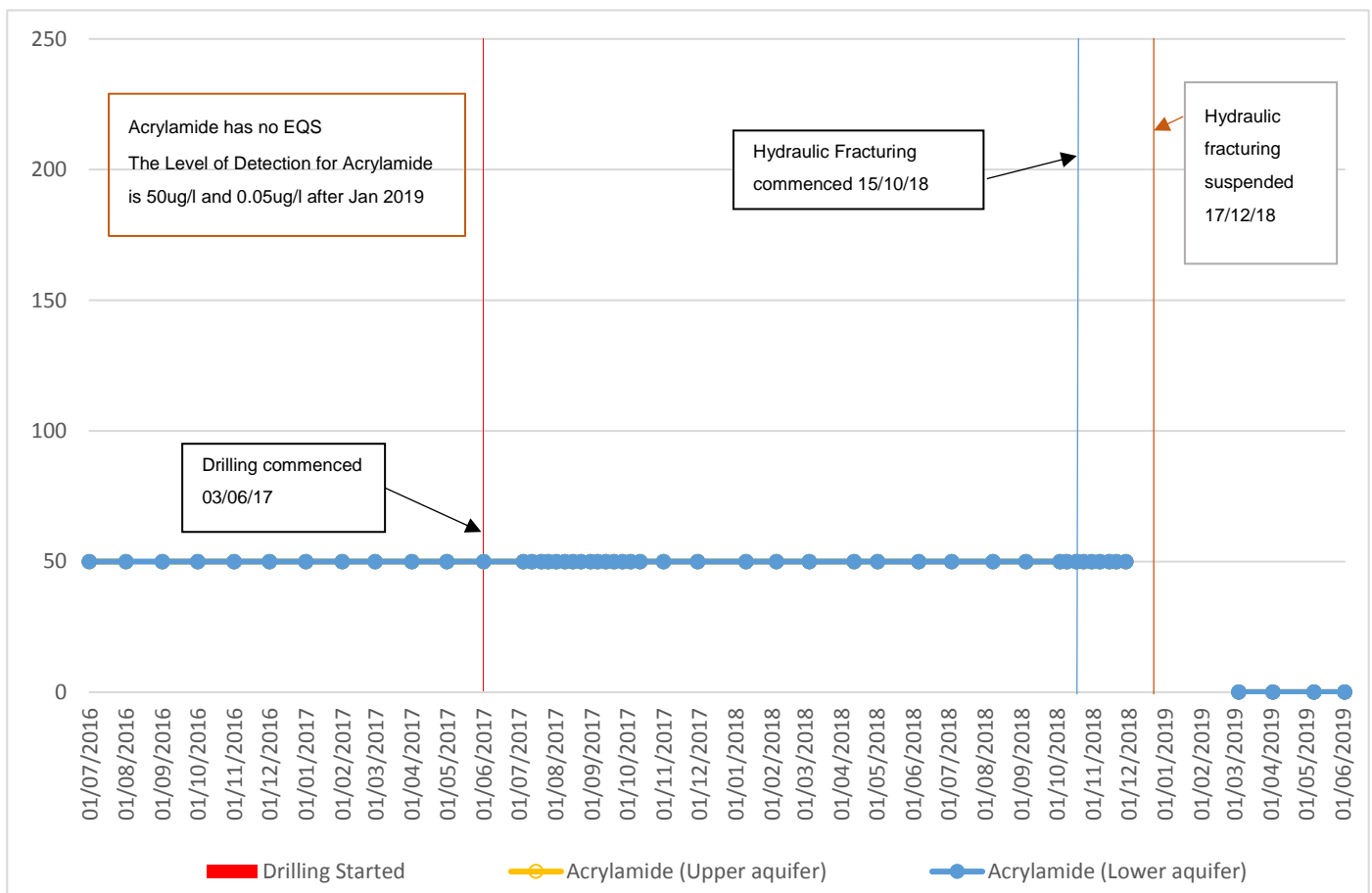


Preston New Road Groundwater Monitoring Data Q2 2019

The following report includes Cuadrilla's quarterly groundwater monitoring data for Quarter 2 2019 (April-June 2019).

