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September 3, 2002

Ms. Mary Beth Marks
USDA Gallatin National Forest
Supervisors Office
P.O. Box 130
Bozeman, MT 59771

SUBJECT: Final Project Report
Humidity Cell Test - Weeks 1 to 20
McLaren Pit Capping Material
New World Response & Restoration Project, Park County, Montana
Maxim Project No. 9902245.350

Dear Ms. Marks:

Maxim Technologies, Inc. (Maxim), has prepared this final report on kinetic humidity cell tests of glacial till from the Daisy Creek Moraine. This report summarizes results of testing, which was initiated on March 5, 2002 and ran for 20 weeks until July 26, 2002.

Humidity cell testing was conducted to determine the suitability of Daisy Creek colluvium for use in a reclamation cap for the McLaren Pit Response Action. In particular, the goal was to determine if leachate from this material would contain significant concentrations of metals or acidity that could further impact surface and groundwater at the site. Based on static test data (acid base account), there was a possible need to add an amendment to the glacial till material to neutralize its acid generating potential.

Results of the humidity cell test indicate that the glacial till material will not generate significantly acidic or metals-enriched leachate. Test results further indicate that when amended with lime kiln dust this material could produce leachate with aluminum and copper concentrations that exceed MDEQ WQB-7 standards. Leachate collected from amended material also had a high initial sulfate concentration that remained higher than that observed in non-amended material throughout the duration of the test. Based on these results, it is recommended that the Daisy Creek colluvium be used without amendment as a reclamation cap over the McLaren Pit.

METHOD

Humidity cell testing was performed in general accordance with ASTM D 5744-96: Standard Test Method for Accelerated Weathering of Solid Materials using a Modified Humidity Cell. Approximately 50 pounds of rock material was collected from each of four test pits excavated in 2001 in the glacial till of the Daisy Creek Moraine. A full description of the test pit samples is provided in our Technical Memorandum, dated November 21, 2001, titled *Revised and Final Report on Potential Rock and Soil Sources – McLaren Pit Capping system and Drainage Channel*. The sample consists of an oxidized, orange brown sandy matrix with clasts of silicified and skarn-altered shale that contain a minor amount of visible pyrite and crusts of iron-oxide on fracture surfaces.

For purposes of the humidity cell testing, a split of the sample collected from each test pit was composited into one sample. This composite sample was then sieved to remove all rock fragments greater than ¾ inch. This portion of the sample, therefore, contains a very high percentage of fines and was used to charge two of the three columns. Of these two columns, Column #1 was mixed with 2.81 percent lime-kiln dust (LKD) that was obtained from Montana Limestone in Lovell, Montana. The volume of LKD added to Column #1 was based on a standard liming requirement of 33 percent calcium carbonate to volume of material divided by 117.3 percent lime as calcium carbonate in the LKD (Attachment A). No amendments or lime additions were added to Column #2.

For the third column, rock fragments were randomly selected from the remaining sample. A hammer was used to break these rock fragments into smaller fragments (less than two inches in length/width) and powdered rock. A representative sample was then selected consisting mostly of rock fragments (1-2 inches) (ancillary fines were also produced and put into the column) for charging the third column. A summary of sample and column characteristics is contained in Table 1.

TABLE 1
SAMPLE AND CELL CHARACTERISTICS
COLLUVIUM ACCELERATED WEATHERING TESTS
McLAREN PIT RESPONSE ACTION
PARK COUNTY, MONTANA

COLUMN	SAMPLE MASS	SAMPLE TYPE	AMENDMENT	WEEKLY APPLICATION FOR LEACHING
#1 4-inch diameter	1,000 grams	Crushed rock with fines	2.81% Lime kiln dust	600 ml
#2 4-inch diameter	1,000 grams	Crushed rock with fines	None	600 ml
#3 6.2-inch diameter	2,000 grams	Rock chips and fines	None	1,000 ml

The method calls for cycling of dry (low humidity) and moist air through the cells followed by a weekly leaching of each cell with de-ionized water for the collection and characterization of the resulting leachate.

Leachate was analyzed by Northern Analytical Laboratories (Northern) in Billings, Montana. Northern evaluated its performance using in-lab duplicates, calibration standards, and spike analyses. Maxim submitted four sets of duplicate samples from the Weeks 3, 5, and 7 leaching events. Characterization consisted of the measuring the following parameters:

<u>Measured in Maxim laboratory prior to sampling and shipment:</u>

pH and Oxidation/Reduction Potential (Eh)
Conductivity

Appearance and Odor
Measured by Northern Analytical Laboratories
pH and Eh
Sulfate
Alkalinity
Acidity
Total Iron

Every five weeks, a composite collected from each column was submitted to Northern for analysis of total iron, aluminum, copper, cadmium, manganese, lead, and zinc metal parameters.

This report contains the results of metals analyses for the weeks 1 through 5, 5 through 10, 10 through 15, and 15 through 20 composite samples.

RESULTS

Analytical results are summarized in tables contained in Attachment A for Weeks 1 through 20. Also included in Attachment A are the results for lime kiln dust used to amend Column #1. Trends in parameters are presented in figures contained in Attachment B. A summary discussion of trends for each of these parameters is presented in Table 2.

Values of pH for amended material decreased during the first three weeks after which time pH fluctuated slightly above neutral for the remainder of the test. Values of pH for non-amended materials fluctuated around neutral throughout the test. Oxidation/reduction potential (Eh) was similar in all three cells and decreased from approximately 400 to 100 millivolts (mV) between Weeks 1 and 2 before stabilizing between 100 and 220 mV for the remainder of the test. Alkalinity fluctuated slightly during the test but was slightly higher in amended material.

Sulfate concentrations decreased from a maximum of 25 milligrams per liter (mg/L) to less than 5 mg/L in non-amended materials and from 476 to 90 mg/L in amended material. The results of metals analysis of composite samples from all three columns indicated that iron and cadmium concentrations were consistently below MDEQ WQB-7 chronic aquatic life standards (adjusted for a hardness of 50 mg/L). Zinc concentrations were below the standard in all samples except for a slight exceedance in the Week 15-20 sample in Column #2. Copper concentrations exceeded the standard (0.0052 mg/L) in all composite samples from the amended material (0.069, 0.01, 0.006, and 0.008 mg/L respectively) and in Week 10 through 15 and Week 15 through 20 samples in Column #3 (0.015 and 0.006 mg/L respectively).

Chronic aquatic life standards were exceeded for aluminum in the Week 1 through 5 and Week 5 through 10 composite samples from the amended material. It is likely that the aluminum and sulfate were present in the lime kiln dust, although the high concentrations may also reflect elevated solubility of aluminum sulfate minerals such as basaluminite ($Al_4SO_4(OH)_{10}{\cdot}5H_2O$) under very high pH conditions.

Since the reporting limit for aluminum was greater than the aquatic life standard no definitive conclusion could be reached as to whether this element exceeded the standard in other samples. Similarly, the reporting limit for lead

exceeded the standard during analysis of the Week 1 through 5 composite samples, which was adjusted for subsequent analyses, and the resulting data indicated that lead concentrations were below the standard for the remainder of the test.

Analysis of in-lab duplicates, calibration standards, spike analyses and duplicate samples submitted by Maxim indicate that the data obtained during this test are of adequate quality to be used in determining the suitability of the colluvium for use as a reclamation cap for the McLaren Pit Response Action.

TABLE 2
SAMPLE AND CELL CHARACTERISTICS IN PROGRESSIVE LEACHING RESULTS
WEEKS 1-20
COLLUVIUM ACCELERATED WEATHERING TESTS
McLAREN PIT RESPONSE ACTION
PARK COUNTY, MONTANA

PARAMETER	COLUMN #1	COLUMN #2	COLUMN #3
pH su	Decrease from 12.7 to 8.2	Fluctuation between 6.5 and 8.7	Fluctuation between 5.8 and 8.2
Lab pH su	Decrease from 12.8 to 8	Fluctuation between 7.2 and 7.8	Fluctuation between 7.4 and 7.8
Eh mV	Decrease from 413 to 142	Decrease from 459 to 150	Decrease from 474 to 165
Lab Eh (1) mV	Increase from 92 to 243	Increase from 228 to 291 (2)	Increase from 236 to 288 (2)
Conductivity uS	Decrease from 714 to 285	Fluctuation between 34 and 74 with one outlying value of 108 at Week 14	Fluctuation between 57 and 120 until Week 6 then generally decreasing to 45.5
Sulfate Mg/L	Decrease from 476 to 90	Decrease from 15 to less than 5	Decrease from 25 to less than 5
Alkalinity Mg/L	Decrease in bicarbonate and calcium carbonate alkalinity. No carbonate alkalinity detected.	Fluctuation in bicarbonate and calcium carbonate alkalinity. No carbonate alkalinity detected.	Decrease in bicarbonate alkalinity. Fluctuation in calcium carbonate alkalinity. No carbonate alkalinity detected.
Acidity Mg/L	Below detection	Below detection	Below detection
Fe Mg/L	Below detection	Below detection	Below detection

Notes:
su : Standard unit mV : Millivolts uS : Microseimens mg/L : Milligrams per liter
1 : Reliable measurements beginning Week 1 and discontinued on Week 5 due to discrepancy with Maxim lab measurements
2 : Eh measured at Northern laboratory may be influenced by transport and holding times

We appreciate the opportunity to work with the US Forest Service. If you have any questions or concerns, please contact me at 582-8780.

