

Environmental Protection Agency, Castlebar Regional Inspectorate, Castlebar, Co. Mayo.

IPC Reg. No. P0021-02

28th September 2022

Reference: Bi-annual Borehole Analysis 2022

Dear Sir/Madam,

In accordance with Schedule C.6 of P0021-02 please find enclosed major anion / cation, Phenol, Ammonia and pH results for the three, site boreholes for the second bi-annual monitoring report 2022.

The facility groundwater borehole locations are shown on the site map in Appendix A.

The analysis data where GTVs exist are included in Table 1 for each of the three boreholes for 2016 and 2017 and 2018 and 2019, 2020, 2021 and 2022. All test results are below the GTVs with the exception of Ammonia which is highlighted in the table and graphed to show each boreholes trend for the past five years.

With regards to ammonia the test data although above the ground water threshold values is stable with no increase of decrease in levels evident. This trend of stable monitoring results has been in place since before the commencement of operations of the facility meaning that the ammonia present is not as a result of site activities. Groundwater quality under the facility has been fully assessed in detail by an external hydro geological consultant in accordance with the requirements of Condition 6.6.1 of the license. The findings of this report which has been submitted to EPA confirm that the ammonia is not as a result of site activities.

Ammonia data will continue to be trended for future reports to assess if any changes occur and all other remaining parameters will be compared to groundwater GTVs.

The full suite of test data for each borehole is shown in Appendix B.