Acrylamide

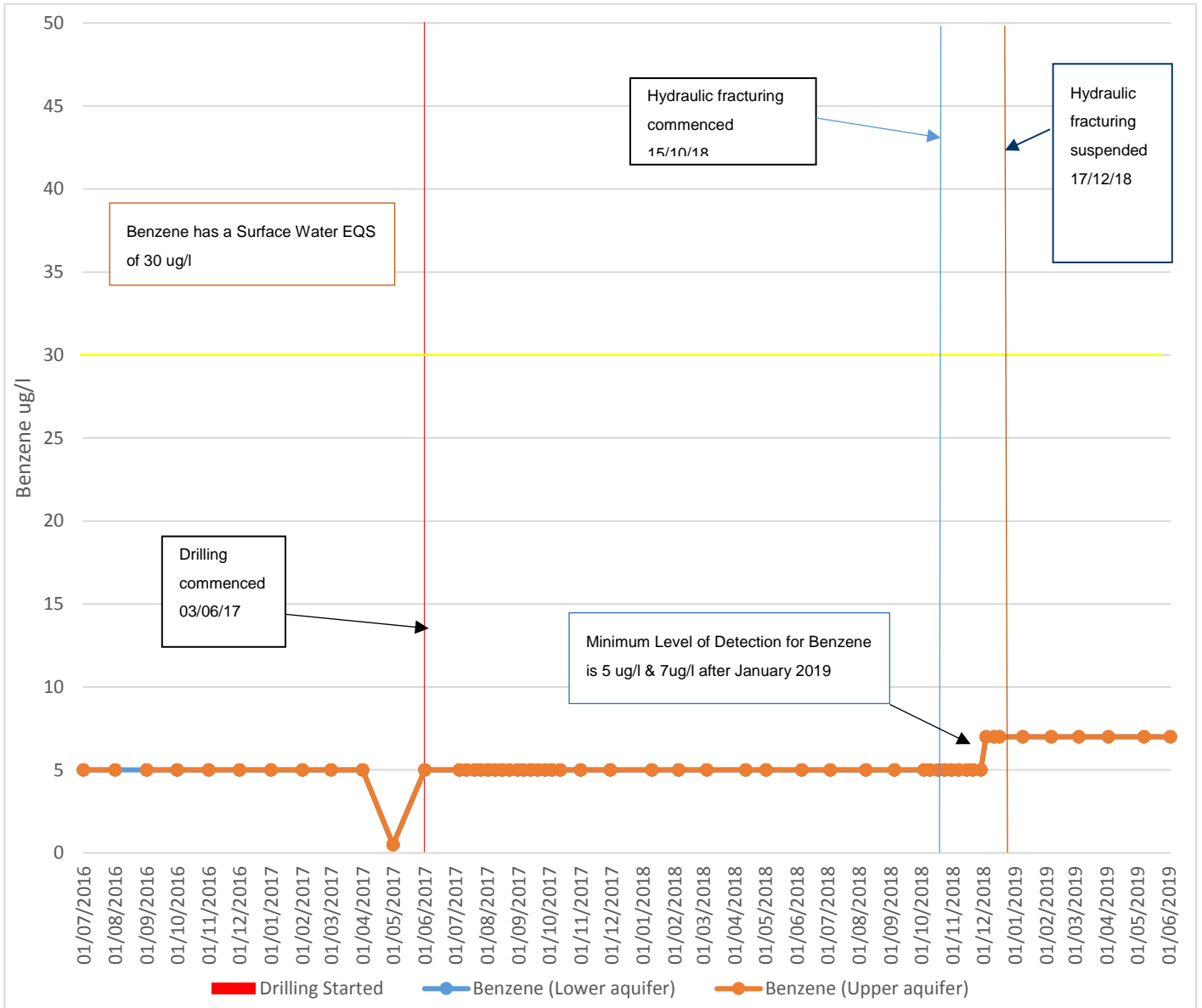
Groundwater Monitoring Preston New Road Acrylamide in 2 aquifers Q2 2019