Sincerely,

Lisa Kirk
Senior Geochemist

cc: Bob Kirkpatrick

enclosures: Attachment A
Attachment B

ATTACHMENT A

COLLUVIUM ACCELERATED WEATHERING TEST
McLAREN PIT RESPONSE ACTION, PARK COUNTY, MONTANA

Humidity Cell Analytical Results

SAMPLE ID	PORE VOLUME	PORE VOLUME MEASURED	PORE VOLUME LEACHED	TOTAL VOLUME LEACHED	Oxidation Reduction Potential	Acidity as $CaCO_3$		Alkalinity Bicarbonate as HCO_3		Alkalinity Carbonate as CO_3		Alkalinity Total as CaCO3		Sulfate as SO_4		pH	Iron, Dissolved			Al	Cu	Cd	Mn	Pb	Zn
	week	ml	ml	ml	mV	mg/l	Cum mg/l	mg/l	Cum mg/l	mg/l	Cum mg/l	mg/l	Cum mg/l	mg/l	Cum mg/l	s.u.	mg/l	Cum mg/l		mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
COLUMN #1	**Amended with Lime Kiln Dust**																								
NW 1-1	**1**	600	543	543	91.9	< 2	2	105	105	0	0	86	86	476	476	11.0	< 0.05	0.05							
NW 1-2	**2**	600	500	1043	203	< 2	4	31	136	0	0	50	136	334	810	9.2	< 0.05	0.1							
NW 1-3	**3**	600	561	1604	255	< 2	6	57	193	0	0	47	183	259	1069	8.2	< 0.05	0.15							
NW 1-4	**4**	600	588	2192	239	< 2	8	55	248	0	0	45	228	248	1317	7.7	< 0.05	0.2							
NW 1-5	**5**	600	556	2748	243	< 4	12	57	305	0	0	47	275	235	1552	8.0	< 0.05	0.25							
NW 4-5	**C5**																< 0.01			1.5	0.069	**0.0001**	0.041	**0.003**	0.03
NW 1-6	**6**	600	585	3333	nd	< 4	16	59	364	0	0	48	323	233	1785	8.0	< 0.05	0.3							
NW 1-7	**7**	600	575	3908	nd	< 2	18	60	424	0	0	49	372	166	1951	8.0	< 0.05	0.35							
NW 1-8	**8**	700	96	4004	nd	0	18	0	424	0	0	0	372	0	1951	nd	0	0.35							
NW 1-9	**9**	600	568	4572	nd	< 2	20	55	479	0	0	45	417	138	2089	8.1	< 0.05	0.4							
NW 1-10	**10**	600	600	5172	nd	< 2	22	61	540	0	0	50	467	122	2211	8.1	< 0.05	0.45							
	C10																< 0.01			0.2	0.01	**0.0001**	0.014	**0.001**	**0.01**
NW 1-11	**11**	600	591	5763	nd	< 2	24	57	597	0	0	47	514	130	2341	7.9	< 0.05	0.5							
NW 1-12	**12**	600	600	6363	nd	< 2	26	71	668	0	0	58	572	204	2545	7.8	< 0.05	0.55							
NW 1-13	**13**	600	518	6881	nd	< 2	28	63	731	0	0	52	624	148	2693	7.7	< 0.05	0.6							
NW 1-14	**14**	600	602	7483	nd	< 2	30	77	808	0	0	63	687	120	2813	8.1	< 0.05	0.65							
NW 1-15	**15**	600	587	8070	nd	< 2	32	66	874	0	0	54	741	116	2929	7.9	< 0.05	0.7							
	1-15-C																**0.01**			**0.1**	0.006	0.0003	**0.003**	**0.001**	**0.01**
NW 1-16	**16**	600	550	8620	nd	< 2	34	66	940	0	0	54	795	118	3047	7.8	< 0.05	0.75							
NW 1-17	**17**	600	566	9186	nd	< 2	36	61	1001	0	0	50	845	130	3177	8.0	< 0.05	0.8							
NW 1-18	**18**	600	557	9743	nd	< 2	38	55	1056	0	0	45	890	133	3310	7.8	< 0.05	0.85							
NW 1-19	**19**	600	575	10318	nd	< 2	40	46	1102	0	0	38	928	70	3380	7.8	< 0.05	0.9							
NW 1-20	**20**	600	563	10881	nd	< 2	42	63	1165	0	0	52	980	90	3470	8.0	< 0.05	0.95							
	1-20-C																< 0.01			**0.1**	0.008	0.0003	**0.003**	0.001	0.03
COLUMN #2																									
NW 2-1	**1**	600	505	505	228	< 2	2	11	11	0	0	9	9	15	15	7.6	< 0.05	0.05							
NW 2-2	**2**	600	419	924	224	< 2	4	22	33	0	0	18	27	12	27	7.3	< 0.05	0.1							
NW 2-3	**3**	600	400	1324	279	< 2	6	11	44	0	0	9	36	7	34	7.3	< 0.05	0.15							
NW 2-4	**4**	600	458	1782	282	< 2	8	13	57	0	0	11	47	8	42	7.2	< 0.05	0.2							
NW 2-5	**5**	600	457	2239	291	< 4	12	13	70	0	0	11	58	8	50	7.4	< 0.05	0.25							
NW 5-5	**C5**																< 0.01			**0.1**	0.002	**0.0001**	0.06	**0.003**	0.03
NW 2-6	**6**	600	455	2694	nd	< 4	16	15	85	0	0	12	70	< 5	55	7.3	< 0.05	0.3							
NW 2-7	**7**	600	462	3156	nd	< 2	18	11	96	0	0	9	79	8	63	7.6	< 0.05	0.35							
NW 2-8	**8**	600	213	3369	0	< 4	22	13	109	0	0	11	90	7	70	7.6	0	0.35							
NW 2-9	**9**	600	487	3856	nd	< 2	24	12	121	0	0	10	100	< 5	75	7.6	< 0.05	0.4							
NW 2-10	**10**	600	449	4305	nd	< 2	26	20	141	0	0	16	116	7	82	7.7	< 0.05	0.45							
	C10																**0.01**			**0.1**	**0.001**	**0.0001**	0.058	**0.001**	**0.01**
NW 2-11	**11**	600	425	4730	nd	< 2	28	15	156	0	0	12	128	7	89	7.5	< 0.05	0.5							
NW 2-12	**12**	600	600	5330	nd	< 2	30	17	173	0	0	14	142	< 5	94	7.6	< 0.05	0.55							
NW 2-13	**13**	600	434	5764	nd	< 2	32	17	190	0	0	14	156	8	102	7.5	< 0.05	0.6							
NW 2-14	**14**	600	575	6339	nd	< 2	34	20	210	0	0	16	172	28	130	7.5	< 0.05	0.65							
NW 2-15	**15**	600	500	6839	nd	< 2	36	33	243	0	0	27	199	< 5	135	7.7	< 0.05	0.7							
	2-15-C																**0.01**			**0.1**	0.001	0.0002	0.03	**0.001**	**0.01**
NW 2-16	**16**	600	518	7357	nd	< 2	38	27	270	0	0	22	221	5	140	7.6	< 0.05	0.75							
NW 2-17	**17**	600	525	7882	nd	< 2	40	20	290	0	0	16	237	6	146	7.8	< 0.05	0.8							
NW 2-18	**18**	600	500	8382	nd	< 2	42	17	307	0	0	14	251	0	146	7.5	< 0.05	0.85							
NW 2-19	**19**	600	435	8817	nd	< 2	44	20	327	0	0	16	267	< 5	151	7.5	< 0.05	0.9							
NW 2-20	**20**	600	448	9265	nd	< 2	46	11	338	0	0	9	276	< 5	156	7.4	< 0.05	0.95							
	2-20-C																< 0.01			**0.1**	0.001	**0.0001**	0.012	**0.001**	0.07

