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GEOLOGICAL INVESTIGATION • SEDIMENTATION • EROSION CONTROL • REGULATORY COMPLIANCE ASSISTANCE

July 23, 2018

Mr. Jeff Biddick
Oklahoma Dept. of Environmental Quality
Land Protection Division
P. O. Box 1677
Oklahoma City, OK 73101-1677

Re: Evans and Associates Construction Co., Inc., Big Fork Ranch Facility
Interim/2018 Semi-Annual Groundwater Monitoring and Corrective Action Report

Dear Mr. Biddick:

On Behalf of Evans and Associates Construction Co., Inc. (EVANS), I submit an interim/ 2018 semi-annual groundwater monitoring and corrective action report for the Big Fork Ranch coal combustion residuals (CCR) facility. The reporting period is February 26, 2017 through April 14, 2018.

The Big Fork Ranch facility is an existing CCR site. The facility is located in the NW/4 Section 8, Township 24 North, Range 3 East, Noble County. There are no CCR impoundments at the facility.

The following report documents groundwater analysis, statistical analysis of ground-water analytical data, flow direction, elevations in the uppermost aquifer; actions completed, problems, if any, encountered during the February 26, 2017 through April 14, 2018 reporting period.

- A map showing the boundaries of the Big Fork Ranch facility, CCR cells, active up-gradient and down-gradient monitoring wells, haul roads and cover material borrow areas is attached.

- No new monitoring wells were installed during the reporting period February 26, 2017 through April 14, 2018. Monitoring Well GWMP-6A represents up-gradient conditions, while monitoring wells GWMP-8A, GWMP-9A, and GWMP-10A represent down-gradient conditions, as required by OAC 252:517-9-2 (c). No monitoring wells were decommissioned during the reporting period. No problems were experienced with operation of the monitoring wells.

- Eight (8) samples were collected from all four (4) wells on 2/26/17, 7/29/17, 9/10/17, 10/14/17, 11/11/17, 1/6/2018, 3/3/2018 and 4/14/2018 for Detection Monitoring. This exceeds the minimum monitoring frequency of semi-annual, required by DEQ at OAC

252:517-9-5(b). Table No. 1 presents the analytical results of the February 26, 2017 April 14, 2018 Detection Monitoring program for all four (4) groundwater monitoring wells.

- The EPA Groundwater Statistics Tool, EPA Publication OSWER 9283.1-46, was chosen for groundwater data statistical analysis. This is because it incorporates analytical tools that identify outlying values, mean values, upper confidence limits, and rising or declining concentration trends by identifying specific analytical values identified by the Dixon's Test. The EPA statistical tool presents Dixon's Outlier, Box and Whiskers Plot, Normality Test, Trend Line, Confidence Band and Shapiro-Wilk Test tables and charts, that allow rapid identification of anomalous high values and the statistical significance of those values. The EPA statistical tool was run for the Detection Monitoring parameters pH, TDS, Boron, Calcium, Chloride, Fluoride, and Sulfate at each of the four wells.

- The EPA Groundwater Statistics Tool-based statistical analysis of the February 26, 2017 through April 14, 2018 Detection Monitoring analytical data showed no significant increasing trend in any Detection Monitoring analytical parameter at any one well, excluding an outlying value for chloride at down-gradient well GWMP #9A. Regarding GWMP #9A, excluding an outlying low value for chloride, 7.5 mg/l, results in a nearly flat Trend Line for chloride. The EPA Groundwater Statistics Tool clearly flagged this anomalous low value. Intra-well statistical analysis was chosen to identify potential problems emerging at any one location to decide if initiation of Assessment Monitoring is required by OAC 252:517-9-5 (e)(1).

- Attachment 1 to this report contains tables of groundwater analytical results and the February 14, 2018 potentiometric surface map. Attachment 2 contains groundwater analyses control charts and EPA Groundwater Statistics Tool statistical analyses. Attachment 3 provides laboratory reports of groundwater analyses.

- Three (3) new monitoring wells are proposed for 2018 at locations approved by DEQ. GWMP #11A will be an up-gradient well, while GWMP #12A and GWMP #13A will be down-gradient wells. A completion report with supporting drill logs and well completion diagrams will be submitted to DEQ.

- Detection Monitoring has been conducted during the reporting period to collect the required eight independent samples from each groundwater monitoring well to establish background values for each Detection Monitoring parameter at each well.

- Sampling and analytical methods during the reporting period were conducted according to the groundwater monitoring plan approved by DEQ. Up-gradient and down-gradient samples were collected unfiltered, as required by OAC 252:517-9-4 (j). Static groundwater elevations were measured immediately before each sampling event.

- A potentiometric Surface Map is attached, showing groundwater elevations and flow

direction as of the April 14, 2018 sampling event. Based on monitoring well gauging conducted on April 14, 2018, groundwater flow down-gradient of the disposal cell is to the north-northwest. Groundwater flow is very slow at the Site, varying from 0.42 to 0.98 gallon per hour in the four monitoring wells. Facility-wide groundwater flow rate is calculated at 0.88 foot per year.

- Background concentrations of Detection Monitoring parameters were determined from the February 26, 2017 - April 14, 2018 analytical results from a total of eight (8) samples per well.

- Collection of groundwater samples commenced on 1/6/2018 for Assessment Monitoring, in addition to the Detection Monitoring program. Assessment monitoring sample collection will continue through October 2018.

- Detection Monitoring conducted during February 26, 2017 through April 14, 2018 was to determine the background level for each parameter. Each background level was obtained from the mean value published by the EPA Groundwater Statistics Toll in the Upper Confidence Limit calculations report for each parameter, and from the mean values in enclosed Table 1, Groundwater Detection Monitoring Results.

This report is submitted in fulfillment of DEQ rule at OAC 252:517-9-1 (e). As required by DEQ rule at OAC 252:517-19-1(h)(1), this report will be placed in the facility's operating record, when available. As required by DEQ rule at OAC 252:517-19-2(g)(1), this report will be submitted to DEQ. As required by DEQ rule at OAC 252:517-19-3(h)(1), this report will be posted to the facility's CCR web site, when approved by DEQ.

Please contact me at (405) 557-0000 or at mszahrai@gmail.com should you want to discuss.

Sincerely,

Saeed Zahrai, P. E.
President
EMERA, Corp.

Attachment 1: Potentiometric Surface Map and Tables of Groundwater Analytical Results
Attachment 2: Groundwater Analyses Control Charts and Statistical Analyses
Attachment 3: Laboratory Reports of Groundwater Analyses

cc: Mr. Lee Evans, President, EVANS

ATTACHMENT 1

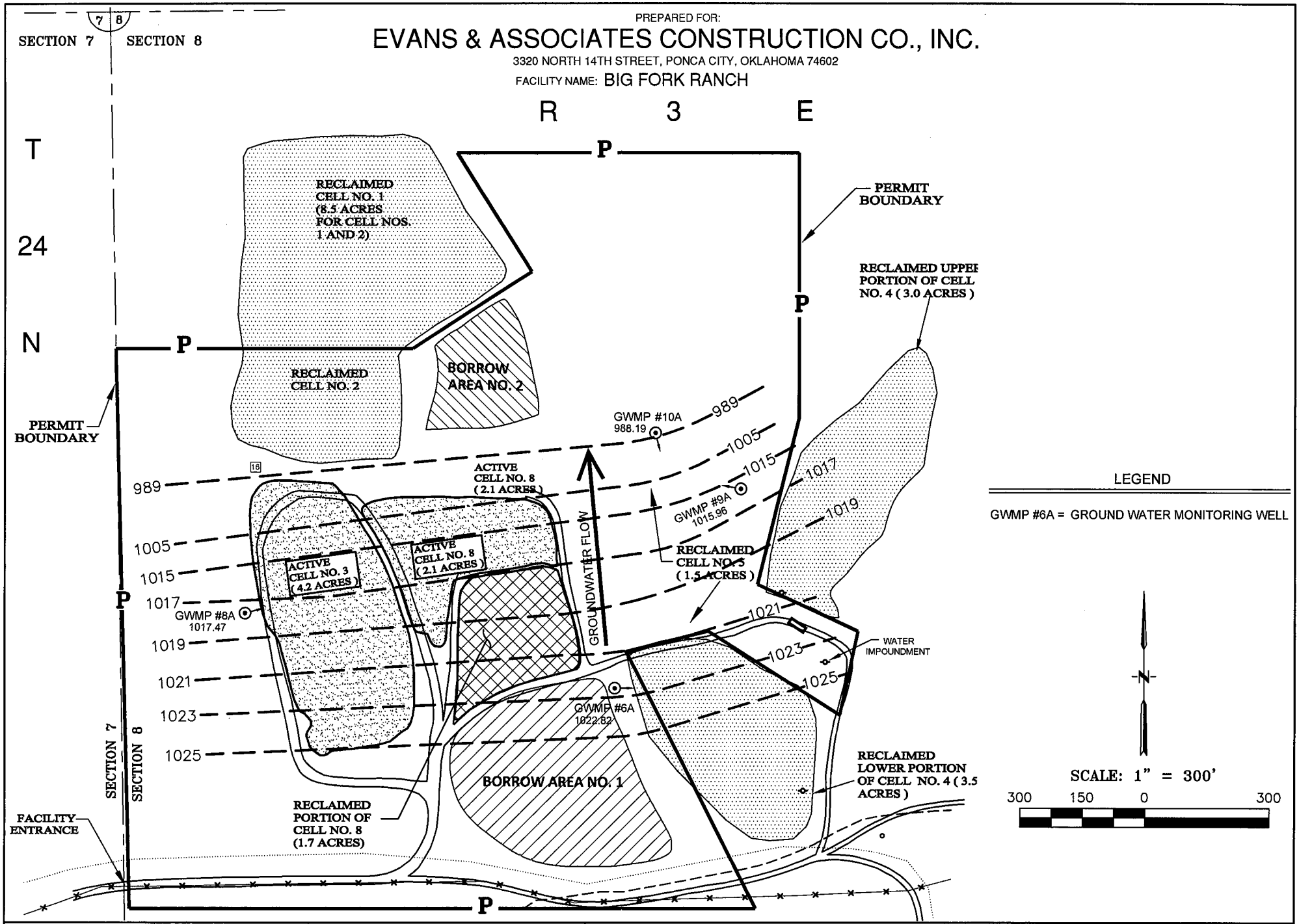
Potentiometric Surface Map and Tables of Groundwater Analytical Results

PREPARED FOR:

EVANS & ASSOCIATES CONSTRUCTION CO., INC.

3320 NORTH 14TH STREET, PONCA CITY, OKLAHOMA 74602

FACILITY NAME: BIG FORK RANCH



DRAWING NO.:	DATE:	PROJECT NAME:	TITLE OF MAP:	PREPARE BY:
MP-8-4/18	7-23-18	BIG FORK RANCH	POTENTIOMETRIC SURFACE MAP (for 4-14-18)	EMERA CORPORATION P. O. BOX 2228, EDMOND, OK 73083

TABLE 1
GROUNDWATER DETECTION MONITORING RESULTS
EVANS AND ASSOCIATES CONSTRUCTION COMPANY, INC.
BIG FORK RANCH FACILITY

Sample Date	Well #	Total Depth (ft.)	Depth to Water (ft.)	pH (su)	TDS (mg/l)	Boron (mg/l)	Calcium (mg/l)	Chloride (mg/l)	Fluoride (mg/l)	Sulfate (mg/l)
2/26/2017	6A	40	31.70	6.92	460	<0.100	81	3	0.48	40.45
7/29/2017	6A	40	31.20	7.31	372	0.0705	89.8	1.73	0.433	26.5
9/10/2017	6A	40	31.00	7.72	330	0.0704	105	1.99	0.415	32.3
10/14/2017	6A	40	32.90	7.72	380	0.0654	97.3	1.53	0.394	26.4
11/11/2017	6A	40	31.60	7.27	380	0.0766	99.4	1.29	0.412	26.5
1/6/2018	6A	40	33.00	7.09	400	0.068	110	1.58	0.38	31.3
3/3/2018	6A	40	34.50	7.09	470	0.113	121	1.22	0.42	23.6
4/14/2018	6A	40	32.60	7.34	432	0.121	127	1.14	0.510	21.6
Minimum			31.00	6.92	330.00	0.07	81.00	1.14	0.38	21.60
Maximum			34.50	7.72	470.00	0.12	127.00	3.00	0.51	40.45
Average			32.31	7.31	403.00	0.08	103.81	1.69	0.43	28.58

TABLE 1, CONTINUED
GROUNDWATER DETECTION MONITORING RESULTS
EVANS AND ASSOCIATES CONSTRUCTION COMPANY, INC.
BIG FORK RANCH FACILITY