Yours sincerely,

Camila Batista Environmental & Sustainability Leader

Table 1: Bi-Annual Borehole Analysis in Accordance with ScheduleC.6

			Table 1	: Bi-Annual E	Borehole Anal	sis in Accor	dance with S	chedule C.6				
MW1												
Parameter					Bi Annual 12020			Bi Annual 2 202			Units	GTV'S
Ammonia	1460	1560	1540	1390	1590	1210	1210	1360	1080	1360	µ.g/I N	65 - 175 ug/l M
Arsenic	1			<1	(1		4		< 2.5		µ.q/l	150 µ.q/l
Cadmium	(1			<1	(1		<0.2		<0.5		µ.g/l	3.75 µ.q/l
Chloride	28.00	24.94	22.00	21.00	19.00	20.50	19.60	15.70	16.50	18.40	mq/l	24 - 187.5 mg
Chromium -	<3			<2	<2		<0.9		<15		µq/l	37.5 µq/l
Copper	1			(1	(1		(2.0		1>		µ.q/l	1500 µ.q/l
Mercury	0.18			<0.08	<0.08		<0.05		<lod< td=""><td></td><td>μq/l</td><td>0.75 µ.q/l</td></lod<>		μq/l	0.75 µ.q/l
Vickel	(1	-0.47	10.12	(1	(1	(0.42	(0.5	10.05	(2		μq/l	15 µ.q/l
Vitrate	0.48	<0.47	<0.47	<0.47	<0.47 <0.01	(0.47	(2.0	<0.05	<0.05	<0.2	mq/l	37.5 mg/l
Vitrite Na dive	<0.002	<0.01	<0.01	<0.01 34.00	35.3	<0.01	<0.005 33.3	<0.006	<0.006 25.5	(0.02	mg/l	0.375 mg/l
Sodium Sulatata	30.00	28.70	28.20		35.3	32.3		27.7		24	mq/l	150 mg/l
Sulphate PAH's	21.00	26.00	20.00	22.00 <0.01	<0.01	17	24.6 0.03	26.5	35.6 < LOD	38.5	mq/I μ.q/I	187.5 mg/l 0.075 μg/l
-012	(0.01			10.01	10.01		0.05		1000		kqn	o.oro pgr
VIW 2												
Parameter					Bi Annual 12020							GTV'S
Ammonia	280	290	230	190	90	210	<10	270	270	430	µg/IN	65 - 175 ug/l M
Arsenic	3.00			2.00	2		3		< 2.5		µg/l	150 µ.q/l
Cadmium	4			((1		0.3		<0.5		µg/l	3.75 µ.q/l
Chloride	17.00	19.05	18.00	22.00	19	19.9	29.3	18.6	17	15.4	nq/l	24 - 187.5 mg
Chromium	<3			<2	(2		1.7		<15		µ.q/l	37.5 µ.q/l
Copper	1			1	(1		9.4		<7		µq/l	1500 µ.q/l
Mercury	0.12			<0.08	<0.08		<0.05		<lod< td=""><td></td><td>µq/l</td><td>0.75 µ.q/l</td></lod<>		µq/l	0.75 µ.q/l
Vickel	2.00			1.00	1.00		0.70		<2		µg/l	15 µ.q/l
Vitrate	0.72	<0.47	<0.47	<0.47	<0.47	<0.47	<2.0	<0.05	<0.05	<0.2	mg/l	37.5 mg/l
Vitrite	<0.002	<0.01	<0.01	0.03	0.05	<0.01	<0.05	<0.006	<0.006	<0.02	mq/l	0.375 mg/l
Sodium	29.50	33.10	30.20	44.10	38.6	33.3	57.4	35.0	33.5	26.4	mq/l	150 mg/l
Sulphate PAH's	41.00 <0.01	44.00	38.00	41.00 <0.01	43 <0.01	37	45 <0.01	37	38 <lod< td=""><td>38</td><td>mq/l μ.q/l</td><td>187.5 mg/l 0.075 μg/l</td></lod<>	38	mq/l μ.q/l	187.5 mg/l 0.075 μg/l
rolly	(0.01			(0.01	10.01		(0.01		1000		kdu	0.010 pgn
MW 3	Di Jacob 14 0040	D' Louis Lo coto	D: 1	D: 1	Bi Annual 12020	D: 1	D' 1	Di J	D: 1	D: 1	11-25-	GTV'S
Parameter												
Ammonia	450	460	470	430	450	460	440	590	440	590	μq/IN	65 - 175 ug/l N
Arsenic Ordeline	2			3	3		3		< 2.5		μq/l	150 μq/l
Cadmium Ottaaida	(1	05.47	04.00	<1	(1	04.7	<0.2	015	<0.5	01.0	μ.q/l	3.75 µ.q/l