COLLUVIUM ACCELERATED WEATHERING TEST
McLAREN PIT RESPONSE ACTION, PARK COUNTY, MONTANA

Humidity Cell Analytical Results

SAMPLE ID	PORE VOLUME	PORE VOLUME MEASURED	PORE VOLUME LEACHED	TOTAL VOLUME LEACHED	Oxidation Reduction Potential	Acidity as $CaCO_3$		Alkalinity Bicarbonate as HCO_3		Alkalinity Carbonate as CO_3		Alkalinity Total as CaCO3		Sulfate as SO_4		pH	Iron, Dissolved			Al	Cu	Cd	Mn	Pb	Zn
	week	ml	ml	ml	mV	mg/l	Cum mg/l	mg/l	Cum mg/l	mg/l	Cum mg/l	mg/l	Cum mg/l	mg/l	Cum mg/l	s.u.		mg/l	Cum mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
COLUMN #3																									
NW 3-1	**1**	600	526	526	236	< 2	2	41	41	0	0	34	34	25	25	7.6	<	0.05	0.05						
NW 3-2	**2**	1000	800	1326	329	< 2	4	29	70	0	0	24	58	15	40	7.6	<	0.05	0.1						
NW 3-3	**3**	1000	844	2170	276	< 2	6	32	102	0	0	26	84	8	48	7.8	<	0.05	0.15						
NW 3-4	**4**	1000	865	3035	285	< 2	8	24	126	0	0	20	104	6	54	7.5	<	0.05	0.2						
NW 3-5	**5**	1000	807	3842	288	< 4	12	20	146	0	0	16	120	8	62	7.6	<	0.05	0.25						
NW 6-5	**C5**																<	0.01		**0.1**	0.001	**0.0001**	0.029	**0.003**	0.03
NW 3-6	**6**	1000	750	4592	nd	< 4	16	22	168	0	0	18	138	17	79	7.5	<	0.05	0.3						
NW 3-7	**7**	1000	763	5355	nd	< 2	18	17	185	0	0	14	152	11	90	7.6	<	0.05	0.35						
NW 3-8	**8**	1000	333	5688	nd	< 4	22	27	212	4	4	22	174	8	98	7.6	<	0.05	0.4						
NW 3-9	**9**	1000	799	6487	nd	< 2	24	26	238	0	4	21	195	7	105	7.7	<	0.05	0.45						
NW 3-10	**10**	1000	750	7237	nd	< 2	26	30	268	0	4	25	220	7	112	7.7	<	0.05	0.5						
	C10																	**0.01**			**0.001**	**0.0001**	**0.003**	**0.001**	0.03
NW 3-11	**11**	1000	817	8054	0	< 2	28	66	334	0	4	54	274	8	120	7.6	<	0.05	0.55						
NW 3-12	**12**	1000	1000	9054	nd	< 2	30	20	354	0	4	16	290	< 5	125	7.5	<	0.05	0.6						
NW 3-13	**13**	1000	702	9756	nd	< 2	32	20	374	0	4	16	306	7	132	7.5	<	0.05	0.65						
NW 3-14	**14**	1000	819	10575	nd	< 2	34	26	400	0	4	21	327	< 5	137	7.6	<	0.05	0.7						
NW 3-15	**15**	800	558	11133	nd	< 2	36	27	427	0	4	22	349	5	142	7.7	<	0.05	0.75						
	3-15-C																	**0.01**		**0.1**	0.015	0.0005	**0.003**	**0.001**	**0.01**
NW 3-16	**16**	1000	703	11836	nd	< 2	38	29	456	0	4	24	373	< 5	147	7.5	<	0.05	0.8						
NW 3-17	**17**	1000	732	12568	nd	< 2	40	21	477	0	4	17	390	< 5	152	7.6	<	0.05	0.85						
NW 3-18	**18**	1000	853	13421	nd	< 2	42	33	510	0	4	27	417	10	162	7.6	<	0.05	0.9						
NW 3-19	**19**	1000	667	14088	nd	< 2	44	17	527	0	4	14	431	< 5	167	7.4	<	0.05	0.95						
NW 3-20	**20**	1000	751	14839	nd	< 2	46	17	544	0	4	14	445	< 5	172	7.6	<	0.05	1						
	3-20-C																<	0.01		**0.1**	0.006	**0.0001**	**0.003**	**0.001**	0.03
DUPLICATE SAMPLES																									
DUP 4-3	3	Duplicate of sample 3-3			280	< 2		32		0		26		9		7.9	<	0.05							
DUP 7-5	5	Duplicate of sample 6-5 (Cell 3, weeks 1-5, metals comp.)															<	0.01		<0.1	0.001	<0.0001	0.026	0.003	0.02
DUP 4-7	7	Duplicate of sample 3-7 for Fe analysis															<	0.05							
DUP 5-7	7	Duplicate of sample 3-7 for commons analysis				< 2		5		0		4		12		8.4									
BLANK 4-9		DI Blank -- tested for metals															<	0.01		<0.1	<0.001	<0.001	<0.003	<0.003	<0.01

NOTES:
Results entered to Week 20

< less than
ml: milliliters
mV: millivolts
mg/l: milligrams/liter
Cum/mg/l cumulative milligrams/liter
C5: composite of weeks 1-5
pv pore volume
NM not measured

Lab Data
pH and Eh

COLLUVIUM ACCELERATED WEATHERING TEST
McLAREN PIT RESPONSE ACTION, PARK COUNTY, MONTANA

SAMPLE ID		Column 1									
PORE VOLUME WEEK No.		1	2	3	4	5	6	7	8	9	10
PORE VOLUME MEASURED	ml	600	600	600	600	600	600	600	700	600	600
PORE VOLUME LEACHED	ml	543	500	561	588	556	585	575	96	568	600
TOTAL VOLUME LEACHED	ml	543	1043	1604	2192	2748	3333	3908	4004	4572	5172
Northern Analytical											
pH	s.u.	11	9.2	8.2	7.7	8	8	8	nd	8.1	8.1
Eh	mV	91.9	203	255	239	243	nd	nd	nd	nd	nd
Maxim data											
Column 1 pH	s.u.	11.08	9.19	8.82	7.81	7.78	7.88	7.79	7.92	7.86	7.9
Column 1 Eh	mV	413	103	182	205	192	215	206	220	219	219
Column 1 SC	us	714	510	391	383	577	524	379	379	360	398

SAMPLE ID		Column 2									
PORE VOLUME WEEK No.		1	2	3	4	5	6	7	8	9	10
PORE VOLUME MEASURED	ml	600	600	600	600	600	600	600	600	600	600
PORE VOLUME LEACHED	ml	505	419	400	458	457	455	462	213	487	449
TOTAL VOLUME LEACHED	ml	505	924	1324	1782	2239	2694	3156	3369	3856	4305
Northern Analytical											
pH	s.u.	7.6	7.3	7.3	7.2	7.4	7.3	7.6	7.6	7.6	7.7
Eh	mV	228	224	279	282	291	nd	nd	0	nd	nd
Maxim data											
Column 2 pH	s.u.	8.73	8.1	8.3	7.18	7.15	7.1	7.55	6.89	7.02	7.39
Column 2 Eh	mV	459	113	183	201	190	209	202	233	219	219
Column 2 SC	us	45.1	42.3	33.8	38	62.5	73.8	55.7	51.8	42.6	47.6

SAMPLE ID		Column 3									
PORE VOLUME WEEK No.		1	2	3	4	5	6	7	8	9	10
PORE VOLUME MEASURED	ml	600	1000	1000	1000	1000	1000	1000	1000	1000	1000
PORE VOLUME LEACHED	ml	526	800	844	865	807	750	763	333	799	750
TOTAL VOLUME LEACHED	ml	526	1326	2170	3035	3842	4592	5355	5688	6487	7237
Northern Analytical											
pH	s.u.	7.6	7.6	7.8	7.5	7.6	7.5	7.6	7.6	7.7	7.7
Eh	mV	236	329	276	285	288	nd	nd	nd	nd	nd
Maxim data											
Column 3 pH	s.u.	8.18	7.78	8.17	7.1	6.98	7.45	7.32	7.59	7.19	7.59
Column 3 Eh	mV	474	133	194	198	195	215	210	232	218	218
Column 3 SC	us	98.2	70.7	57.8	62.6	71.8	120.3	72.5	63.2	57	63.7

Notes: nd : not determine ml : milliliters mV : millivolts us : micro siemens s.u. : standard units

Lab Data
pH and Eh

COLLUVIUM ACCELERATED WEATHERING TEST
McLAREN PIT RESPONSE ACTION, PARK COUNTY, MONTANA

SAMPLE ID		Column 1									
PORE VOLUME WEEK No.		**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
PORE VOLUME MEASURED	ml	600	600	600	600	600	600	600	600	600	600
PORE VOLUME LEACHED	ml	591	600	518	602	587	550	566	557	575	563
TOTAL VOLUME LEACHED	ml	5763	6363	6881	7483	8070	8620	9186	9743	10318	10881
Northern Analytical											
pH	s.u.	7.9	7.8	7.7	8.1	7.9	7.8	8	7.8	7.8	8
Eh	mV	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Maxim data											
Column 1 pH	s.u.	7.67	7.89	7.8	7.8	7.83	7.81	7.52	7.36	7.15	8.13
Column 1 Eh	mV	204	188	199	107	214	153	174	232	220	142
Column 1 SC	us	344	460	362	303	284	278	304	388	237	285

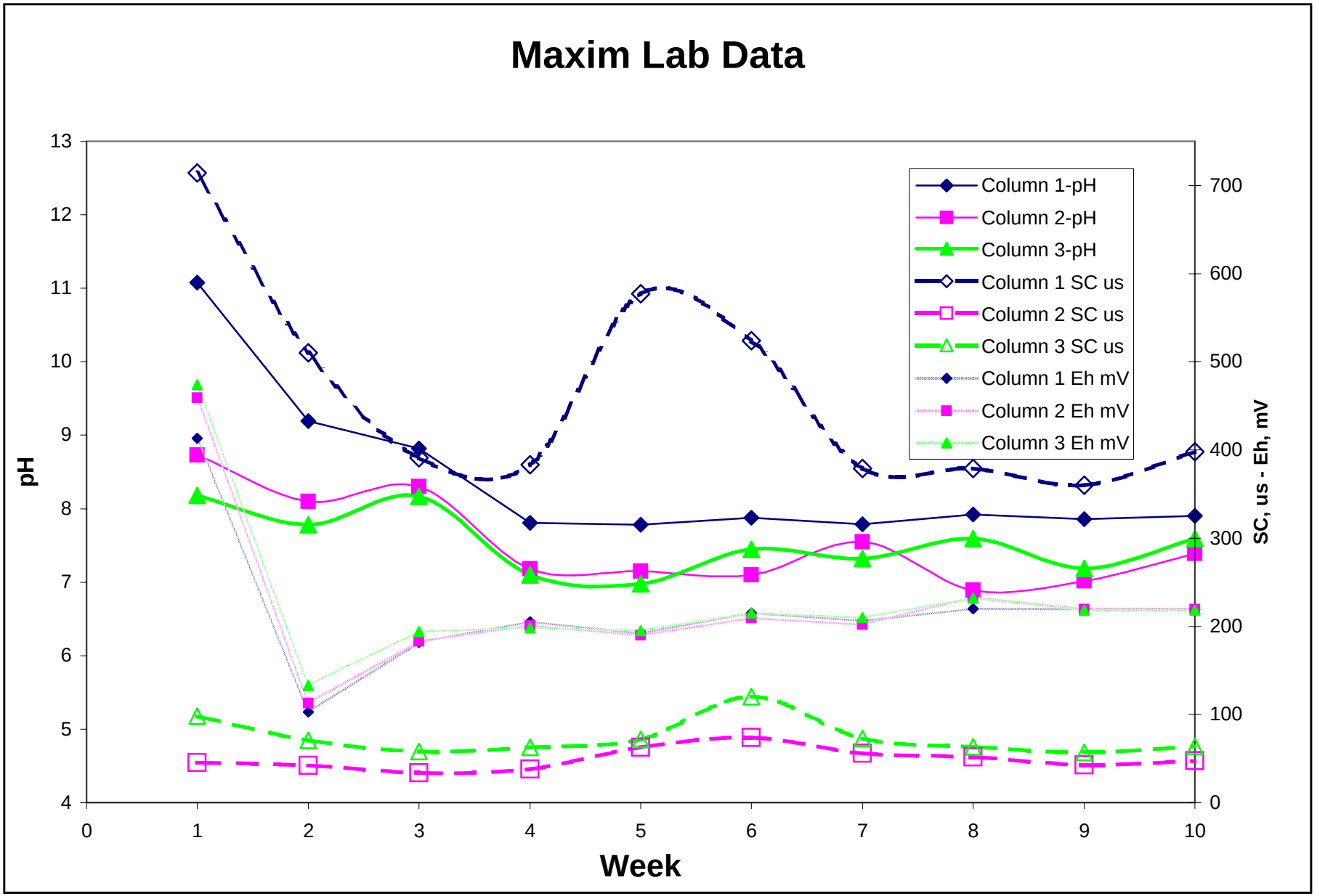
SAMPLE ID		Column 2									
PORE VOLUME WEEK No.		**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
PORE VOLUME MEASURED	ml	600	600	600	600	600	600	600	600	600	600
PORE VOLUME LEACHED	ml	425	600	434	575	500	518	525	500	435	448
TOTAL VOLUME LEACHED	ml	4730	5330	5764	6339	6839	7357	7882	8382	8817	9265
Northern Analytical											
pH	s.u.	7.5	7.6	7.5	7.5	7.7	7.6	7.8	7.5	7.5	7.4
Eh	mV	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Maxim data											
Column 2 pH	s.u.	7.04	7.2	6.94	7.83	6.87	7.65	7.17	6.61	6.49	8.35
Column 2 Eh	mV	203	178	198	111	209	164	187	223	222	150
Column 2 SC	us	47	43	36.1	108	36	59.4	58.3	53	34.5	36.3