Sample Date	Well #	Total Depth (ft.)	Depth to Water (ft.)	pH (su)	TDS (mg/l)	Boron (mg/l)	Calcium (mg/l)	Chloride (mg/l)	Fluoride (mg/l)	Sulfate (mg/l)
2/26/2017	8A	45	41.7	7.44	352	0.12	63	3.5	0.39	37.21
7/29/2017	8A	45	41.2	7.70	422	0.13	84.8	4.55	0.359	30.8
9/10/2017	8A	45	42.4	7.51	316	0.111	92.1	4.61	0.346	31.5
10/14/2017	8A	45	40.6	7.57	372	0.108	74.7	3.78	0.31	32.3
11/11/2017	8A	45	32.4	7.53	354	1.36	38.9	3.57	0.322	31.9
1/6/2018	8A	45	41.3	7.66	374	0.11	86	3.55	0.344	31.2
3/3/2018	8A	45	41.0	7.52	444	0.107	78.3	3.59	0.363	33.1
4/14/2018	8A	45	40.5	7.81	430	0.108	84.1	3.52	0.396	30.2
Minimum			32.40	7.44	316.00	0.11	38.90	3.50	0.31	30.20
Maximum			42.40	7.81	444.00	1.36	92.10	4.61	0.40	37.21
Average			40.14	7.59	383.00	0.27	75.24	3.83	0.35	32.28

TABLE 1, CONTINUED
GROUNDWATER DETECTION MONITORING RESULTS
EVANS AND ASSOCIATES CONSTRUCTION COMPANY, INC.
BIG FORK RANCH FACILITY

Sample Date	Well #	Total Depth (ft.)	Depth to Water (ft.)	pH (su)	TDS (mg/l)	Boron (mg/l)	Calcium (mg/l)	Chloride (mg/l)	Fluoride (mg/l)	Sulfate (mg/l)
2/26/2017	9A	40	12.9	7.75	496	1.2	35	7.5	0.76	93.18
7/29/2017	9A	40	12.6	7.97	530	1.21	35.3	18.8	0.747	111
9/10/2017	9A	40	12.2	7.87	454	1.32	44.8	17.1	0.717	106
10/14/2017	9A	40	12.3	8.26	510	1.36	36.8	16.4	0.679	101
11/11/2017	9A	40	11.5	7.81	516	0.109	73.7	17.7	0.703	96.8
1/6/2018	9A	40	11.4	7.97	512	1.43	38	16.9	0.72	98.3
3/3/2018	9A	40	12.7	7.88	526	1.43	35.4	17	0.784	106
4/14/2018	9A	40	13.5	8.01	524	1.36	36.4	17.4	0.822	101
Minimum			11.40	7.75	454.00	0.11	35.00	7.50	0.68	93.18
Maximum			13.50	8.26	530.00	1.43	73.70	18.80	0.82	111.00
Average			12.39	7.94	508.50	1.18	41.93	16.10	0.74	101.66

TABLE 1, CONTINUED
GROUNDWATER DETECTION MONITORING RESULTS
EVANS AND ASSOCIATES CONSTRUCTION COMPANY, INC.
BIG FORK RANCH FACILITY

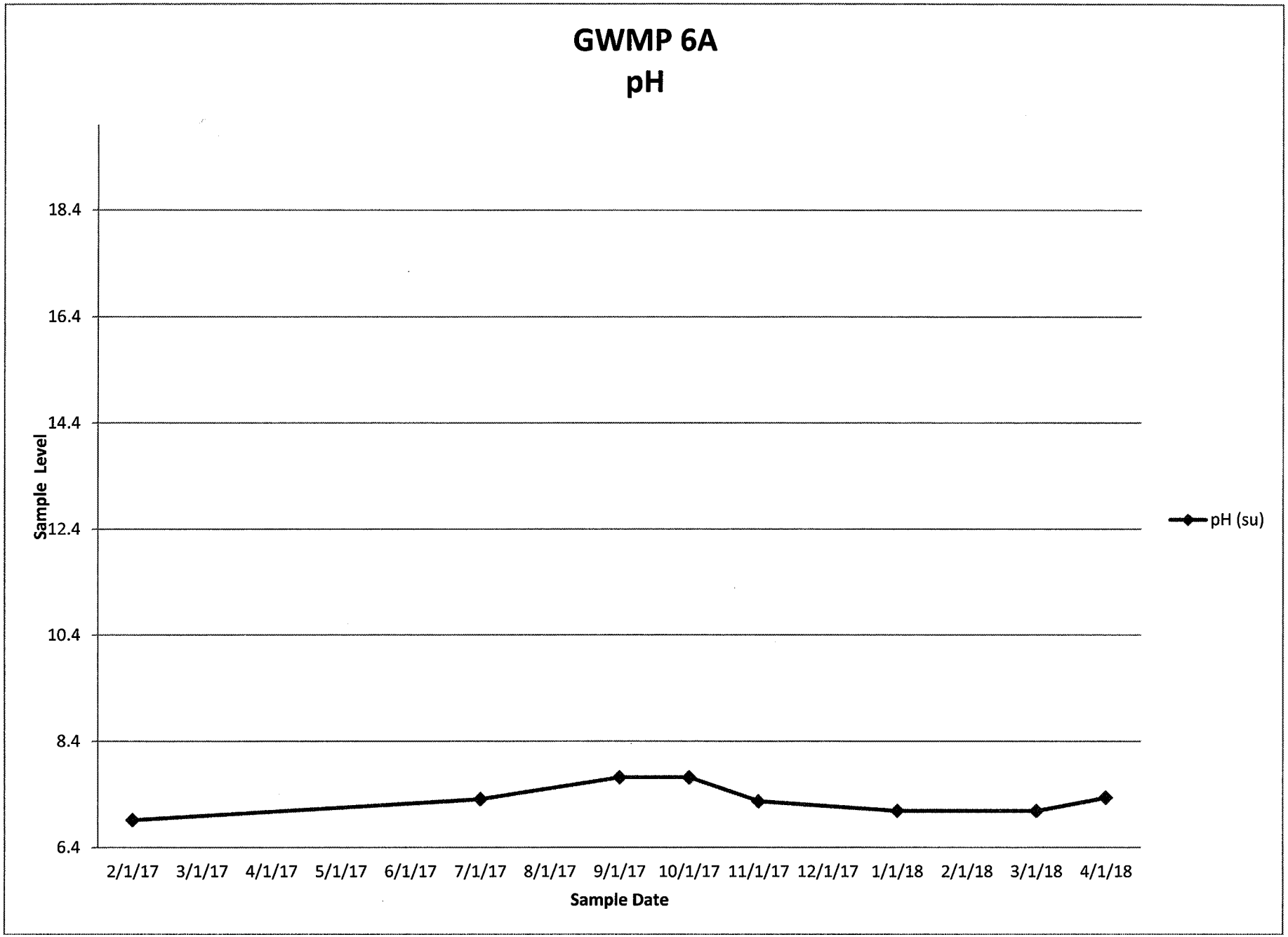
Sample Date	Well #	Total Depth (ft.)	Depth to Water (ft.)	pH (su)	TDS (mg/l)	Boron (mg/l)	Calcium (mg/l)	Chloride (mg/l)	Fluoride (mg/l)	Sulfate (mg/l)
2/26/2017	10A	50.0	28.6	7.19	1730	3.4	130	7	0.32	713.03
7/29/2017	10A	50.0	29.8	7.51	1740	3.13	124	29.6	0.533	677
9/10/2017	10A	50.0	30.5	7.94	2080	4.4	166	26.5	1	914
10/14/2017	10A	50.0	29.4	7.42	2140	4.52	167	27.3	0.5	1140
11/11/2017	10A	50.0	28.6	6.95	1940	4.17	134	78.9	0.394	804
1/6/2018	10A	50.0	29.1	7.48	1760	4.05	122	28.2	0.522	711
3/3/2018	10A	50.0	28.8	7.31	1800	4.41	123	27.8	1	814
4/14/2018	10A	50.0	29.4	7.81	1790	4.43	115	26.3	<1	682
Minimum			28.60	6.95	1730.00	3.13	115.00	7.00	0.32	677.00
Maximum			30.50	7.94	2140.00	4.52	167.00	78.90	1.00	1140.00
Average			29.28	7.45	1872.50	4.06	135.13	31.45	0.61	806.88