Chloride Chaosian	27.00	25.17	24.00	24.00	31	24.7	23.5	21.5	20.3	21.3	mg/l	24 - 187.5 mg
Chromium O	(3			<2 (1	<2		2.4		<15		μq/l	37.5 µq/l
Copper	1.00											
u	0.44						3		(7		μq/l	1500 μ.q/l
Mercury Markat	0.14			<0.08	(0.08		<0.05		< LOD		µ.q/l	0.75 µq/l
Vickel	2.00	/0.47	/0.47	<0.08 1.00	<0.08 1	/0.47	<0.05 1.7	/0.05	<lod < 2</lod 	0.90	μq/ μq/	0.75 µg/l 15 µg/l
Nickel Nitrate	2.00 <0.11	<0.47	(0.47	<0.08 1.00 <0.47	<0.08 1 <0.47	<0.47	<0.05 1.7 <2	(0.05	<lod < 2 <0.05</lod 	0.90	μα/Ι μα/Ι mg/I	0.75 µ.q/l 15 µ.q/l 37.5 m.q/l
Nickel Nitrate Nitrite	2.00 <0.11 <0.002	<0.01	<0.01	<0.08 1.00 <0.47 <0.01	<0.08 1 <0.47 <0.01	<0.01	<0.05 1.7 <2 0.049	<0.006	<lod < 2 <0.05 <0.006</lod 	<0.02	µ.q/l µ.q/l m.q/l m.q/l	0.75 µq/l 15 µq/l 37.5 mq/l 0.375 mq/l
Vickel Vitrate Vitrite Sodium	2.00 <0.11 <0.002 36.00	<0.01 38.50	<0.01 33.70	<0.08 1.00 <0.47 <0.01 38.10	<0.08 1 <0.47 <0.01 37.8	<0.01 32.3	<0.05 1.7 <2 0.043 32.2	<0.006 28.7	<lod < 2 <0.05 <0.006 30.5</lod 	<0.02 28.5	µqil µqil mqil mqil mqil	0.75 µq/l 15 µq/l 37.5 mq/l 0.375 mq/l 150 mq/l
Nickel Nitrate	2.00 <0.11 <0.002	<0.01	<0.01	<0.08 1.00 <0.47 <0.01	<0.08 1 <0.47 <0.01	<0.01	<0.05 1.7 <2 0.049	<0.006	<lod < 2 <0.05 <0.006</lod 	<0.02	µ.q/l µ.q/l m.q/l m.q/l	0.75 µq/l 15 µq/l 37.5 mq/l 0.375 mq/l
Vickel Vitrate Vitrite Sodium Sulphate	2.00 (0.11 (0.002 36.00 58.00	<0.01 38.50	<0.01 33.70	<0.08 1.00 <0.47 <0.01 38.10 54.00	<0.08 1 <0.47 <0.01 37.8 48	<0.01 32.3 50	<0.05 1.7 <2 0.049 32.2 100 <0.01	<0.006 28.7	<lod < 2 <0.05 <0.006 30.5 44.3</lod 	<0.02 28.5	Ligu Ligu Mgi Mgi Mgi Mgi Mgi	0.75 µq/l 15 µq/l 37.5 mg/l 0.375 mg/l 150 mg/l 187.5 mg/l
Nickel Nitrate Nitrite Sodium Sulphate	2.00 (0.11 (0.002 36.00 58.00	<0.01 38.50	<0.01 33.70	<0.08 1.00 <0.47 <0.01 38.10 54.00 <0.01	(0.08 1 (0.47 (0.01 37.8 48 (0.01 Monitoring Wells 1 -3	<0.01 32.3 50 Ammonia ug/l, 2017	<0.05 1.7 <2 0.049 32.2 100 <0.01	<0.006 28.7	<lod < 2 <0.05 <0.006 30.5 44.3</lod 	<0.02 28.5	Ligu Ligu Mgi Mgi Mgi Mgi Mgi	0.75 µq/l 15 µq/l 37.5 mg/l 0.375 mg/l 150 mg/l 187.5 mg/l
Vickel Vitrate Sodium Sulphate PAH's	2.00 <0.11 <0.002 36.00 58.00 <0.01	<0.01 38.50 57.00	<0.01 33.70 50.00	<0.08 1.00 <0.47 <0.01 38.10 54.00	(0.08 1 (0.47 (0.01 37.8 48 (0.01 Monitoring Wells 1 -3	<0.01 32.3 50	<0.05 1.7 <2 0.049 32.2 100 <0.01	<0.006 28.7	<lod < 2 <0.05 <0.006 30.5 44.3</lod 	<0.02 28.5	μαί! μαί! mai! mai! mai! μαί!	0.75 µq/l 15 µq/l 37.5 mq/l 0.375 mq/l 150 mg/l 187.5 mg/l
Vickel Vitrate Sodium Sulphate AH's	2.00 (0.11 (0.002 36.00 58.00	<0.01 38.50 57.00	<0.01 33.70 50.00	<0.08 1.00 <0.47 <0.01 38.10 54.00 <0.01	(0.08 1 (0.47 (0.01) 37.8 48 (0.01) Monitoring Wells 1 -3 1	<0.01 32.3 50 Ammonia ug/l, 2017	<0.05 1.7 <2 0.049 32.2 100 <0.01	<0.006 28.7	<10D <2 <0.05 <0.006 30.5 44.3 <10D	<0.02 28.5 43.2	μαί! μαί! mai! mai! mai! μαί!	0.75 µq/l 15 µq/l 37.5 mq/l 0.375 mq/l 150 mq/l 187.5 mq/l 0.075 µg/l