SAMPLE ID		Column 3									
PORE VOLUME WEEK No.		**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
PORE VOLUME MEASURED	ml	1000	1000	1000	1000	800	1000	1000	1000	1000	1000
PORE VOLUME LEACHED	ml	817	1000	702	819	558	703	732	853	667	751
TOTAL VOLUME LEACHED	ml	8054	9054	9756	10575	11133	11836	12568	13421	14088	14839
Northern Analytical											
pH	s.u.	7.6	7.5	7.5	7.6	7.7	7.5	7.6	7.6	7.4	7.6
Eh	mV	0	nd	nd	nd	nd	nd	nd	nd	nd	nd
Maxim data											
Column 3 pH	s.u.	7.3	7.4	7.07	7.55	6.77	7.38	6.92	7.18	5.81	8.02
Column 3 Eh	mV	208	178	204	114	214	166	185	227	229	165
Column 3 SC	us	51.7	45.9	39.7	46.9	50.7	44.7	36.5	74.4	42.5	45.5

Notes: nd : not determined ml : milliliters mV : millivolts us : micro siemens s.u. : standard units

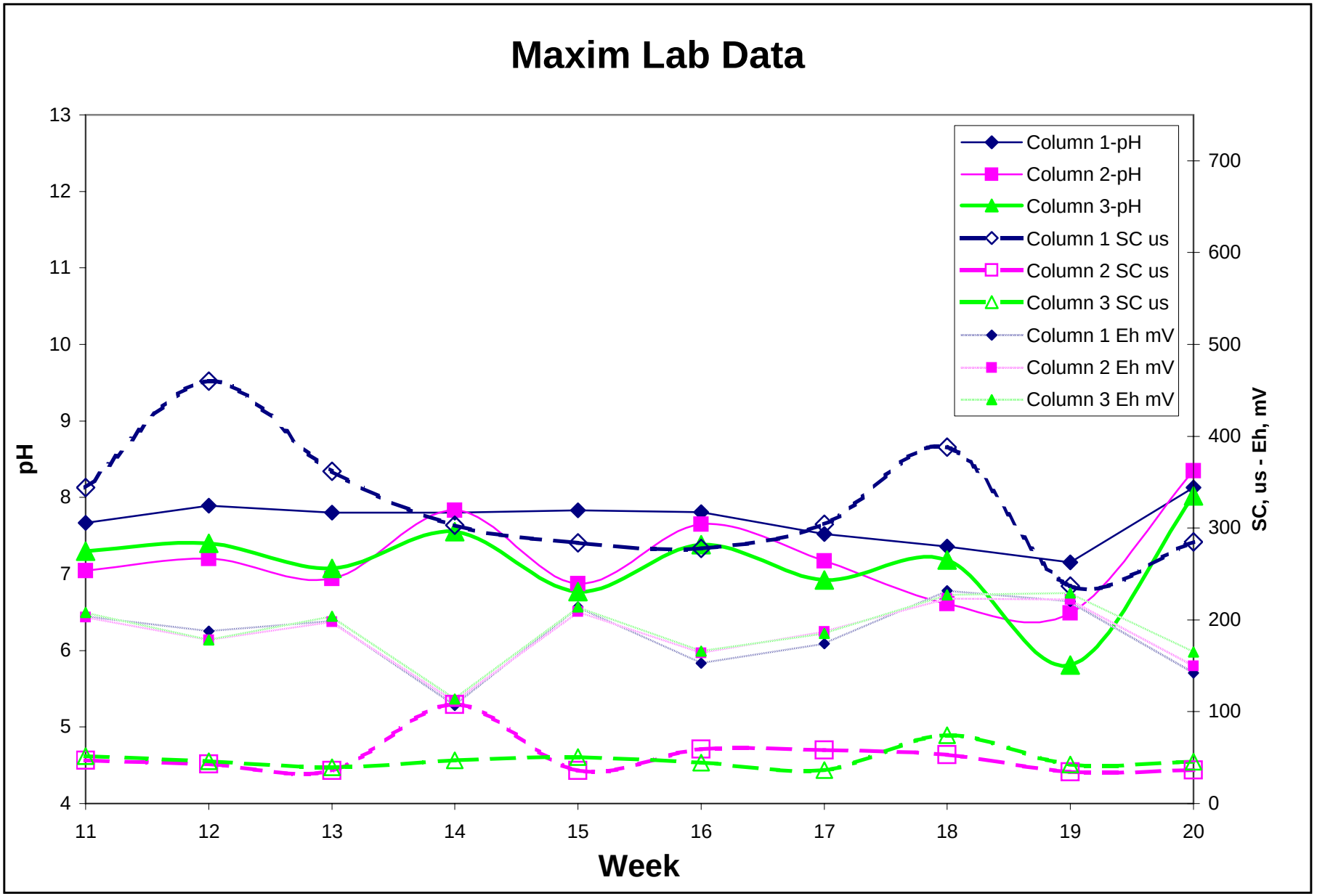
ATTACHMENT B

COLLUVIUM ACCELERATED WEATHERING TEST
McLAREN PIT, NEW WORLD PROJECT, PARK COUNTY, MONTANA



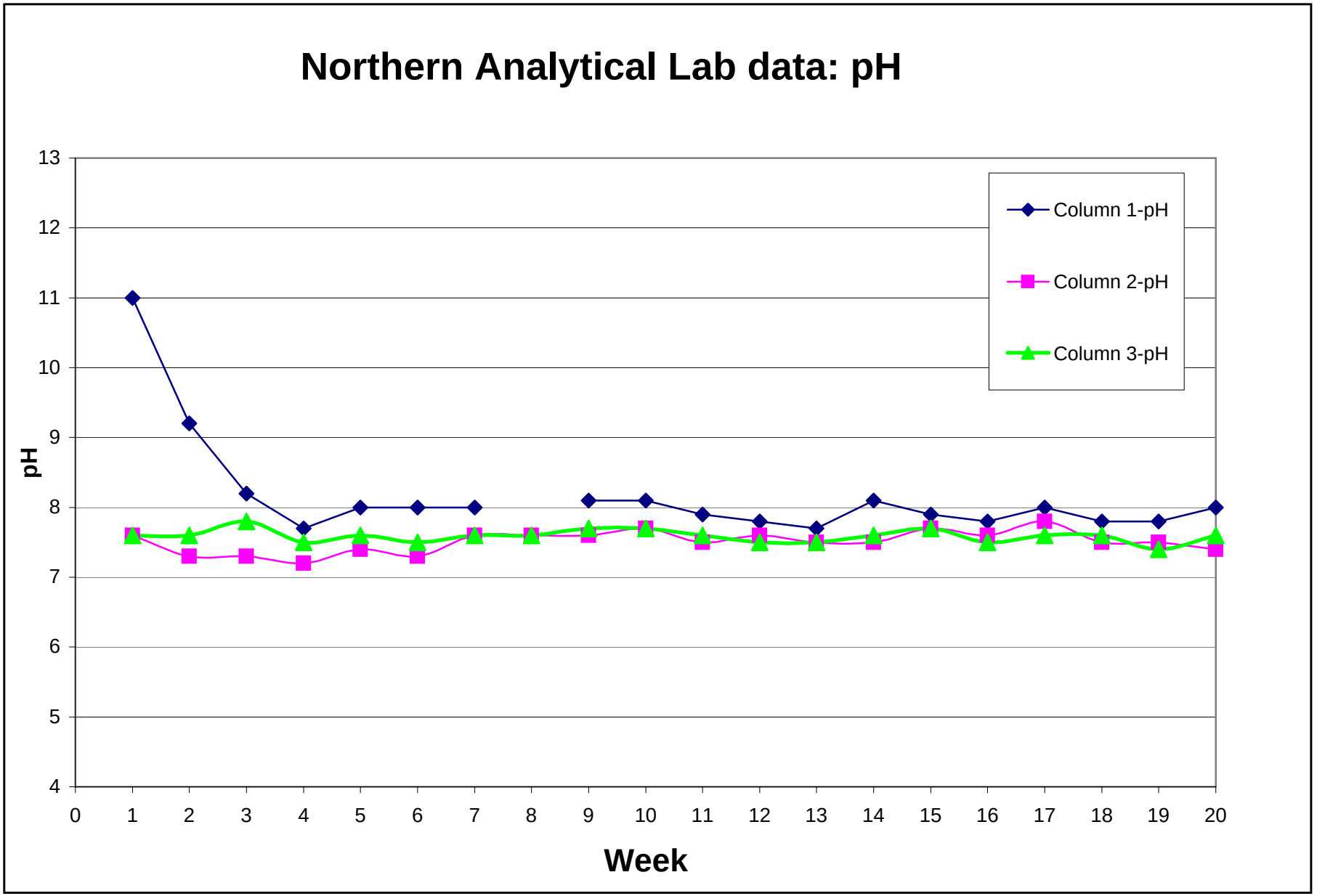
File: New World/9902245/Data Files/Column Data/lab data NW - Maxim-pH

