Vickman, Kimberly M - DNR

From: Stanforth, Robert <RStanforth@trcsolutions.com>
Sent: Thursday, April 25, 2013 4:02 PM
To: Vickman, Kimberly M - DNR
Subject: RE: April 2013 TRC sample analysis

Sodium could have come from the sodium bentonite, although the sodium is used to balance the charge on the bentonite particles, so in order for sodium to be released, some other ion must exchange with it. The only source for magnesium that I can think of is the limestone. If there were some dolomite (calcium-magnesium carbonate) in the limestone as well as high calcium limestone, then some magnesium could be released as well. Calcium sulfate (gypsum) is only moderately soluble, while magnesium sulfate (Epsom salts) is quite soluble. So the calcium concentration may be limited by the sulfate, whereas the magnesium concentration is not. It could be that the magnesium is exchanging with sodium on the bentonite, and freeing the sodium.

It is interesting that the MW11-1 well has such higher concentrations than MW11-2, when both are in the treated area.

From: Vickman, Kimberly M - DNR [mailto:Kimberly.Vickman@wisconsin.gov]
Sent: Thursday, April 25, 2013 3:32 PM
To: Stanforth, Robert
Subject: RE: April 2013 TRC sample analysis

It was nice to meet you as well. Sodium and Sulfate were used in the remediation but Magnesium? How could that get there? It looks like I can add Magnesium and Sodium to my analysis. Sulfate needs a different bottle with no preservation.

I figured the arsenic content in the soil would increase as the groundwater concentrations went down but it looks like that's not the case. Even though hearing that the soil concentrations look pretty clean is good news.

As always, once I get my results back from the lab I will forward results back to you as well.

Thank you!

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From: Stanforth, Robert [mailto:RStanforth@trcsolutions.com]
Sent: Thursday, April 25, 2013 3:22 PM
To: Vickman, Kimberly M - DNR
Subject: April 2013 TRC sample analysis

Kimberly

First, it was nice to meet you, finally. Thanks for permission to take and analyze the samples. For someone interested in arsenic biogeochemistry, Kewaunee is a fascinating site, with lots of unanswered questions.

My screening analysis for the groundwater samples I took is attached. MW11-1 has unexpectedly high concentrations of magnesium, sodium and sulfate. You might want to check for these parameters with the Lab of Hygiene.

The three rows for each sample are total (unfiltered), 0.45 u filtered (in the lab ~ 6 hours after collection) and a hydrogen peroxide treated sample to oxidize any reduced species in the sample prior to filtering (0.45 u).

The soils samples showed one hit for As (1,000 mg/kg) in the soil next to MW11-1 – the other samples were pretty clean.

Bob

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Kewaunee April 2013 Groundwater Sample Analysis
Bob Stanforth, TRC Applied Chemistry Laboratory

Sample		Parameter						
Location	Treatment	pH	As	Ca	Fe	Mg	Na	S
MW11-1	Total	-	35	450	780	3,200	1,600	5,300
	0.45 µ	6.50	12	430	650	3,200	1,600	5,300
	H_2O_2	6.14	0.16	400	0.58	3,200	1,600	5,300
MW11-1i	Total	-	120	120	4.7	50	13	<10
	0.45 µ	7.32	120	110	0.62	50	14	<10
	H_2O_2	6.71	120	110	0.57	49	15	<10
MW11-2	Total	-	49	580	170	470	130	740
	0.45 µ	6.64	21	540	74	460	130	730
	H_2O_2	6.77	<0.13	520	4.7	460	130	720
MW11-3	Total	-	390	330	4.2	130	23	<10
	0.45 µ	7.32	380	310	1.4	130	24	<10
	H_2O_2	6.53	380	310	1.3	130	26	<10
MW11-3i	Total	-	47	150	6.3	44	30	<10
	0.45 µ	7.28	45	110	<0.25	42	31	<10
	H_2O_2	6.92	45	110	0.49	41	33	<10