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

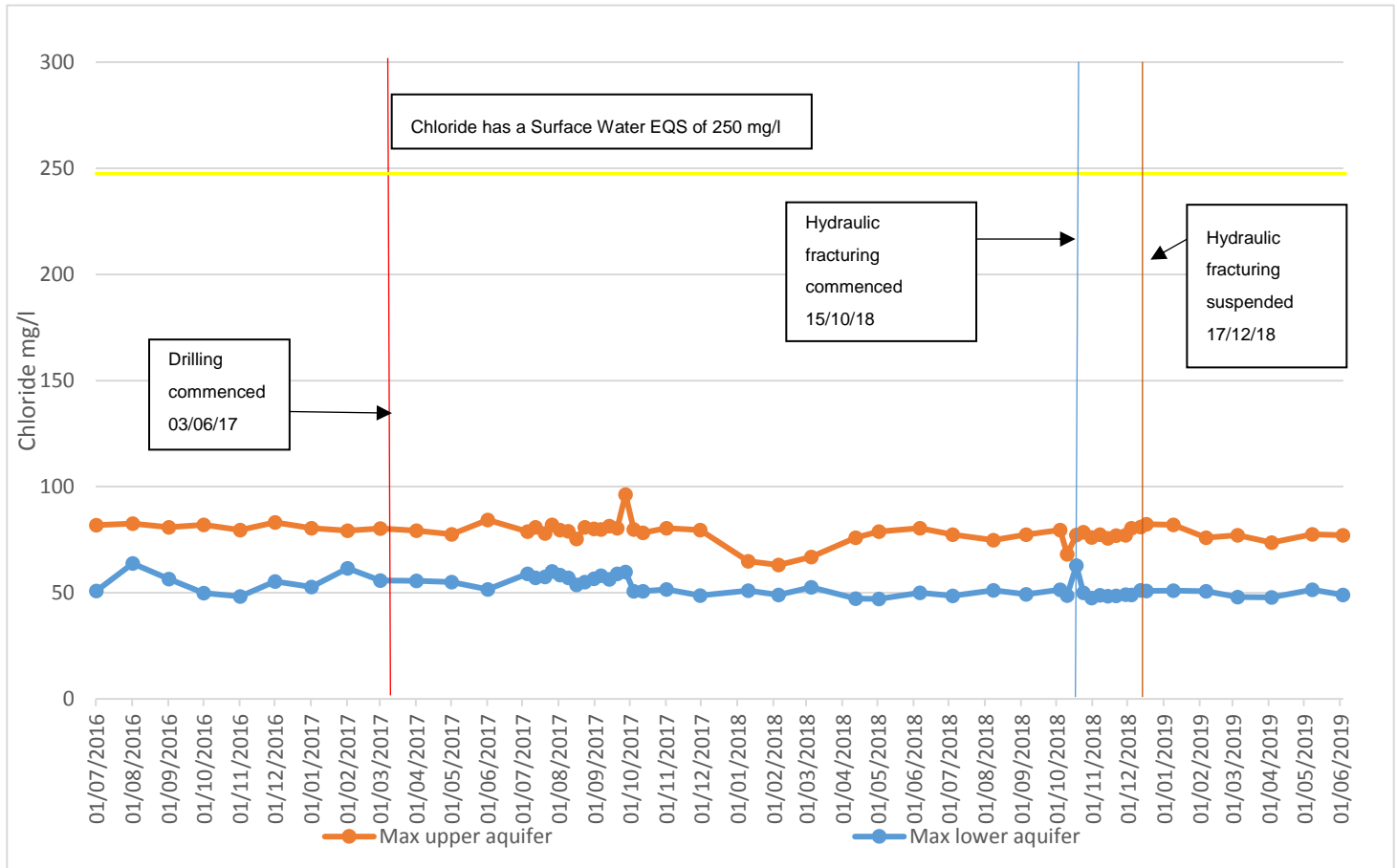
Benzene

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



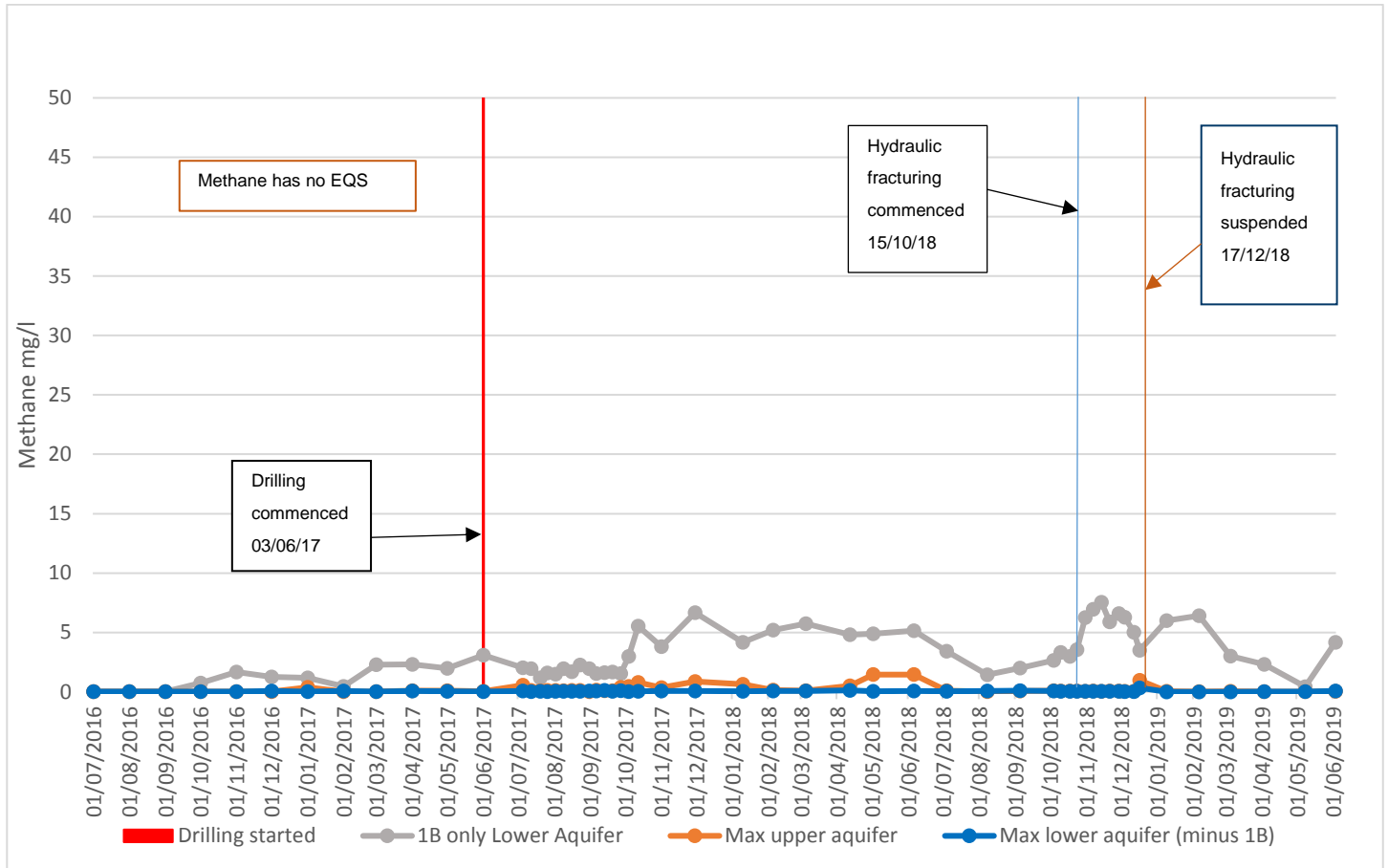
Chloride

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



Methane

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



Cuadrilla Preston New Road Groundwater Quality Monitoring Q2 2019 - Upper Aquifer