COLLUVIUM ACCELERATED WEATHERING TEST
McLAREN PIT, NEW WORLD PROJECT, PARK COUNTY, MONTANA



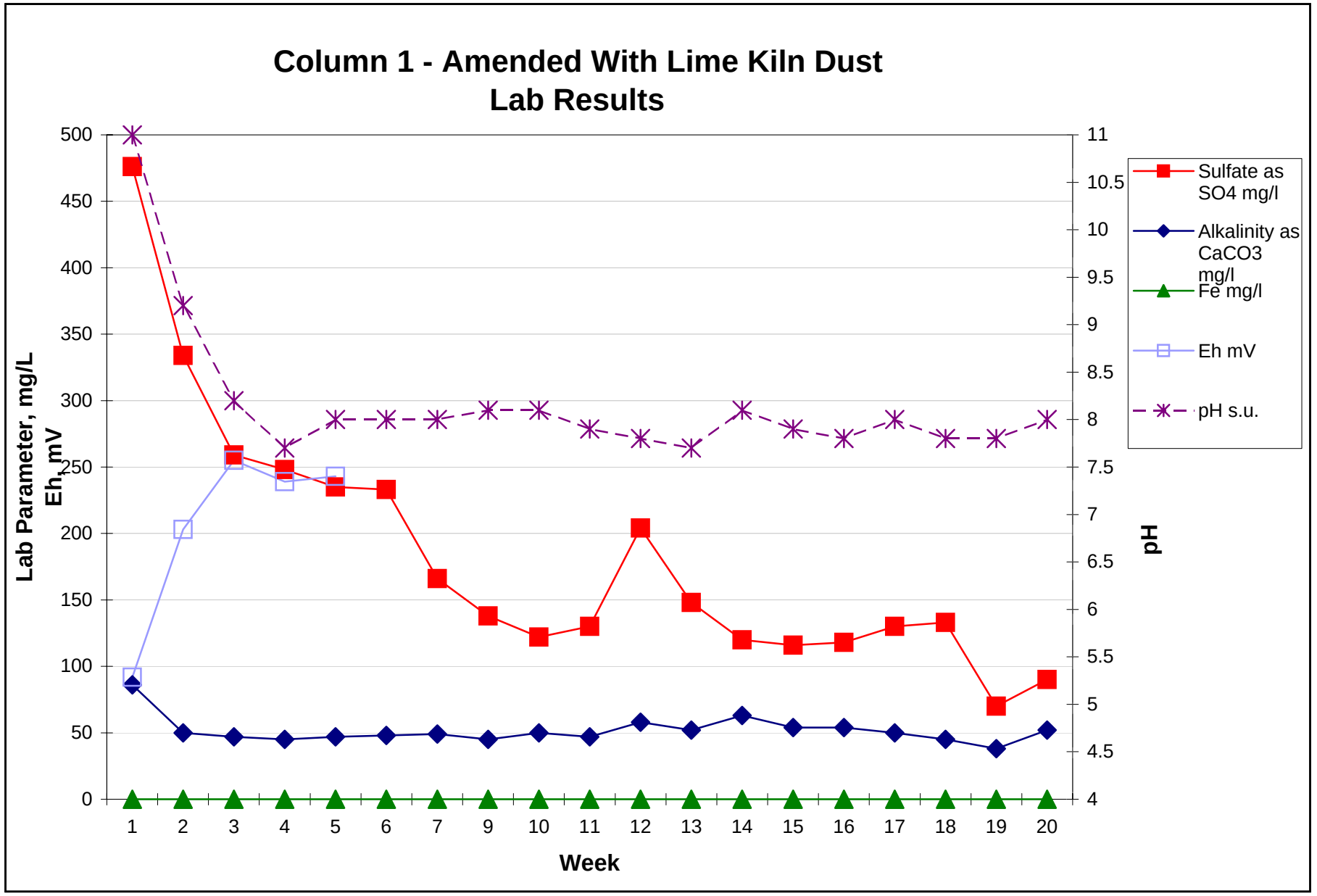
File: New World/9902245/Data Files/Column Data/lab data NW - 9902245-350.xls/Maxim-pH

COLLUVIUM ACCELERATED WEATHERING TEST
McLAREN PIT, NEW WORLD PROJECT, PARK COUNTY, MONTANA



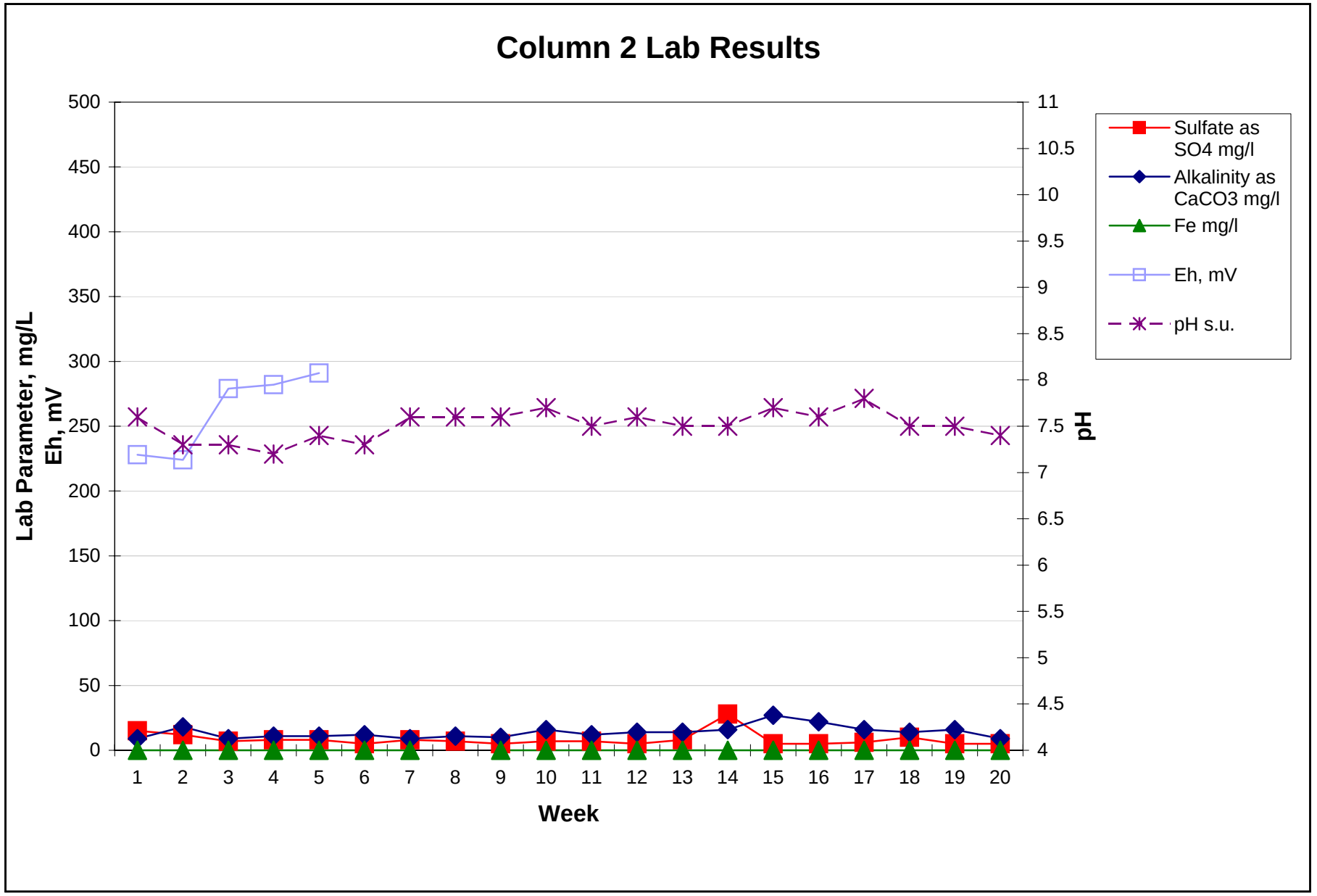
File: New World/9902245/Data Files/Column Data/lab data NW 9902245-350.xls/Lab graph