ATTACHMENT 2

Groundwater Analyses Control Charts and Statistical Analyses

GWMP #6A

Groundwater Analyses Control Charts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16.4
14.4
12.4
10.4
8.4
6.4
Sample Level
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5/1/17
6/1/17
7/1/17
8/1/17
9/1/17
10/1/17
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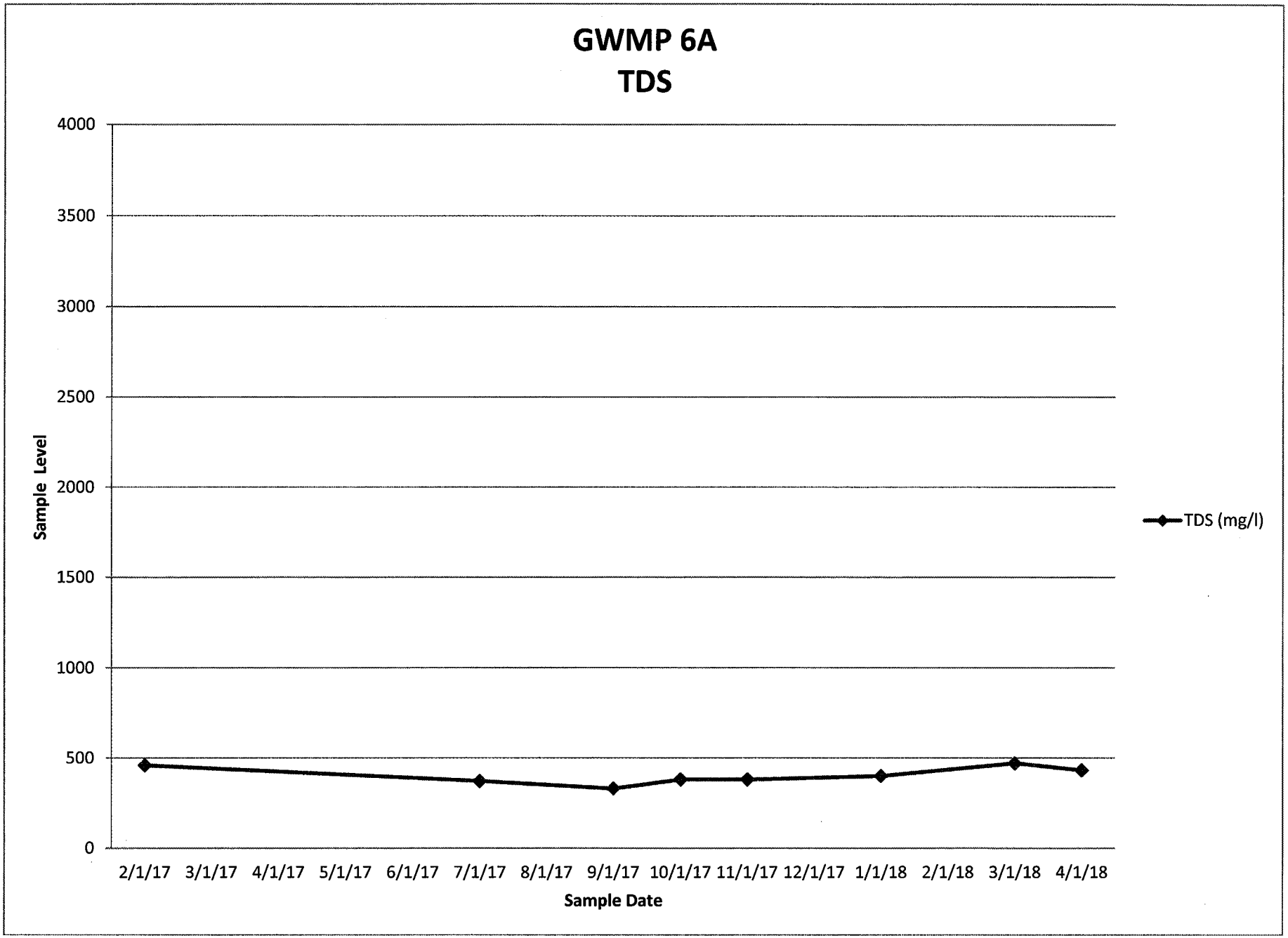
12/1/17
1/1/18
2/1/18
3/1/18
4/1/18
Sample Date
pH (su)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TDS
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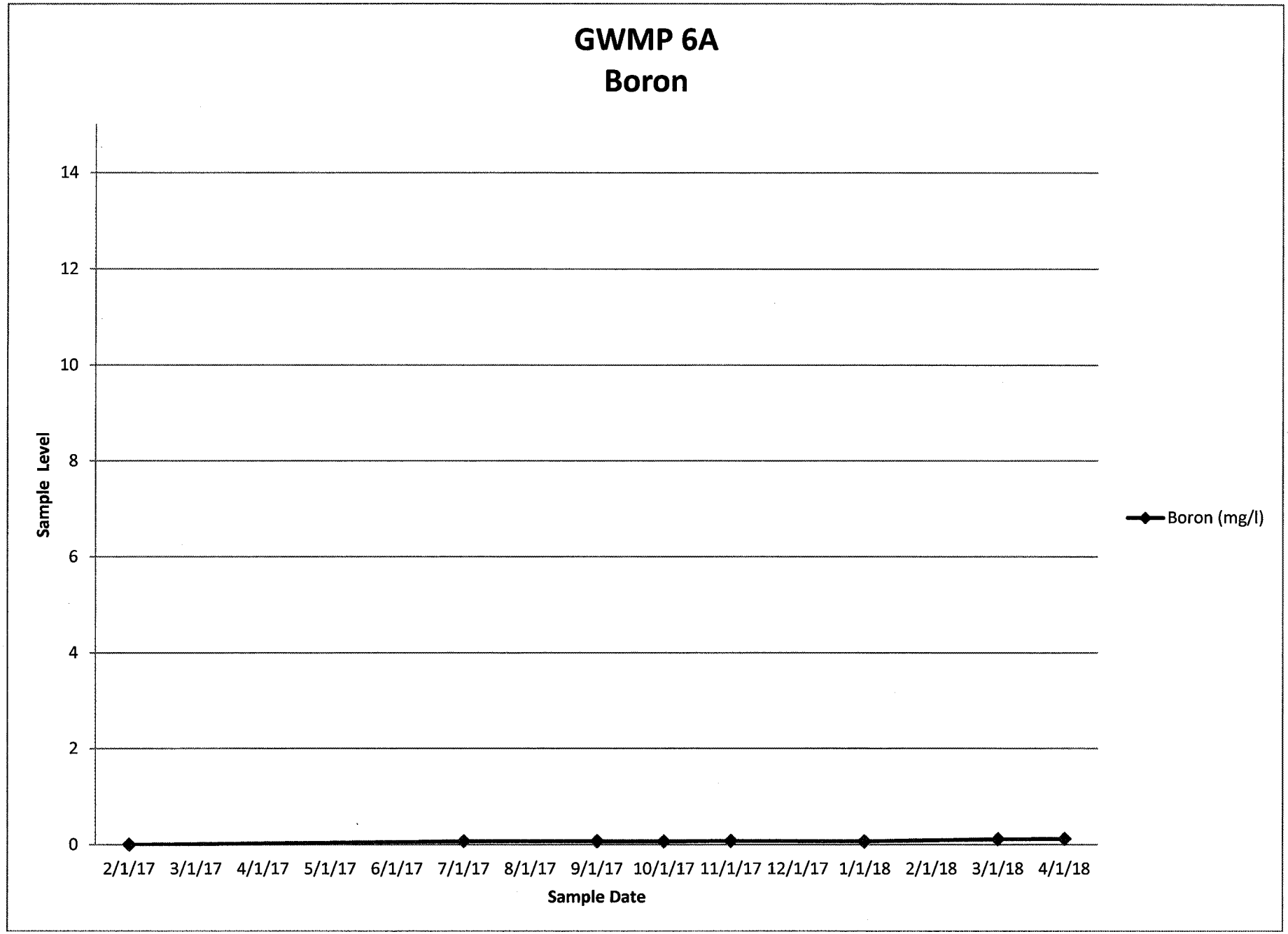
3500
3000
2500
2000
1500
1000
500
0
Sample Level
2/1/17
3/1/17
4/1/17
5/1/17
6/1/17
7/1/17
8/1/17
9/1/17
10/1/17
11/1/17
12/1/17
1/1/18
2/1/18
3/1/18
4/1/18
Sample Date
TDS (mg/l)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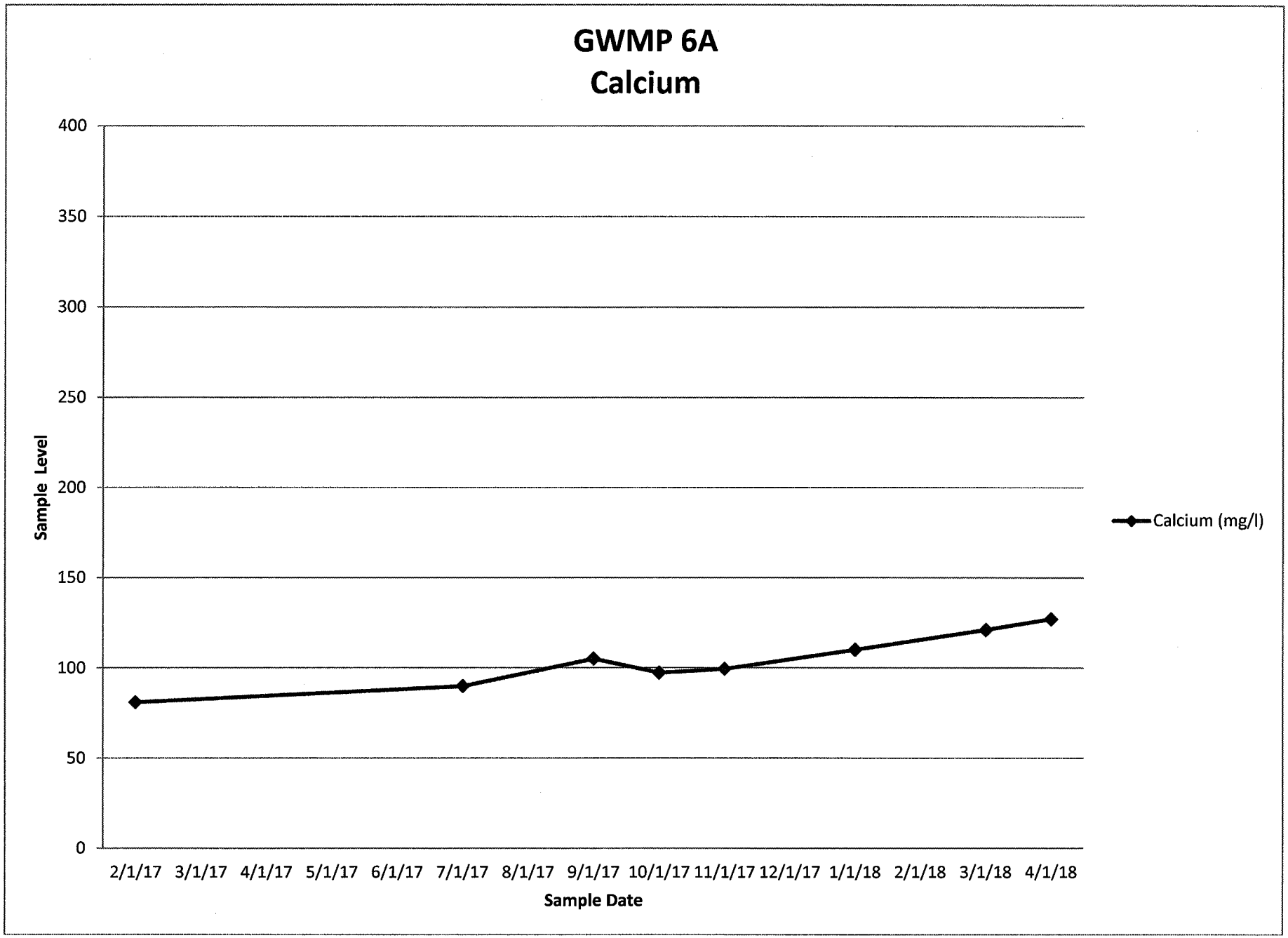
Boron
14
12
10
8
6
4
2
0
Sample Level
2/1/17
3/1/17
4/1/17
5/1/17
6/1/17
7/1/17
8/1/17
9/1/17
10/1/17
11/1/17
12/1/17
1/1/18
2/1/18
3/1/18
4/1/18
Sample Date
Boron (mg/l)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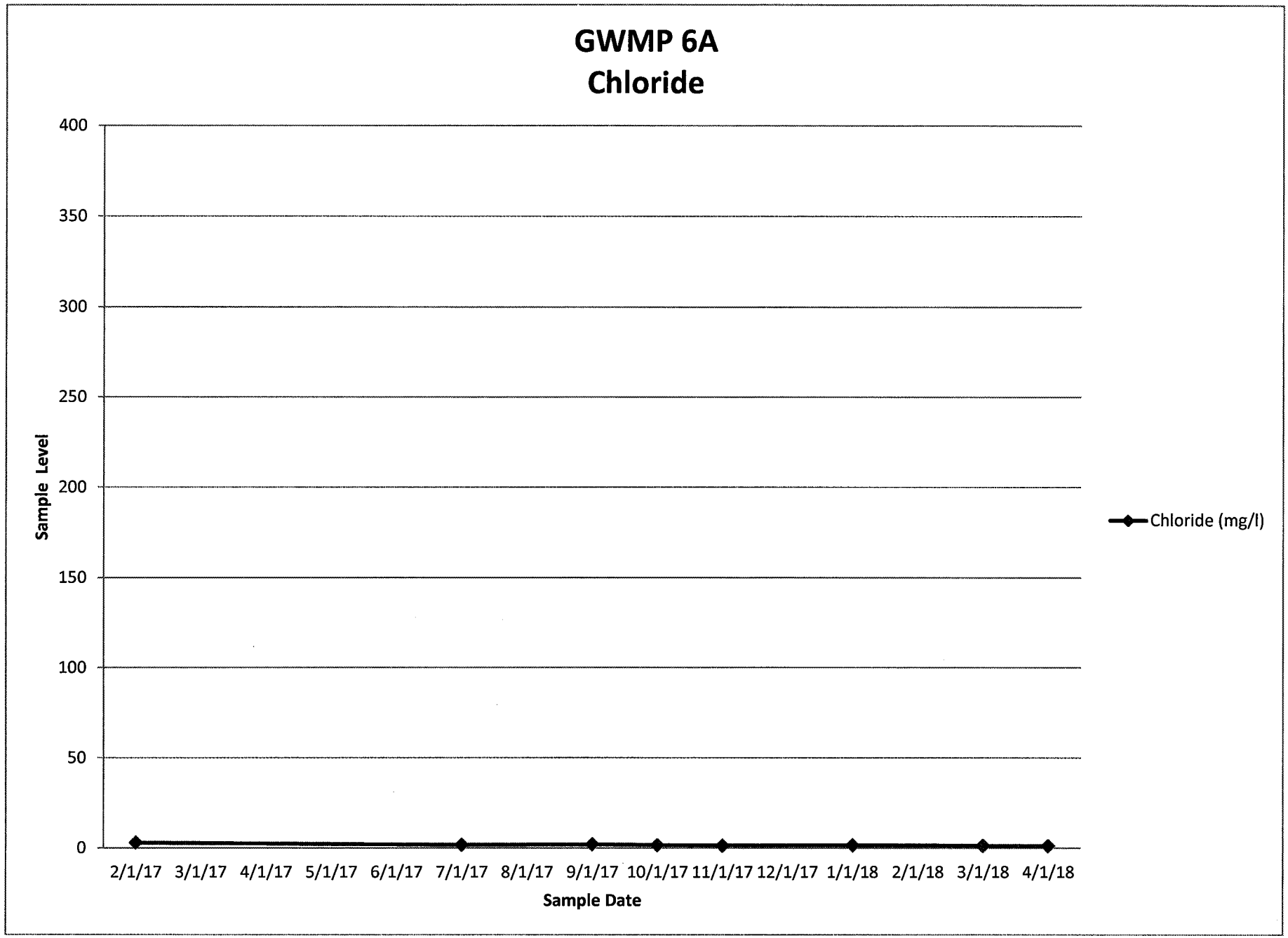
Calcium
400
350
300
250
200
150
100
50
0
Sample Level
2/1/17
3/1/17
4/1/17
5/1/17
6/1/17