Substance/ Parameter	Cuadrilla Preston New Road Upper Aquifer Q2 Groundwater Monitoring data 2019														Pre Frack	
	1A			2A			3A			4A			Q2 assess		uffer A upper	
	03-Apr-19	08-May-19	03-Jun-19	04-Apr-19	09-May-19	04-Jun-19	03-Apr-19	08-May-19	03-Jun-19	03-Apr-19	08-May-19	03-Jun-19	Min	Max	Min	Max
Dissolved Aluminium #	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	20	45
Dissolved Mercury #	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1	1
Dissolved Antimony #	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	2	3
Dissolved Arsenic #	<0.5	<0.5	0.688	0.612	0.678	0.716	1.09	0.769	1.02	<0.5	<0.5	<0.5	<0.5	1.09	2.5	12.7
Dissolved Barium #	175	169	214	108	109	110	50.6	49.4	53.7	144	146	159	49.4	214	37	421
Dissolved Beryllium	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.5	0.5
Dissolved Boron	34.7	24.5	33.4	27.1	29.3	45.9	63.5	44.2	55.6	34.1	20.6	32	20.6	63.5	12	60
Dissolved Cadmium #	<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	<0.08	0.5	0.5
Total Dissolved Chromium #	<1	<1	<1	<1	1.07	<1	<1	<1	<1	<1	<1	<1	<1	1.07	1.5	6.8
Dissolved Cobalt #	<0.5	<0.5	0.511	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.511	2	2
Dissolved Copper #	0.756	0.687	<0.3	0.404	0.51	0.767	<0.3	<0.3	<0.3	2.26	1.9	<0.3	<0.3	2.26	7	8
Dissolved Lead #	<0.2	<0.2	<0.2	<0.2	<0.2	0.485	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.485	5	5
Dissolved Lithium	8.88	8.82	9.48	10.8	11.4	11.1	15.6	13.8	14.6	9.78	9.37	9.91	8.82	15.6	5	48
Dissolved Nickel #	0.418	<0.4	0.905	<0.4	<0.4	<0.4	0.961	0.87	0.969	<0.4	<0.4	<0.4	<0.4	0.969	2	11
Dissolved Selenium #	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	3	10
Dissolved Strontium	240	231	253	294	298	304	554	556	585	220	220	235	220	585	202	649
Dissolved Vanadium #	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1.5	2.3
Dissolved Zinc #	4.4	3.59	7.23	1.03	7.93	3.77	9.02	10.6	11	10.2	6.09	1.07	1.03	10.6	0	33
Dissolved Silver	<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 #	30.1	30.9	34.4	26.4	26.2	26.6	31.4	31.2	33	40.1	40.2	42.9	26.2	42.9	24.1	42.3
Dissolved Magnesium #	35.5	36.7	37.8	35.9	35.6	37	35.4	34.9	35.8	35.2	35	37.4	34.9	37.8	32.1	39.7
Dissolved Potassium #	2.57	2.54	3.02	3.12	3.22	3.38	1.98	2.04	2.22	1.75	1.78	1.86	1.75	3.38	1.4	3.3
Dissolved Calcium #	114	121	125	125	122	123	118	118	123	112	118	127	112	127	101.9	138
Total Dissolved Iron #	<19	<19	<19	<19	<19	<0.019	<19	<19	<19	<19	<19	<19	<19	<19	20	2012
EPH (C8-C40) #	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	10	620
GRO (C4-C8) #	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	10	87
GRO (C8-C12) #	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	10	18
GRO (C4-C12) #	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	10	101
MTBE #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	0.1	5
Benzene #	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	0.5	5
Toluene #	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	5	5
Ethylbenzene #	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	1	5
m/p-Xylene #	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	2	5
o-Xylene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	1	5
Fluoride	<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	0.03	0.4
Bromide	0.155	0.151	0.178	0.167	0.16	0.168	0.159	0.184	0.156	0.17	0.194	0.208	0.151	0.194	0.05	0.18
Chloride #	60.9	62.4	61.6	51.1	51.4	50.4	53	55.4	55.1	73.7	77.5	77.1	50.4	77.5	24.6	96.3
Nitrate as NO3 #	9.19	8.95	8.64	9.86	9.75	9.88	0.454	0.527	0.41	7.09	6.87	6.55	0.41	9.88	0.2	46.5
Nitrite as NO2 #	<0.0152	<0.0152	<0.0152	<0.0152	<0.0152	<0.0152	0.0253	0.0323	0.021	<0.0152	<0.0152	<0.0152	<0.0152	0.0253	0.02	0.7
Ammoniacal Nitrogen as NH4 #	<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	0.03	0.66
Dissolved Ethene #	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	1
Dissolved Ethane #	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	1
Dissolved Butane	-	<2	<2	-	<2	<2	-	<2	<2	-	<2	<2	<2	<2	1	2
Dissolved Propane	<1	<1	<2	<1	<1	<2	<1	<1	<2	<1	<1	<2	<1	<2	1	2
Dissolved Methane	<0.001	<0.00244	<0.001	<0.00223	<0.00222	<0.001	0.0201	0.00877	0.036	<0.001	<0.00244	<0.001	<0.001	0.036	0.01	1.45
Dissolved Carbon Dioxide	32.4	38.6	102.6	32.2	29	101.4	21.5	20.2	87.871	28.6	26.2	97.941	21.5	102.6	17.4	63.2
δ13C - CH4	-	-	NDP	-	-	NDP	-	-	NDP	-	-	NDP	-	NDP	-74.6	28
δ13C - CO2	-	-	-23.6	-	-	-23.4	-	-	-21.6	-	-	-23.6	-21.6	-23.6	-63.9	29.16
Total Alkalinity as CaCO3 #	-	355	358	-	295	340	-	335	329	-	360	357	295	360	250	600
Acrylamide	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	50	50
BOD (Settled) #	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	32
COD (Settled) #	90.9	9.94	26.6	<7	<7	<7	<7	<7	<7	8.82	<7	10.9	<7	90.9	5	22
pH #	7.7	7.85	7.68	7.66	7.79	7.6	7.72	7.84	7.77	7.72	7.65	7.77	7.6	7.79	6.81	7.95
Salinity	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	0.1	11.2
Total Dissolved Solids #	576	564	607	568	554	571	591	553	587	595	559	611	553	611	384	2242
Total Suspended Solids #	349	71.3	116	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	349	10	7669