COLLUVIUM ACCELERATED WEATHERING TEST
McLAREN PIT, NEW WORLD PROJECT, PARK COUNTY, MONTANA



File: New World/9902245/Data Files/Column Data/lab data NW 9902245-350.xls/NW-1

COLLUVIUM ACCELERATED WEATHERING TEST
McLAREN PIT, NEW WORLD PROJECT, PARK COUNTY, MONTANA



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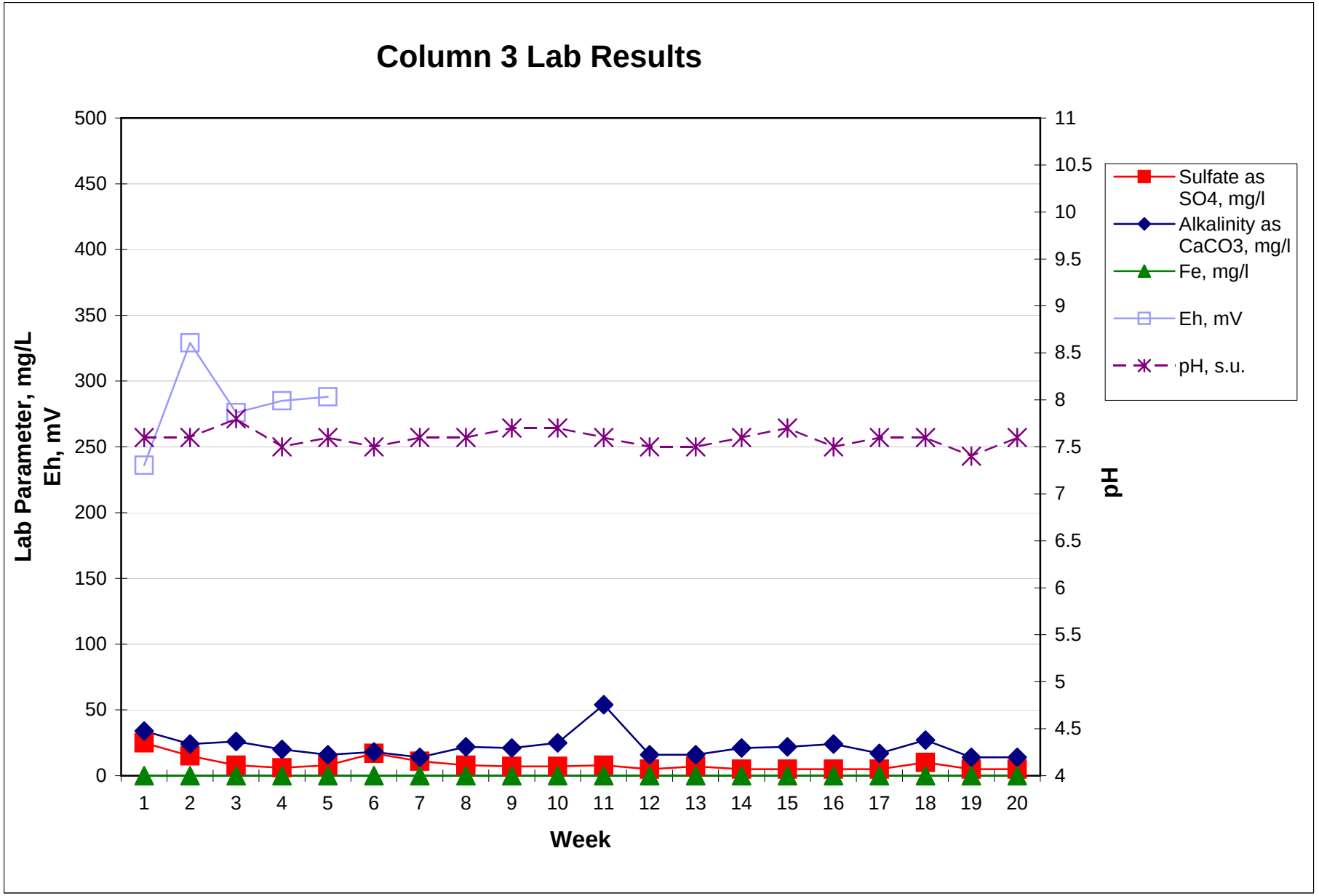
COLLUVIUM ACCELERATED WEATHERING TEST
McLAREN PIT, NEW WORLD PROJECT, PARK COUNTY, MONTANA



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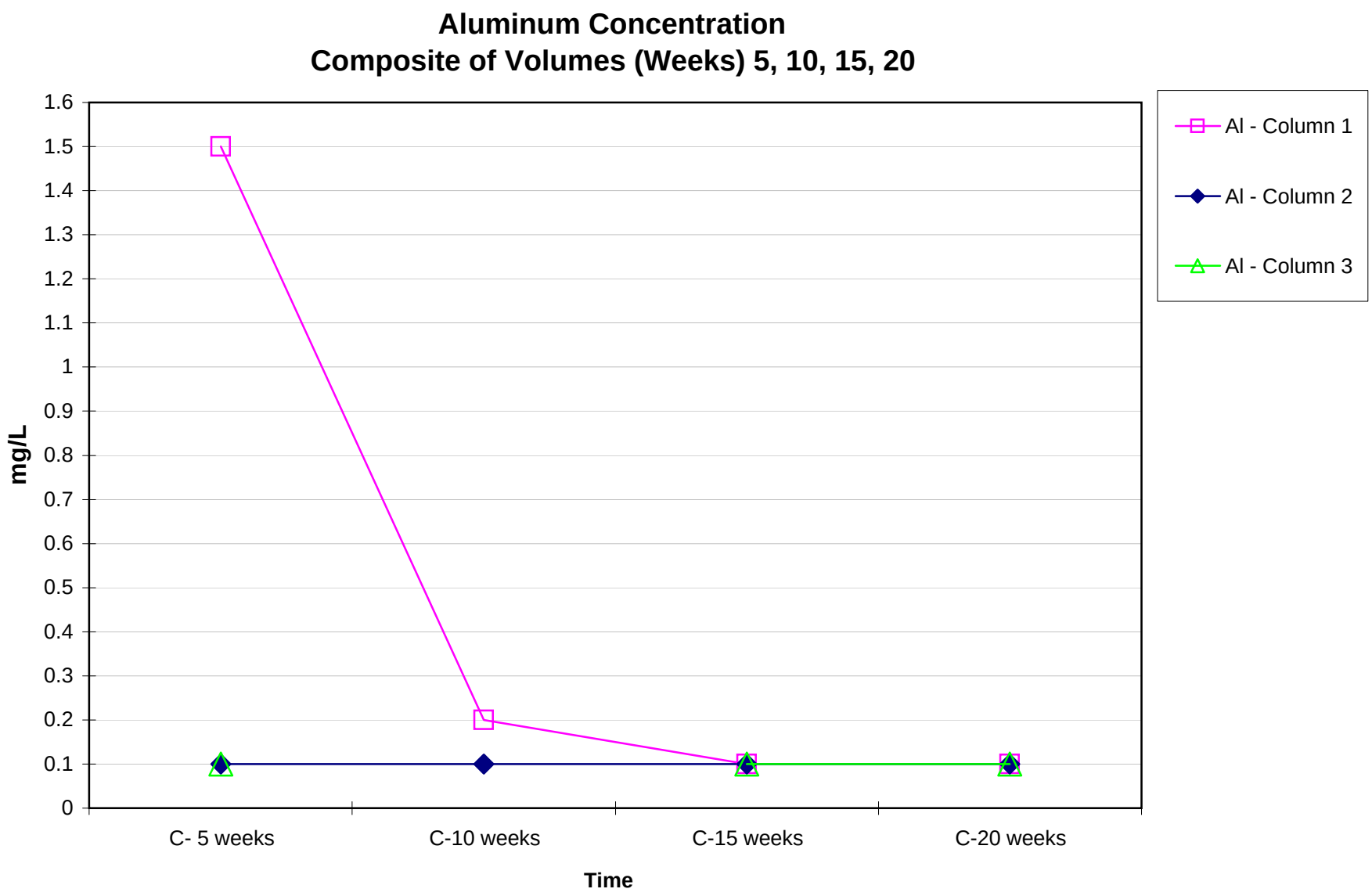
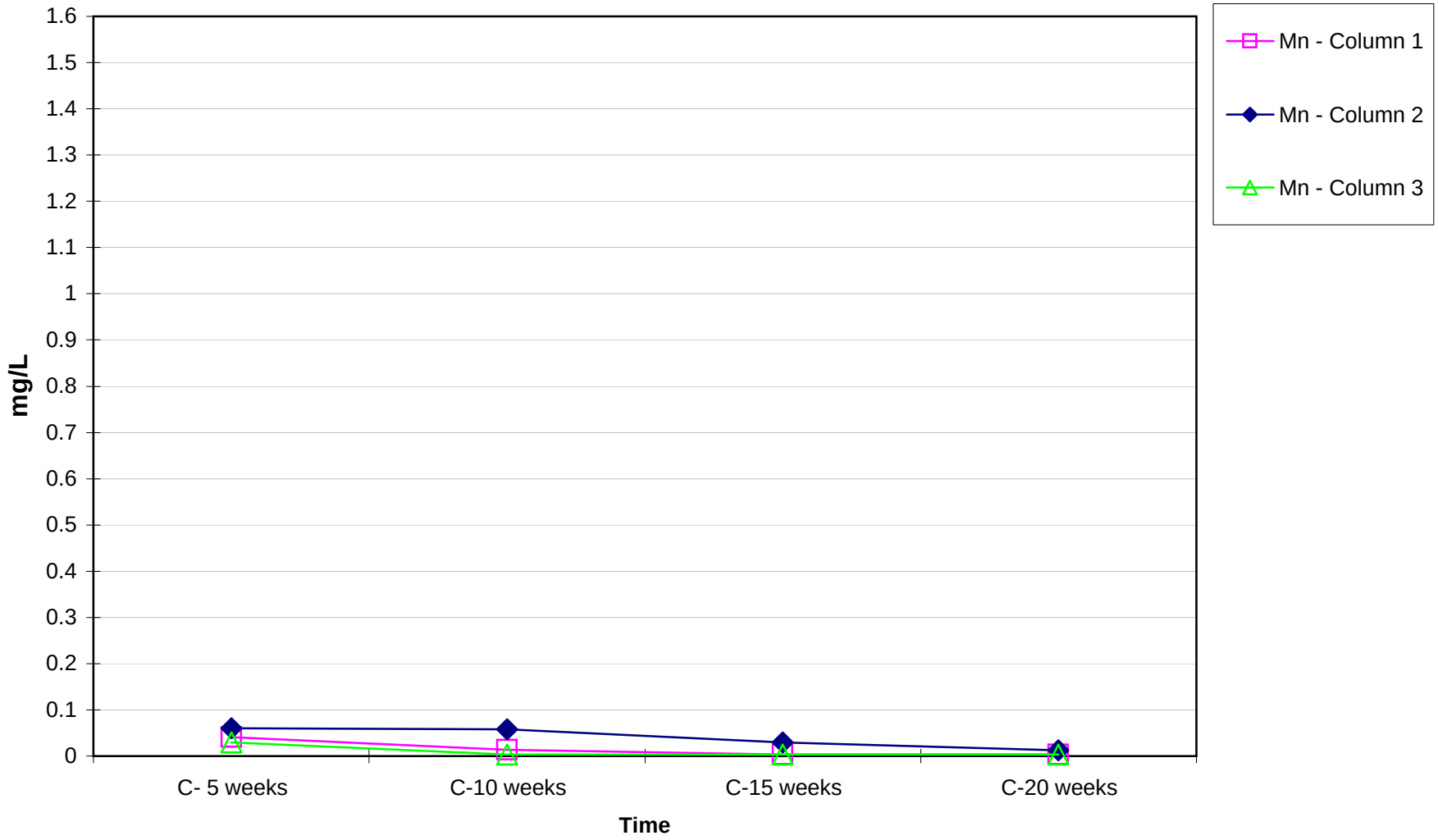
COLLUVIUM ACCELERATED WEATHERING TEST
McLAREN PIT, NEW WORLD PROJECT, PARK COUNTY, MONTANA