7/1/17
8/1/17
9/1/17
10/1/17
11/1/17
12/1/17
1/1/18
2/1/18
3/1/18
4/1/18
Sample Date
Calcium (mg/l)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350
300
250
200
150
100
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Sample Level
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4/1/17
5/1/17
6/1/17
7/1/17
8/1/17
9/1/17
10/1/17
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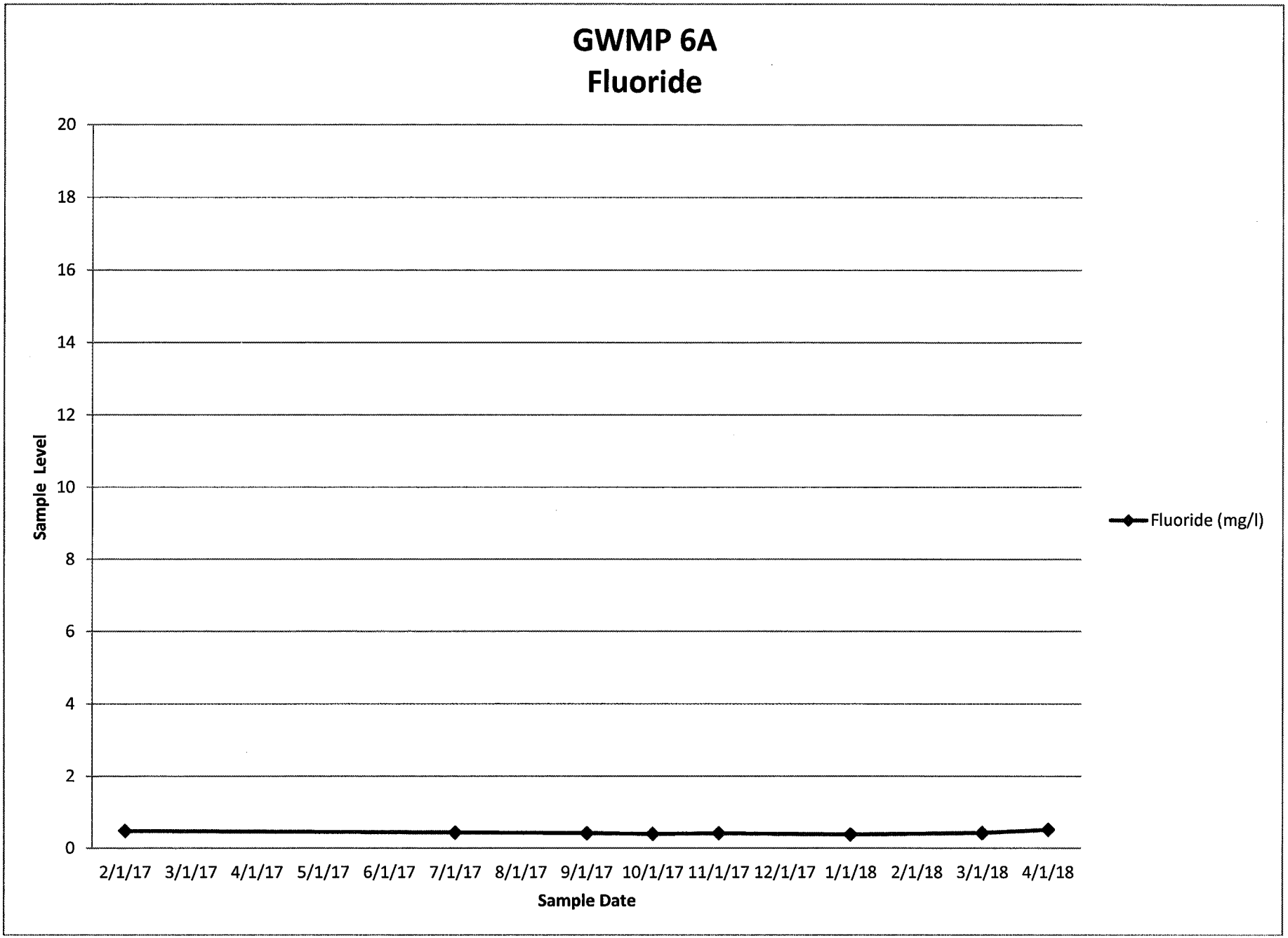
2/1/18
3/1/18
4/1/18
Sample Date
Chloride (mg/l)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Fluoride
20
18
16
14
12
10
8
6
4
2
0
Sample Level
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3/1/17
4/1/17
5/1/17
6/1/17
7/1/17
8/1/17
9/1/17
10/1/17
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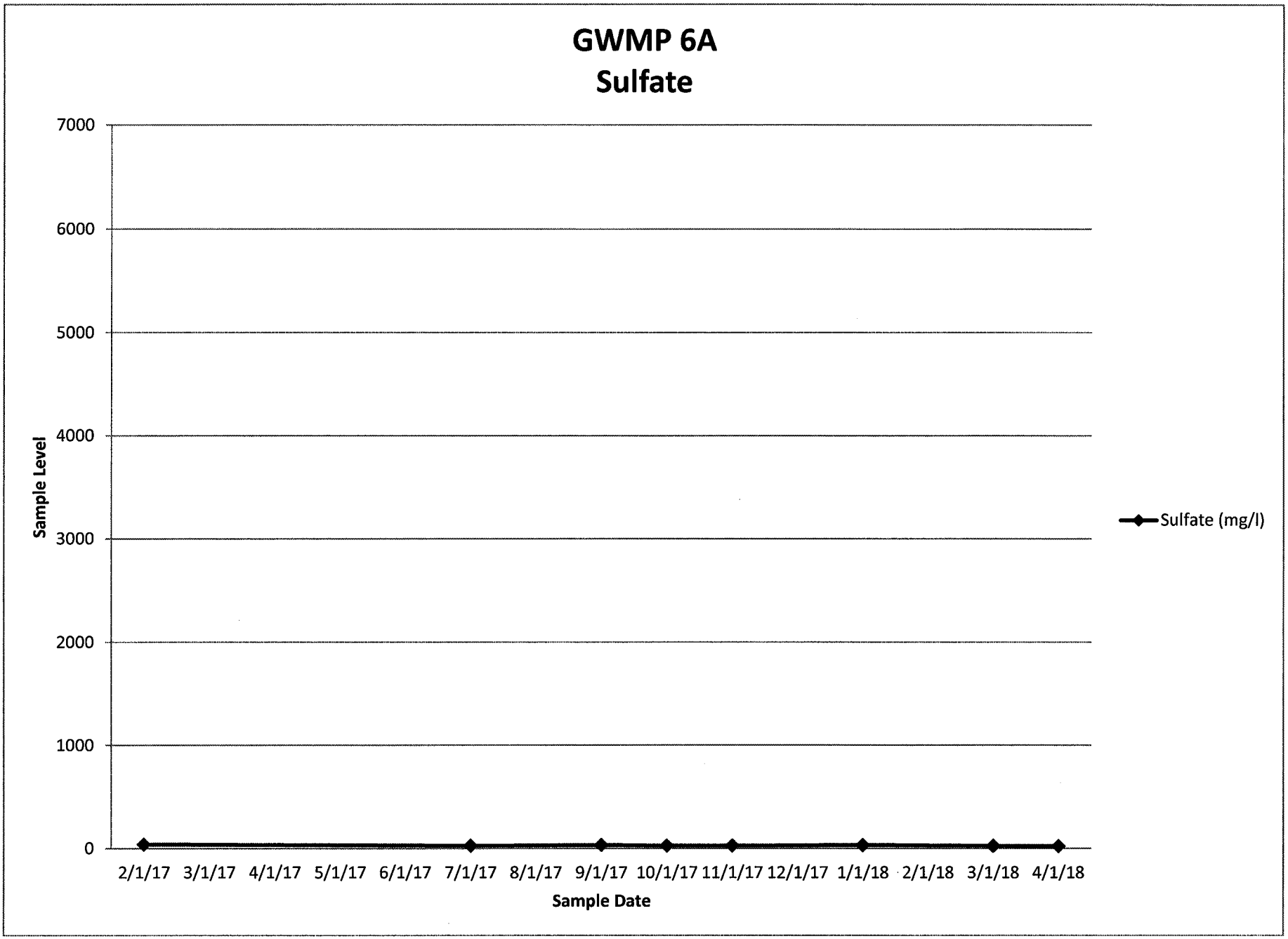
12/1/17
1/1/18
2/1/18
3/1/18
4/1/18
Sample Date
Fluoride (mg/l)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Sulfate
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6000
5000
4000
3000
2000
1000
0
Sample Level
2/1/17
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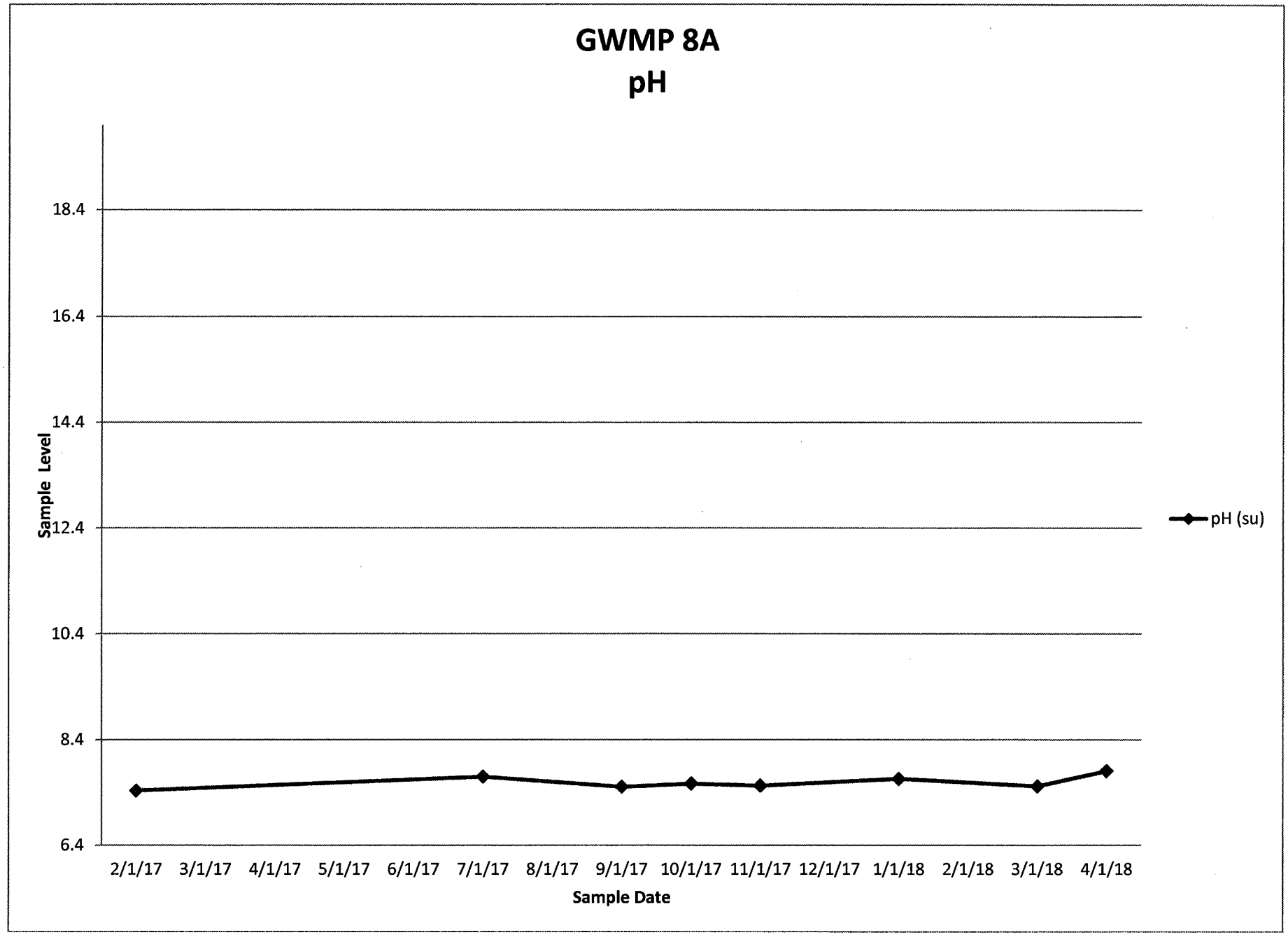
4/1/17
5/1/17
6/1/17
7/1/17
8/1/17
9/1/17
10/1/17
11/1/17
12/1/17
1/1/18
2/1/18
3/1/18
4/1/18
Sample Date
Sulfate (mg/l)