Vickel Vitrate Sodium Sulphate SAH's	2.00 (0.11 (0.002 36.00 58.00 (0.01 127	<0.01 38.50 57.00	<0.01 33.70 50.00	<0.08 1.00 <0.47 <0.01 38.10 54.00 <0.01	(0.08 1 (0.47 (0.01) 37.8 48 (0.01) Monitoring Wells 1 -3 1	<0.01 32.3 50 Ammonia ug/l, 2017	<0.05 1.7 <2 0.049 32.2 100 <0.01	<0.006 28.7 42.6	<10D <2 <0.05 <0.006 30.5 44.3 <10D	<0.02 28.5	μαί! μαί! mai! mai! mai! μαί!	0.75 μq/l 15 μq/l 37.5 mq/l 0.375 mq/l 150 mq/l 187.5 mg/l 0.075 μg/l
Vickel Vitrate Sodium Sulphate AH's	2.00 (0.11 (0.002 36.00 58.00 (0.01 127	<0.01 38.50 57.00	<0.01 33.70 50.00	<0.08 1.00 <0.47 <0.01 38.10 54.00 <0.01	(0.08 1 (0.47 (0.01) 37.8 48 (0.01) Monitoring Wells 1 -3 1	<0.01 32.3 50 Ammonia ug/l, 2017	<0.05 1.7 <2 0.049 32.2 100 <0.01	<0.006 28.7 42.6	<10D <2 <0.05 <0.006 30.5 44.3 <10D 1360	<0.02 28.5 43.2	μq/l μq/l mq/l mq/l μq/l	0.75 µq/l 15 µq/l 37.5 mq/l 0.315 mq/l 180.5 mq/l 181.5 mq/l 181.5 mq/l 360
Vickel Vitrate Sodium Sulphate SAH's	2.00 (0.11 (0.002 36.00 58.00 (0.01	<0.01 38.50 57.00 149 0 459	(0.01 33.70 50.00 150 0 150 0 460	<0.08 1.00 <0.47 <0.01 38.10 54.00 <0.01	<0.08 1 <0.47 <0.01 37.8 48 <0.01 Monitoring Wells 1 -3 1390	<0.01 32.3 50 Ammonia ug/l, 2017	<0.05 1.7 <2 0.049 32.2 100 <0.01	<0.006 28.7 42.6	<10D <2 <0.05 <0.006 30.5 44.3 <10D	<0.02 28.5 43.2	μq/] μq/] mq/] mq/] mq/] μq/]	0.75 µq/l 15 µq/l 37.5 mq/l 0.375 mq/l 150 mq/l 187.5 mq/l 187.5 mg/l 0.075 µg/l
Vickel Vitrate Sodium Sulphate DAH's	2.00 (0.11 (0.002 36.00 58.00 (0.01 127	(0.01 38.50 57.00 149	(0.01 33.70 50.00 150 0 150 0 460	<0.08 1.00 <0.47 <0.01 38.10 54.00 <0.01	<0.08 1 <0.47 <0.01 37.8 48 <0.01 Monitoring Wells 1 3 1390	<0.01 32.3 50 Ammonia ug/l, 2017 1990 450	<0.05 1.7 <2 0.043 32.2 100 <0.01 - 2022 - 2022	<0.006 28.7 42.6	<10D <2 <0.05 <0.006 30.5 44.3 <10D 1360	<0.02 28.5 43.2 1080	μq/] μq/] mq/] mq/] mq/] μq/]	0.75 µq/l 15 µq/l 37.5 mq/l 0.375 mq/l 150 mq/l 187.5 mq/l 0.075 µg/l 360 360 400 400 400 400 400 400 400 4
Nickel Nitrate Sodium Sulphate PAH's	2.00 (0.11 (0.002 36.00 58.00 (0.01	<0.01 38.50 57.00 149 0 459	(0.01 33.70 50.00 150 0 150 0 460	<0.08 1.00 <0.47 <0.01 38.10 54.00 <0.01 	<0.08 1 (0.47 (0.01 37.8 48 (0.01 Monitoring Wells 1-3 1390 430	<0.01 32.3 50 Ammonia ug/l, 2017 1590	<0.05 1.7 <2 0.043 32.2 100 <0.01 - 2022 - 2022 - 2022 - 2022 - 2022 - 2022 - 2022	<0.006 28.7 42.6	<10D <2 <0.05 <0.006 30.5 44.3 <10D 1360 590	<0.02 28.5 43.2 1080	μq/] μq/] mq/] mq/] mq/] μq/]	0.75 µ.q/l 15 µ.q/l 37.5 m.q/l 0.375 m.q/l 150 m.q/l 187.5 m.q/l 0.075 µ.g/l 380

APPENDIX A