File: New World/9902245/Data Files/Column Data/Lab data - NW 9902245-350.xls/Al

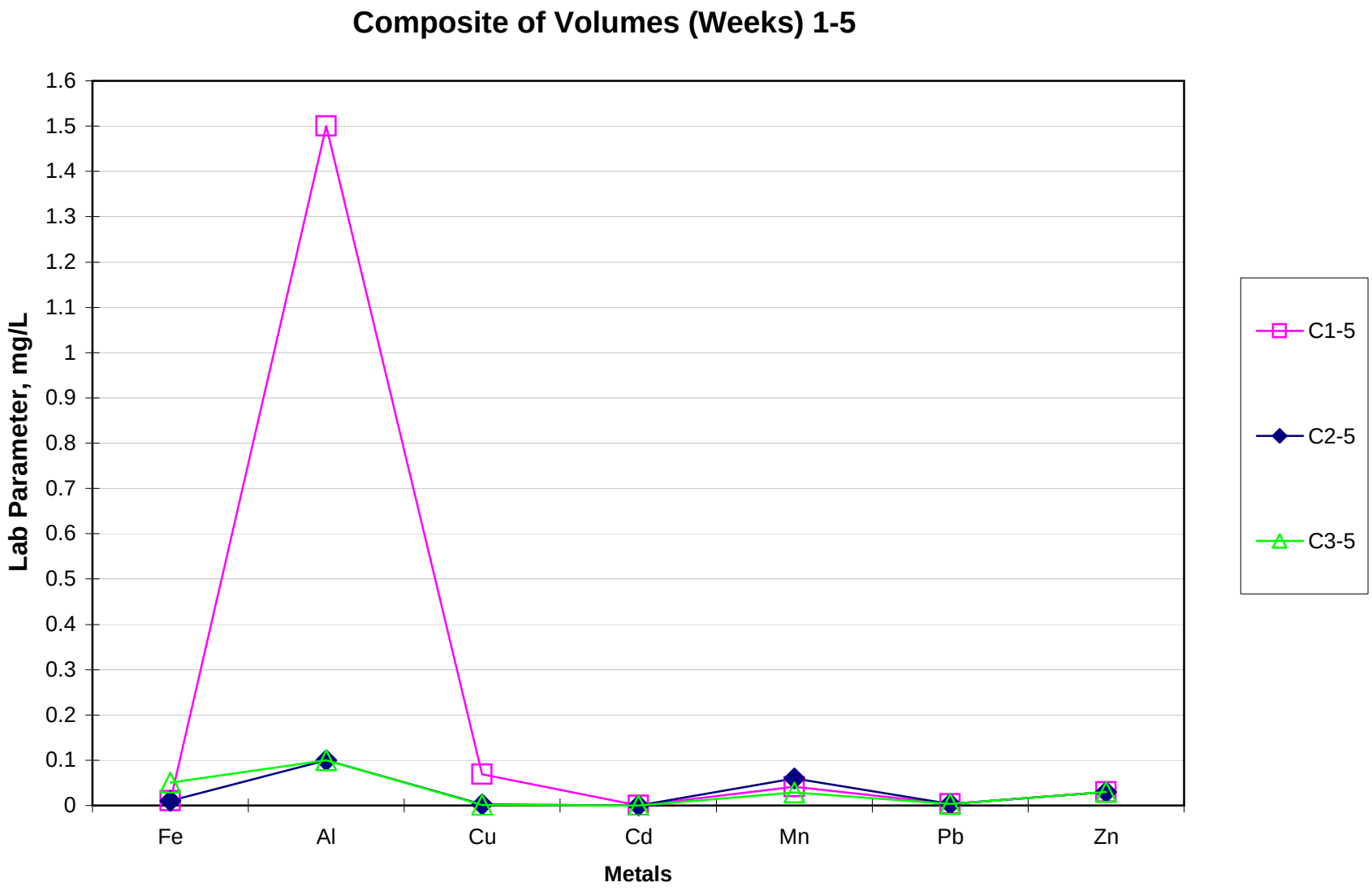
COLLUVIUM ACCELERATED WEATHERING TEST
McLAREN PIT, NEW WORLD PROJECT, PARK COUNTY, MONTANA

Manganese Concentration
Composite of Volumes (Weeks) 5, 10, 15, 20



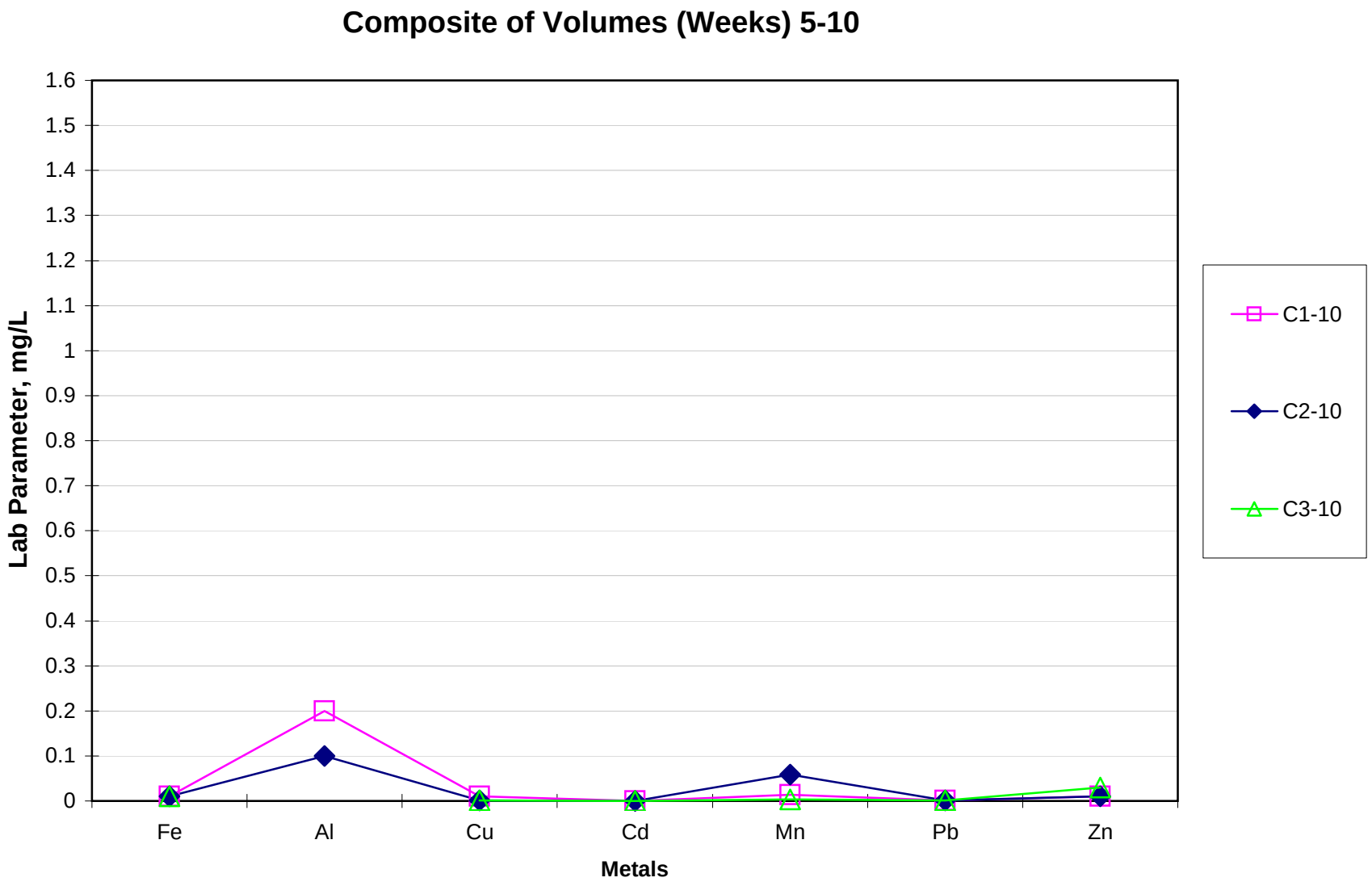
File: New World/9902245/Data Files/Column Data/Lab data - NW 9902245-350.xls/Mn