GWMP #8A

Groundwater Analyses Control Charts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16.4
14.4
12.4
10.4
8.4
6.4
Sample Level
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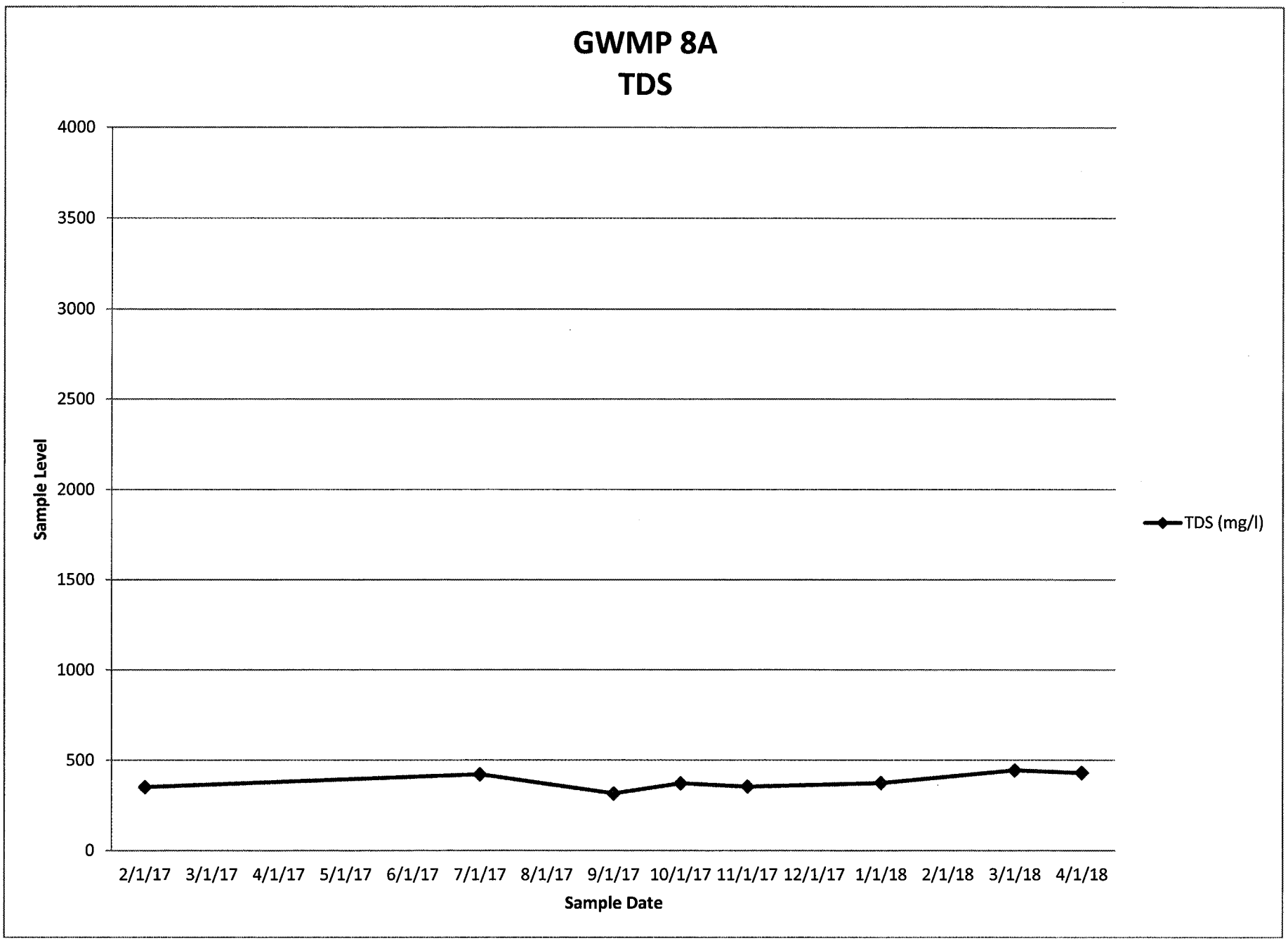
5/1/17
6/1/17
7/1/17
8/1/17
9/1/17
10/1/17
11/1/17
12/1/17
1/1/18
2/1/18
3/1/18
4/1/18
Sample Date
pH (su)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TDS
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3500
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2500
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1000
500
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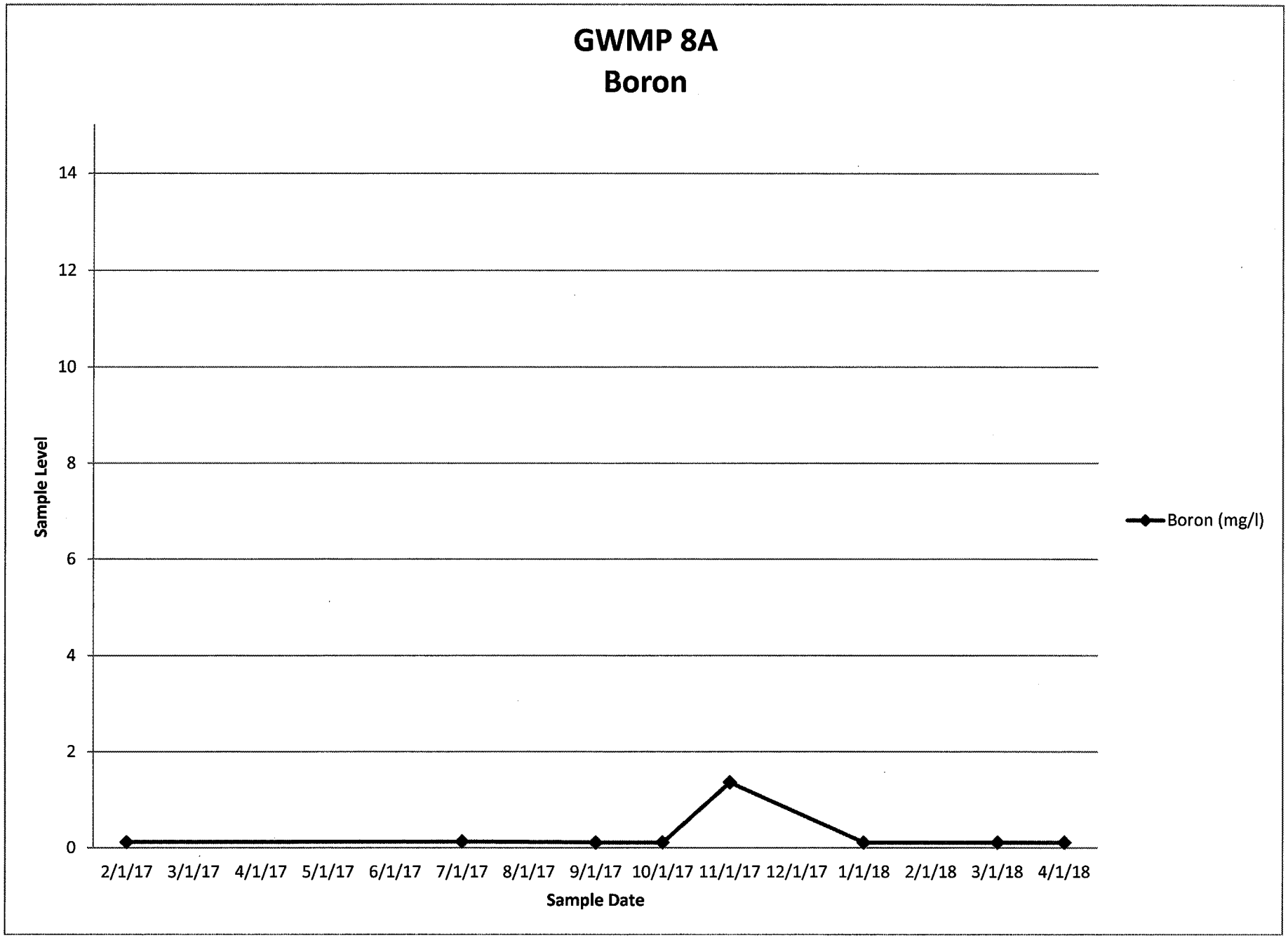
Sample Level
2/1/17
3/1/17
4/1/17
5/1/17
6/1/17
7/1/17
8/1/17
9/1/17
10/1/17
11/1/17
12/1/17
1/1/18
2/1/18
3/1/18
4/1/18
Sample Date
TDS (mg/l)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Boron
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12