customer service line
03708 506 506

incident hotline
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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. High COD in BH 1A is considered to be a function of silt samples.

Data was not received for the following substances:

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 Q2 2019 - Lower Aquifer

Substance/ Parameter	Cuadrilla Preston New Road Ground water Monitoring Lower Aquifer												Q2 Assess		Pre Frack	
	BH1			BH2			BH3			BH4			Lwr Aquifer		Background	
	Lower Aquifer B												Min	Max	Min	Max
	03-Apr-19	08-May-19	03-Jun-19	04-Apr-19	09-May-19	04-Jun-19	03-Apr-19	08-May-19	03-Jun-19	03-Apr-19	08-May-19	03-Jun-19	<10	<10		
Dissolved Aluminium #	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	1	45
Dissolved Mercury #	<0.01	<0.01	<0.01	0.016	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1	1
Dissolved Antimony #	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	2	4
Dissolved Arsenic #	0.98	0.819	0.903	16.4	16.5	15.9	1.66	1.51	1.48	14.1	14.8	13.8	0.819	16.5	2.5	21.2
Dissolved Barium #	126	137	136	71.8	72.6	72.5	62.6	61.2	66.6	70.1	68.1	72.2	61.2	137	49	397
Dissolved Beryllium	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.5	0.6
Dissolved Boron	43.7	29.7	37.4	34.3	37.5	39.8	51.4	38.9	50.6	50.6	36.4	44.4	29.7	51.4	19	55
Dissolved Cadmium #	<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	<0.08	0.5	0.6
Total Dissolved Chromium #	<1	<1	<1	<1	1.32	<1	<1	<1	<1	<1	<1	<1	<1	1.32	1.5	6.6
Dissolved Cobalt #	<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	2	2
Dissolved Copper #	<0.3	0.323	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	4.16	<0.3	4.16	7	22	
Dissolved Lead #	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.948	<0.2	0.948	5	6	
Dissolved Lithium	10.7	9.75	10.7	12.6	13.4	13.7	14.5	13.5	15.2	13.9	13.2	14	9.75	15.2	5	55
Dissolved Nickel #	1.11	1.17	1.07	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	1.17	2	20	
Dissolved Selenium #	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	3	4	
Dissolved Strontium	248	254	241	584	600	617	503	492	518	541	547	567	241	617	207	683
Dissolved Vanadium #	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1.5	2.7
Dissolved Zinc #	5.28	4.81	4.2	1.5	1.34	3.04	2.41	6.94	1.49	2.41	5.87	3.41	1.34	6.94	0	28
Dissolved Silver	<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 #	36.6	36	42.9	27.7	27.4	28.5	26.8	26.8	28.3	25.8	26.4	27.4	25.8	42.9	24.9	53.1
Dissolved Magnesium #	36.3	37.6	37.4	34	33.7	36	33.3	33.1	33.7	34.8	35.8	35.9	33.3	37.6	31.4	40
Dissolved Potassium #	2.09	2.19	2.17	1.89	1.98	1.93	2	2	2.16	1.89	1.85	2.05	1.89	2.19	1.6	3.7
Dissolved Calcium #	105	114	108	121	119	122	111	113	115	117	121	123	105	123	98.2	136
Total Dissolved Iron #	<19	<19	<19	598	631	598	501	511	509	691	724	714	<19	724	20	3472
EPH (C8-C40) #	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	10	11