COLLUVIUM ACCELERATED WEATHERING TEST
McLAREN PIT, NEW WORLD PROJECT, PARK COUNTY, MONTANA



File: New World/9902245/Data Files/Column Data/Humiditycell_Lab data.xls - C5

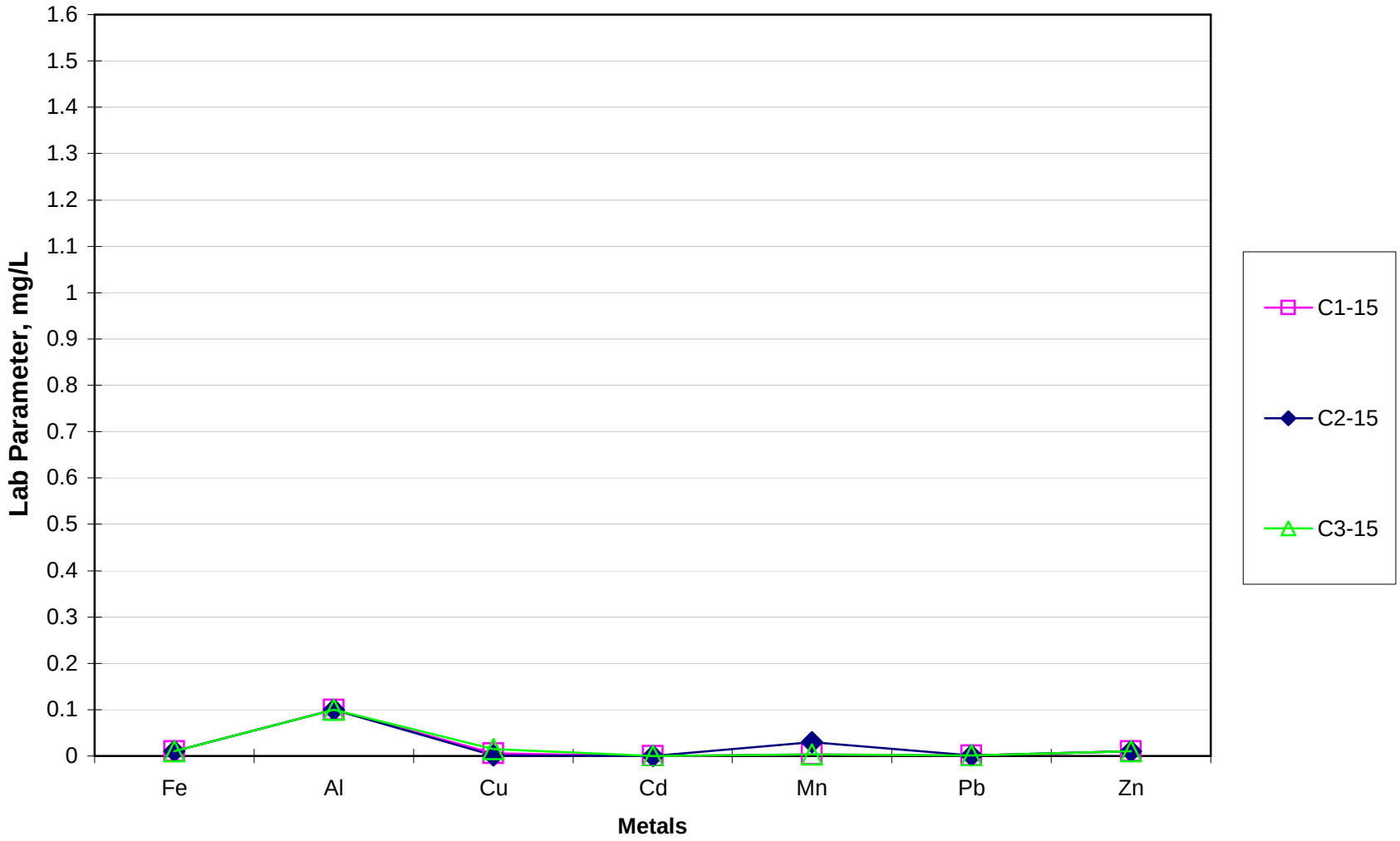
COLLUVIUM ACCELERATED WEATHERING TEST
McLAREN PIT, NEW WORLD PROJECT, PARK COUNTY, MONTANA



File: New World/9902245/Data Files/Column Data/Lab data - NW 9902245-350.xls/C10

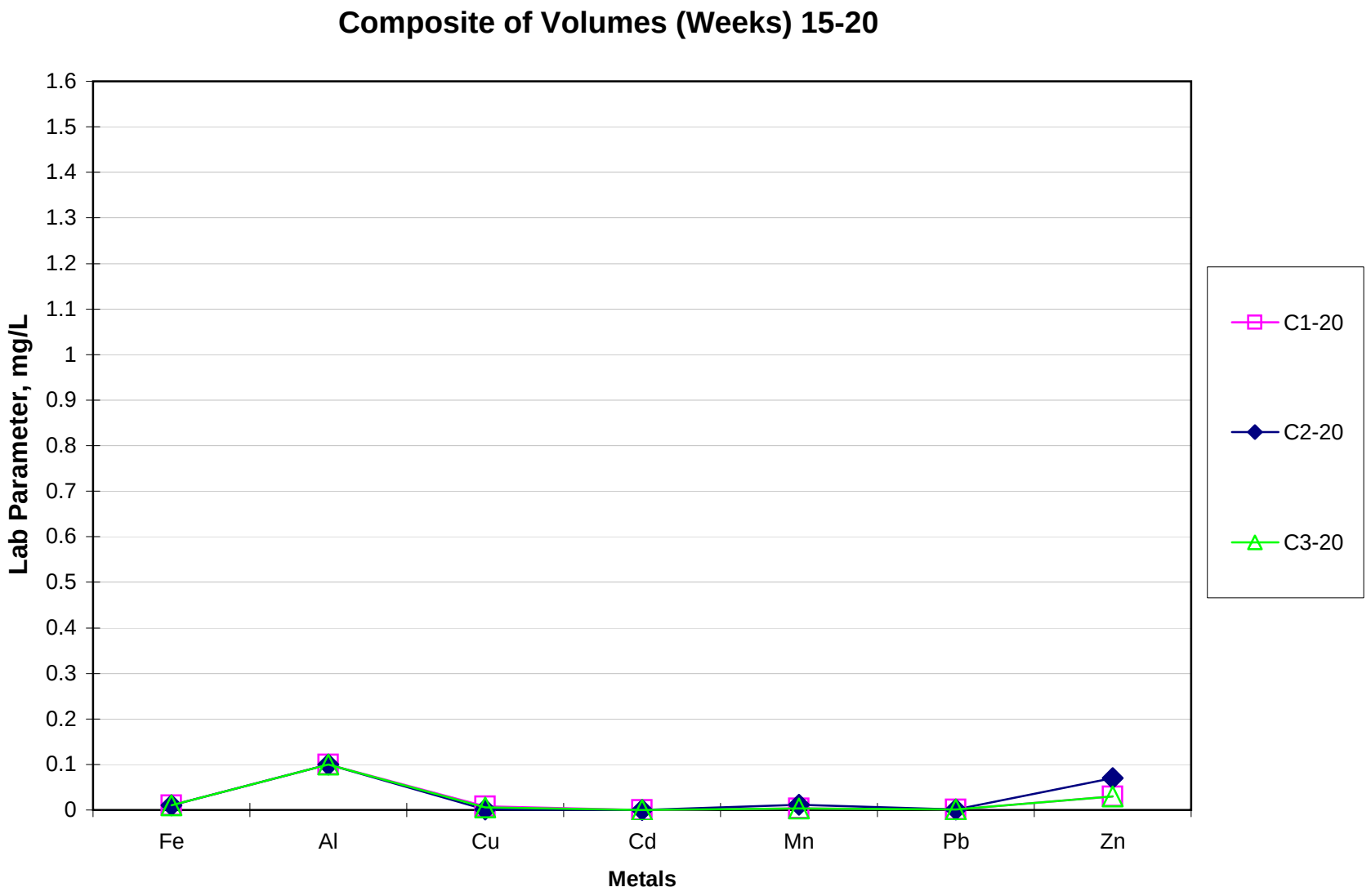
COLLUVIUM ACCELERATED WEATHERING TEST
McLAREN PIT, NEW WORLD PROJECT, PARK COUNTY, MONTANA

Composite of Volumes (Weeks) 11-15



File: New World/9902245/Data Files/Column Data/Lab data - NW 9902245-350/C15

COLLUVIUM ACCELERATED WEATHERING TEST
McLAREN PIT, NEW WORLD PROJECT, PARK COUNTY, MONTANA



File: New World/9902245/Data Files/Column Data/Lab data - NW 9902245-350/C20