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Sample Level
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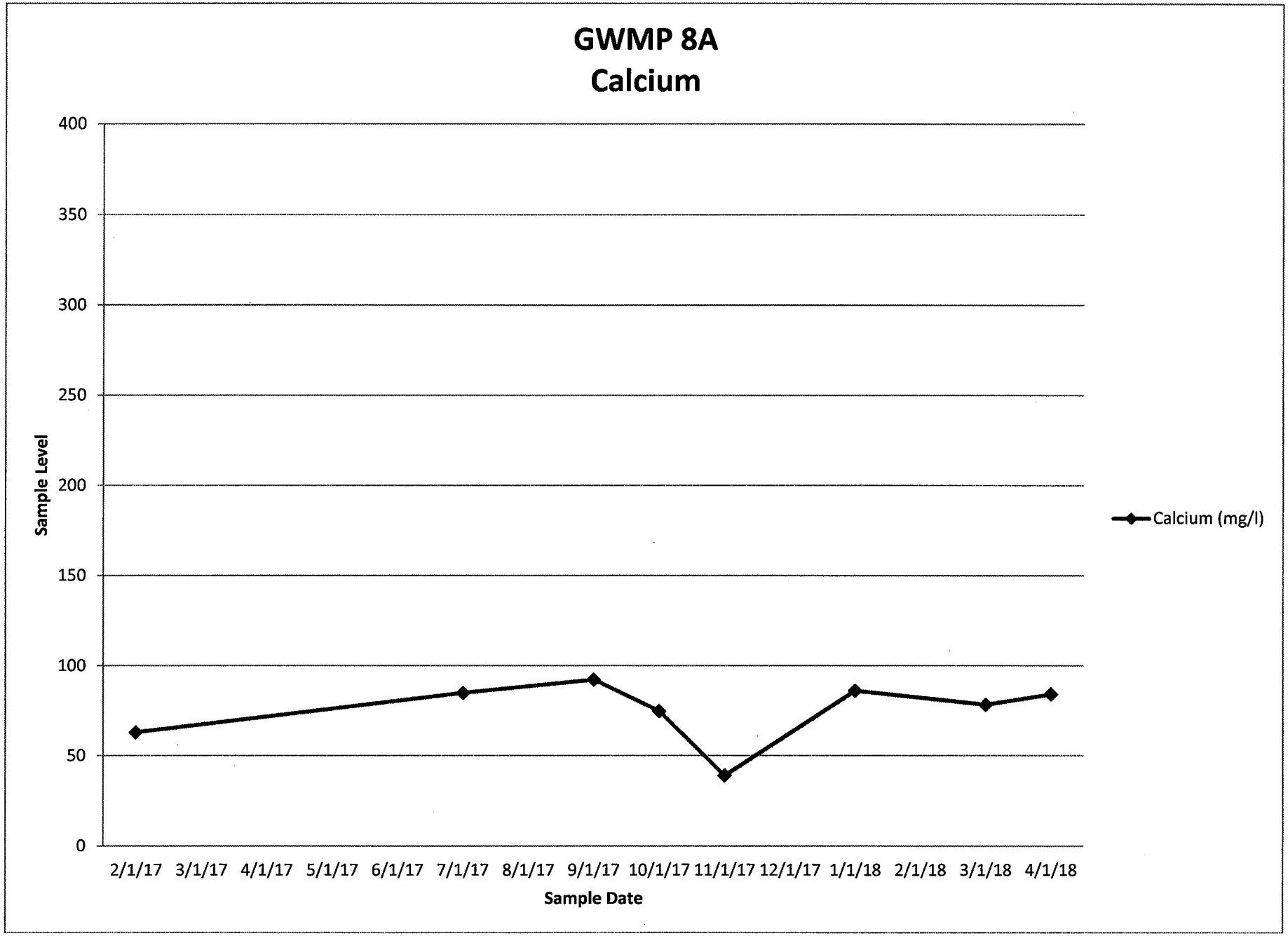
6/1/17
7/1/17
8/1/17
9/1/17
10/1/17
11/1/17
12/1/17
1/1/18
2/1/18
3/1/18
4/1/18
Sample Date
Boron (mg/l)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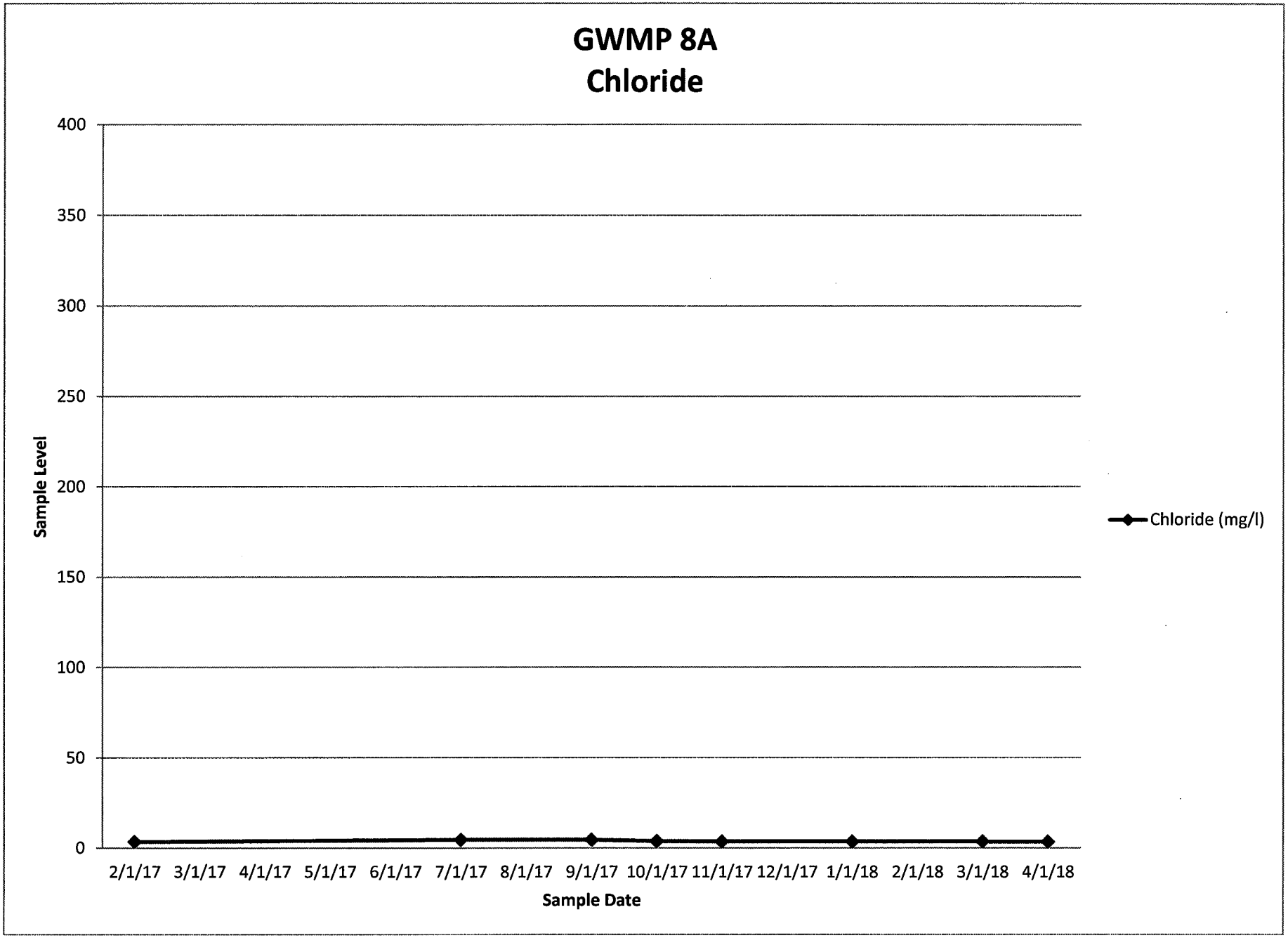
Calcium
400
350
300
250
200
150
100
50
0
Sample Level
2/1/17
3/1/17
4/1/17
5/1/17
6/1/17
7/1/17
8/1/17
9/1/17
10/1/17
11/1/17
12/1/17
1/1/18
2/1/18
3/1/18
4/1/18
Sample Date
Calcium (mg/l)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Chloride
400
350
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250
200
150
100
50
0
Sample Level
2/1/17
3/1/17
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5/1/17
6/1/17
7/1/17
8/1/17
9/1/17
10/1/17
11/1/17
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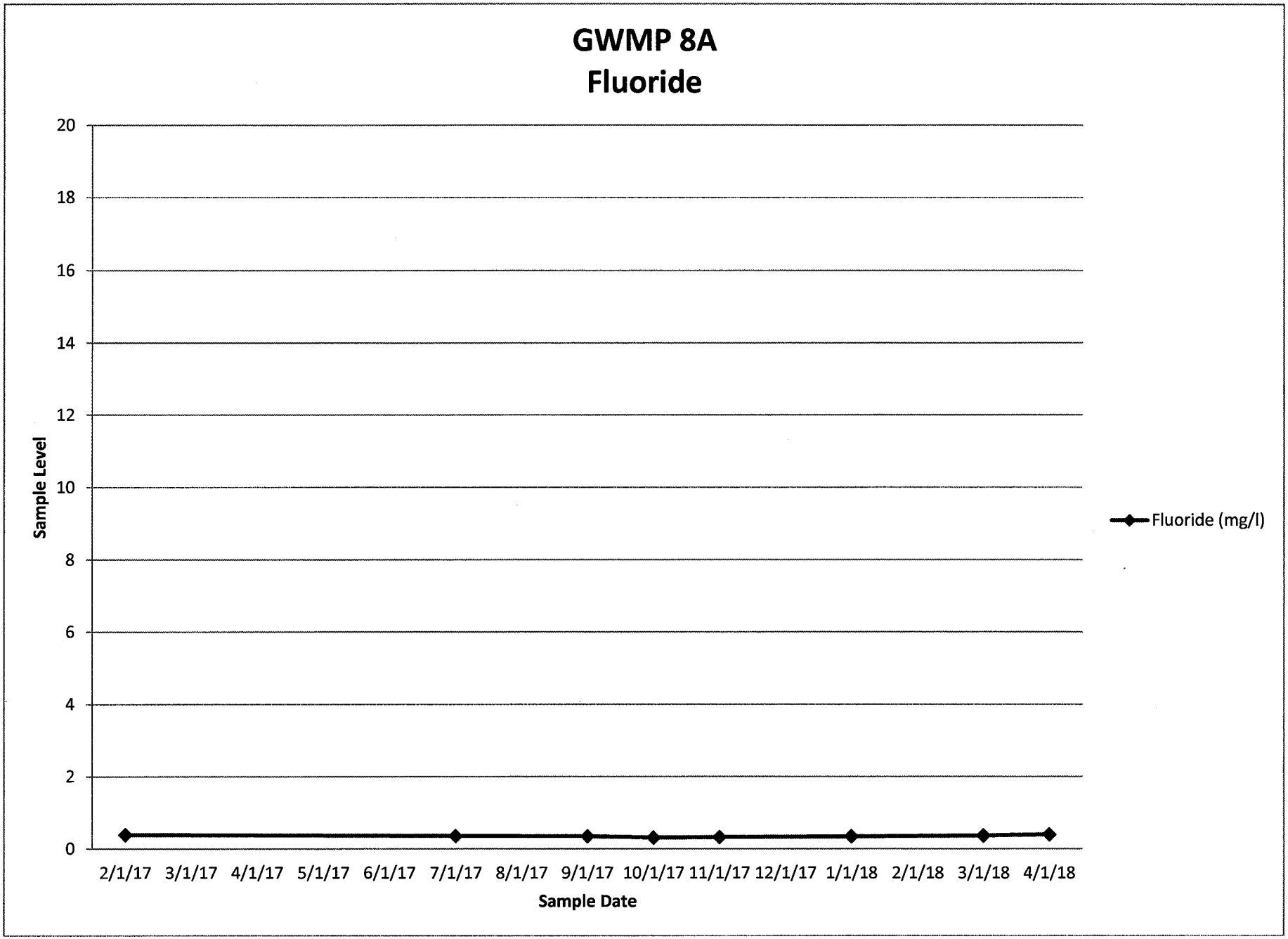
4/1/18
Sample Date
Chloride (mg/l)