GRO (C4-C8) #	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	10	60
GRO (C8-C12) #	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	10	51
GRO (C4-C12) #	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	10	97
MTBE #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	0.1	5
Benzene #	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	0.5	5
Toluene #	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	5	5
Ethylbenzene #	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	1	5
m/p-Xylene #	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	<8	2	5
o-Xylene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	1	5
Fluoride	<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	0.3	1.1
Bromide	0.127	0.171	0.145	0.157	0.178	0.152	0.139	0.15	0.153	0.127	0.151	0.145	0.127	0.178	0.05	0.17
Chloride #	46.2	51.5	44.2	47.9	48	49	46.8	50.1	48.1	42.7	44.5	44.6	42.7	51.5	10	63.8
Nitrate as NO3 #	2.06	3.68	3.27	<0.0677	<0.0677	<0.0677	<0.0677	<0.0677	<0.0677	<0.0677	<0.0677	<0.0677	<0.0677	3.68	0.2	15.1
Nitrite as NO2 #	<0.0152	<0.0152	<0.0152	<0.0152	<0.0152	<0.0152	<0.0152	<0.0152	<0.0152	<0.0152	<0.0152	<0.0152	<0.0152	<0.0152	0.02	0.24
Ammoniacal Nitrogen as NH4	<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	0.03	0.41
Dissolved Ethene #	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	1
Dissolved Ethane #	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	1
Dissolved Butane	-	<2	<2	-	<2	<2	-	<2	<2	-	<2	<2	<2	<2	2	2
Dissolved Propane	<1	<1	<2	<1	<1	<2	<1	<1	<2	<1	<1	<2	<2	<2	2	2
Dissolved Methane	2.31	0.433	4.618	<0.00223	<0.00222	<0.001	0.0167	0.0089	0.078	0.00211	0.00298	<0.001	0.00211	4.618	0.01	6.66
Dissolved Carbon Dioxide	30.5	25.1	73.525	28.4	19.6	81.46	18.4	18.9	83.123	26.7	27.2	58.845	18.4	83.123	9.8	47.9
δ13C - CH4	-60.5	-	-87.2	-	-	NDP	-	-	NDP	-	-	NDP	NDP	-60.5	-73.6	0
δ13C - CO2	-24.8	-	-21.4	-	-	-22	-24.6	-	-21.7	-	-	-22.1	-24.8	-21.4	-35.3	27.2
Total Alkalinity as CaCO3 #	-	380	369	-	350	338	-	325	323	-	345	343	323	380	262	510
Acrylamide	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	50	50
BOD (Settled) #	<1	5.48	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	5.48	1	15
COD (Settled) #	10.1	<7	<7	9.77	7.06	<7	<7	17.3	<7	7.74	12.3	<7	<7	17.3	7	26
pH #	7.9	8.1	7.84	7.73	8.17	7.73	7.66	8.01	7.97	7.72	7.62	7.75	7.72	8.17	6.84	8.06
Salinity	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	0.1	10.2
Total Dissolved Solids #	523	541	529	564	544	585	533	520	571	549	552	593	520	593	393	901
Total Suspended Solids #	3	<2	<2	<2	<2	4.15	<2	3.2	2.15	<2	<2	<2	<2	4.15	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 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. Significantly higher dissolved CO₂ in June are considered to be related to sampling techniques. (NDP refers to inadequate sample available for analysis).

Data was not received for the following substances:

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.