GWMP 8A
Fluoride
20
18
16
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Sample Level
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4/1/17
5/1/17
6/1/17
7/1/17
8/1/17
9/1/17
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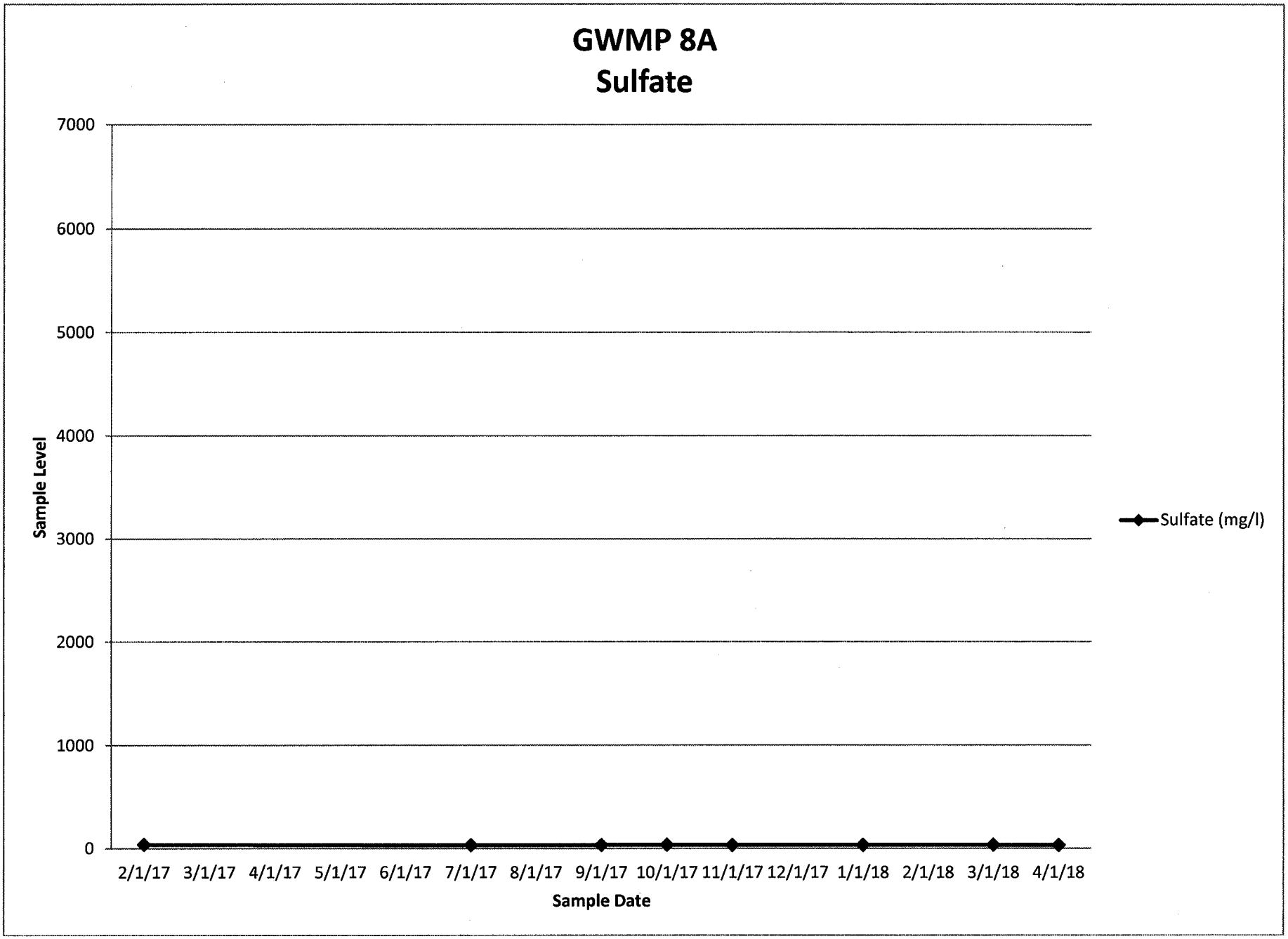
4/1/18
Sample Date
Fluoride (mg/l)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Sulfate
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5000
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3000
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1000
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Sample Level
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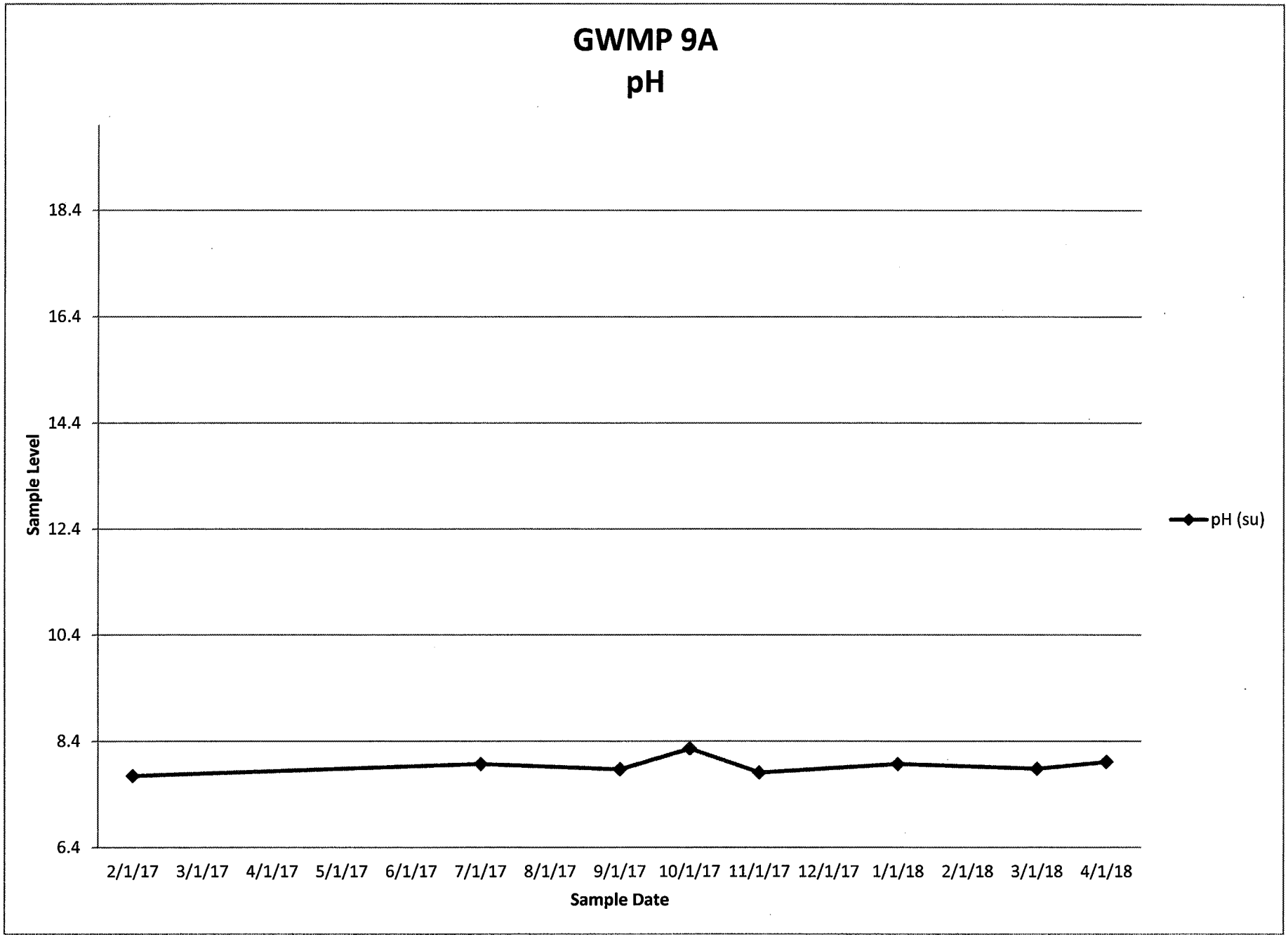
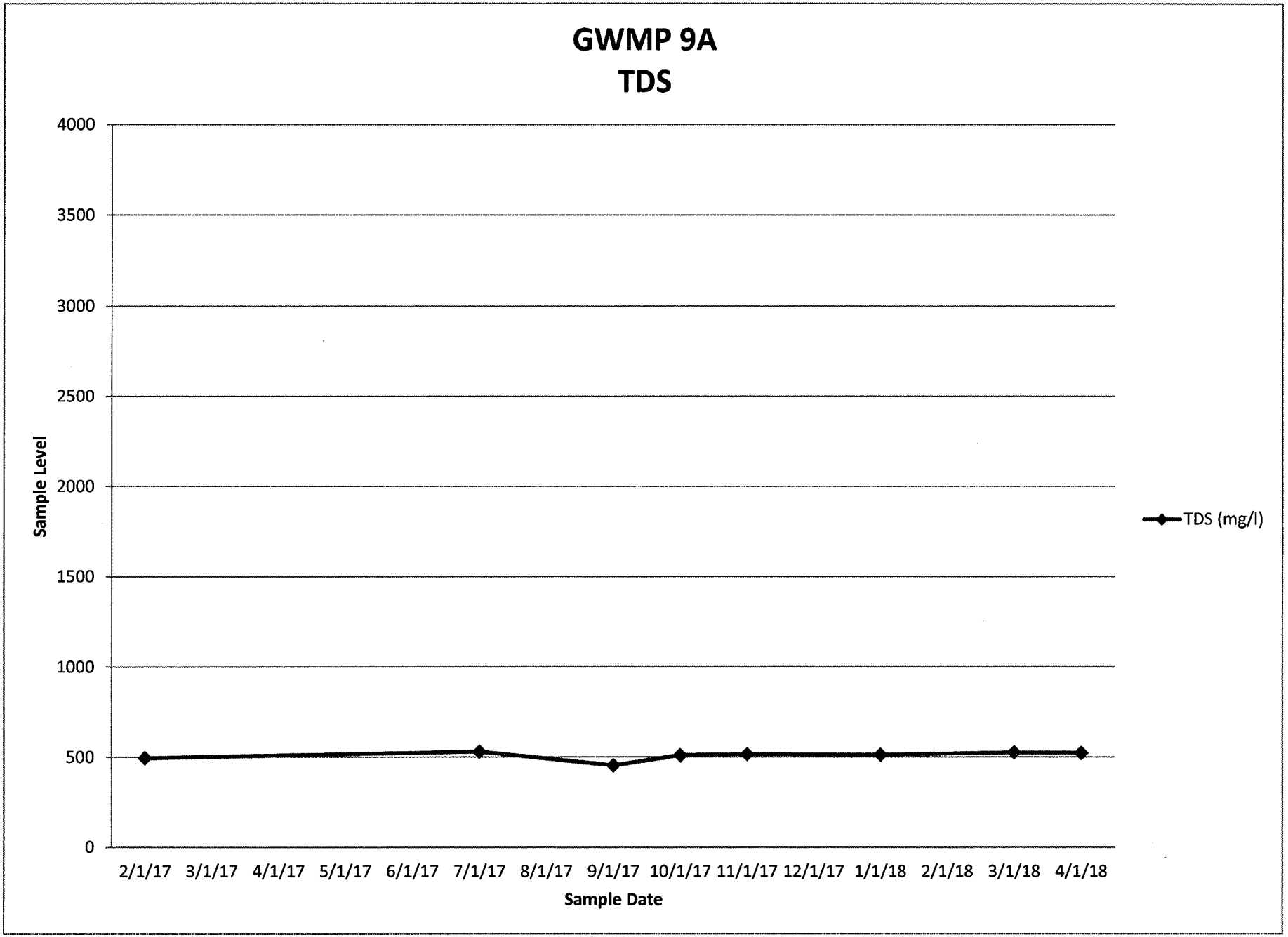
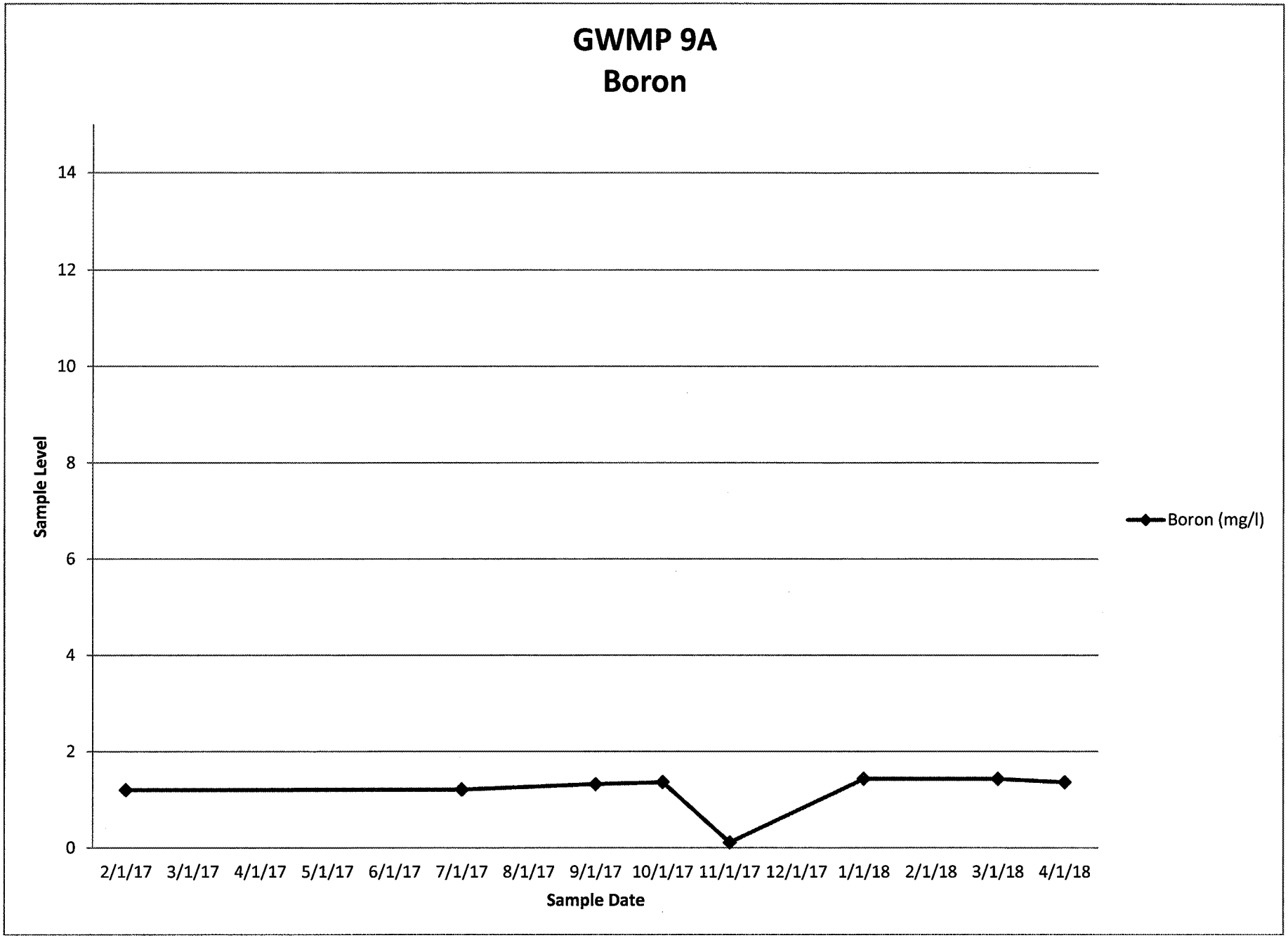
5/1/17
6/1/17
7/1/17
8/1/17
9/1/17
10/1/17
11/1/17
12/1/17
1/1/18
2/1/18
3/1/18
4/1/18
Sample Date
Sulfate (mg/l)

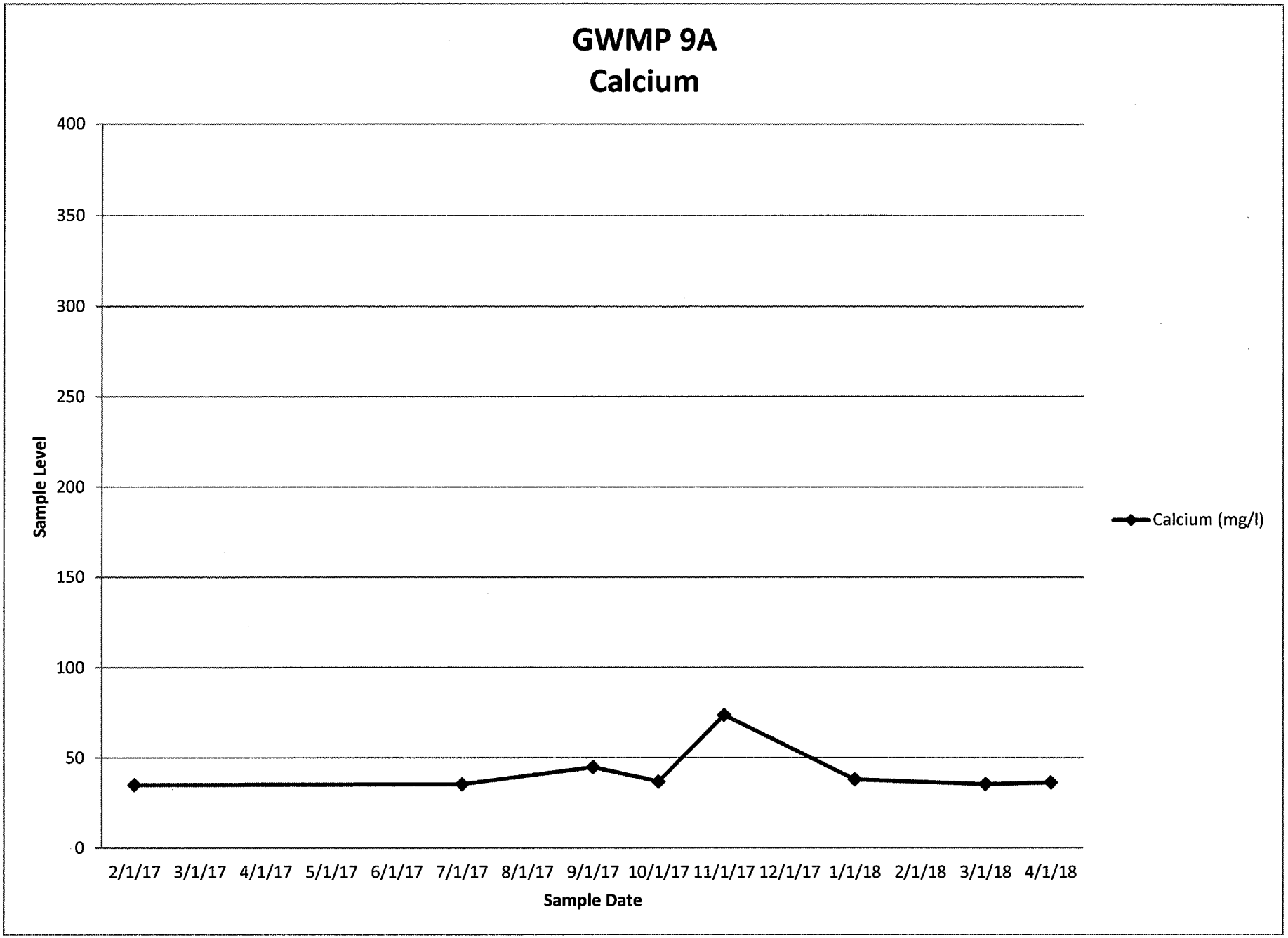
GWMP #9A

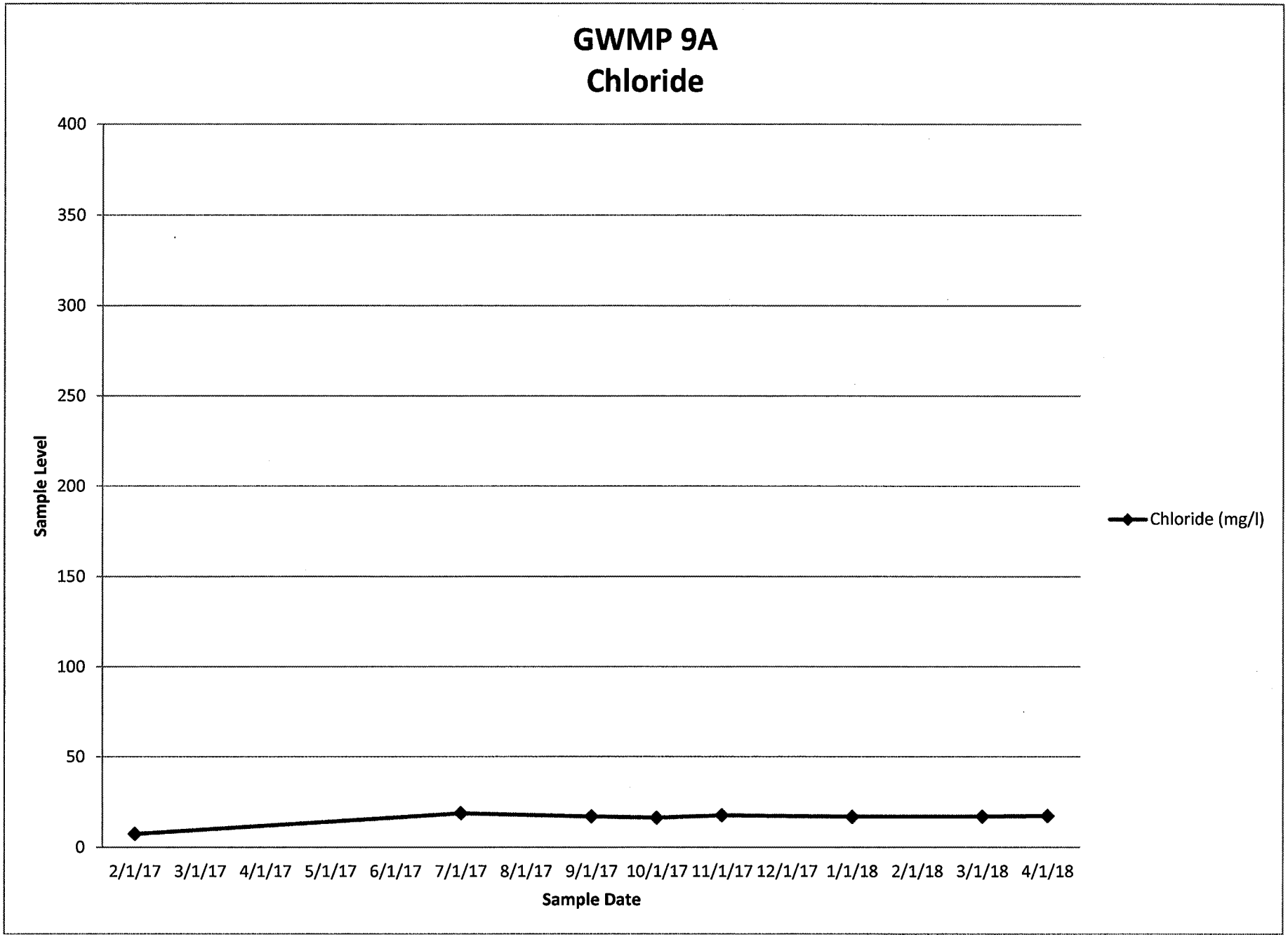
Groundwater Analyses Control Charts

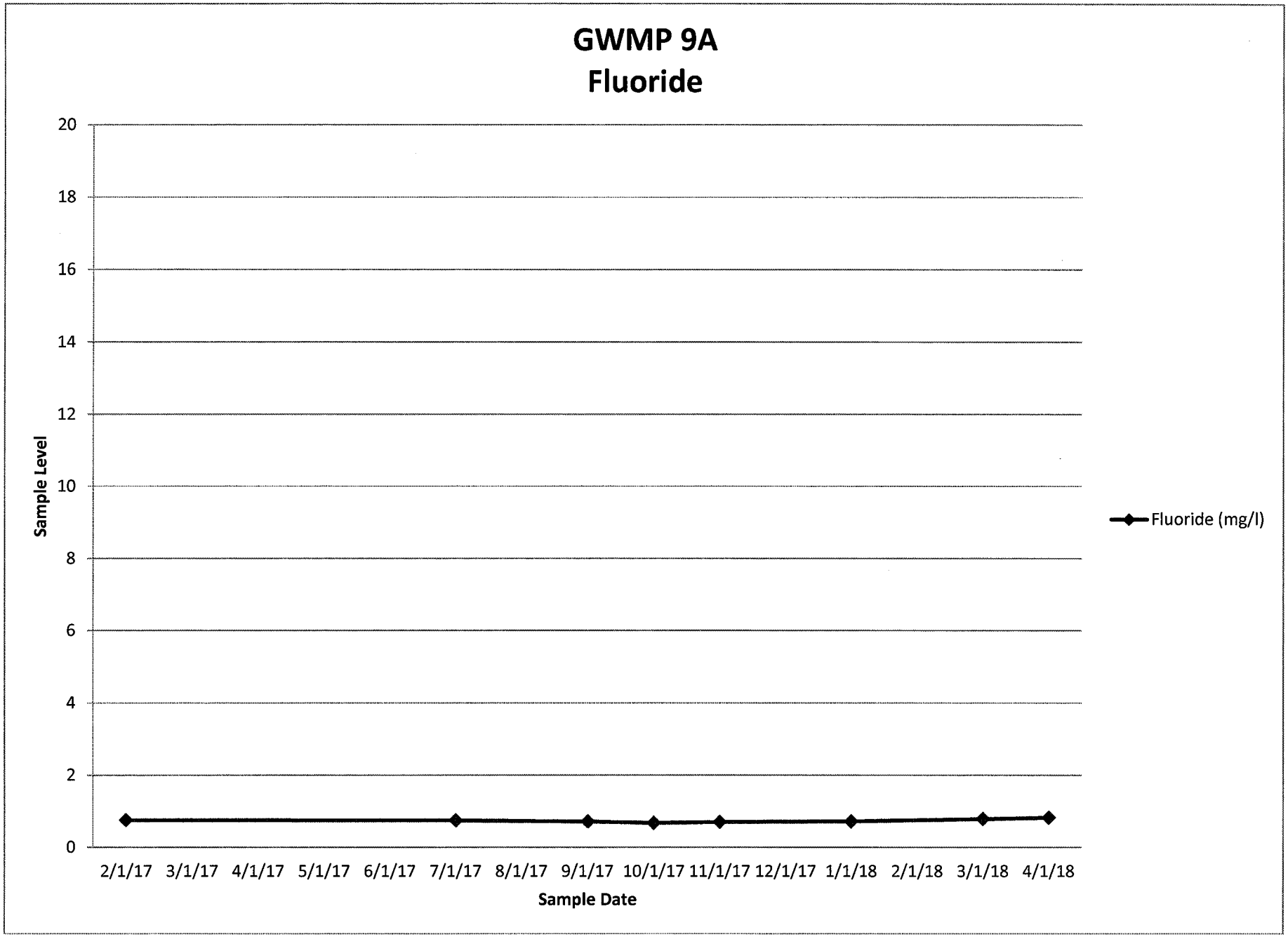

GWMP 9A
pH
18.4
16.4
14.4
12.4
10.4
8.4
6.4
Sample Level
2/1/17
3/1/17
4/1/17
5/1/17
6/1/17
7/1/17
8/1/17
9/1/17
10/1/17
11/1/17
12/1/17
1/1/18
2/1/18
3/1/18
4/1/18
Sample Date
pH (su)

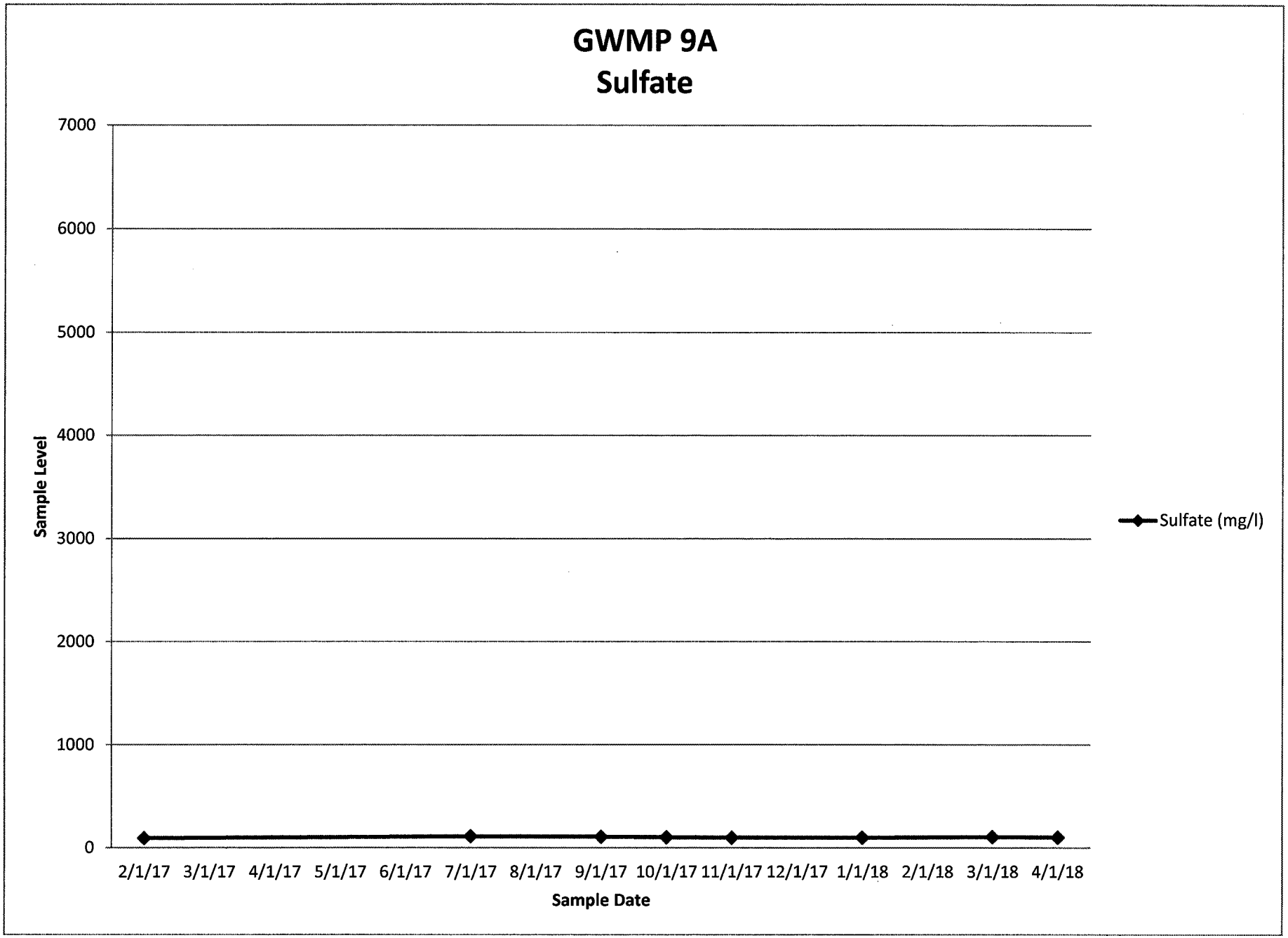

GWMP 9A
TDS
4000
3500
3000
2500
2000
1500
1000
500
0
Sample Level
2/1/17
3/1/17
4/1/17
5/1/17
6/1/17
7/1/17
8/1/17
9/1/17
10/1/17
11/1/17
12/1/17
1/1/18
2/1/18
3/1/18
4/1/18
Sample Date
TDS (mg/l)


GWMP 9A
Boron
14
12
10
8
6
4
2
0
Sample Level
2/1/17
3/1/17
4/1/17
5/1/17
6/1/17
7/1/17
8/1/17
9/1/17
10/1/17
11/1/17
12/1/17
1/1/18
2/1/18
3/1/18
4/1/18
Sample Date
Boron (mg/l)


GWMP 9A
Calcium
400
350
300
250
200
150
100
50
0
Sample Level
2/1/17
3/1/17
4/1/17
5/1/17
6/1/17
7/1/17
8/1/17
9/1/17
10/1/17
11/1/17
12/1/17
1/1/18
2/1/18
3/1/18
4/1/18
Sample Date
Calcium (mg/l)

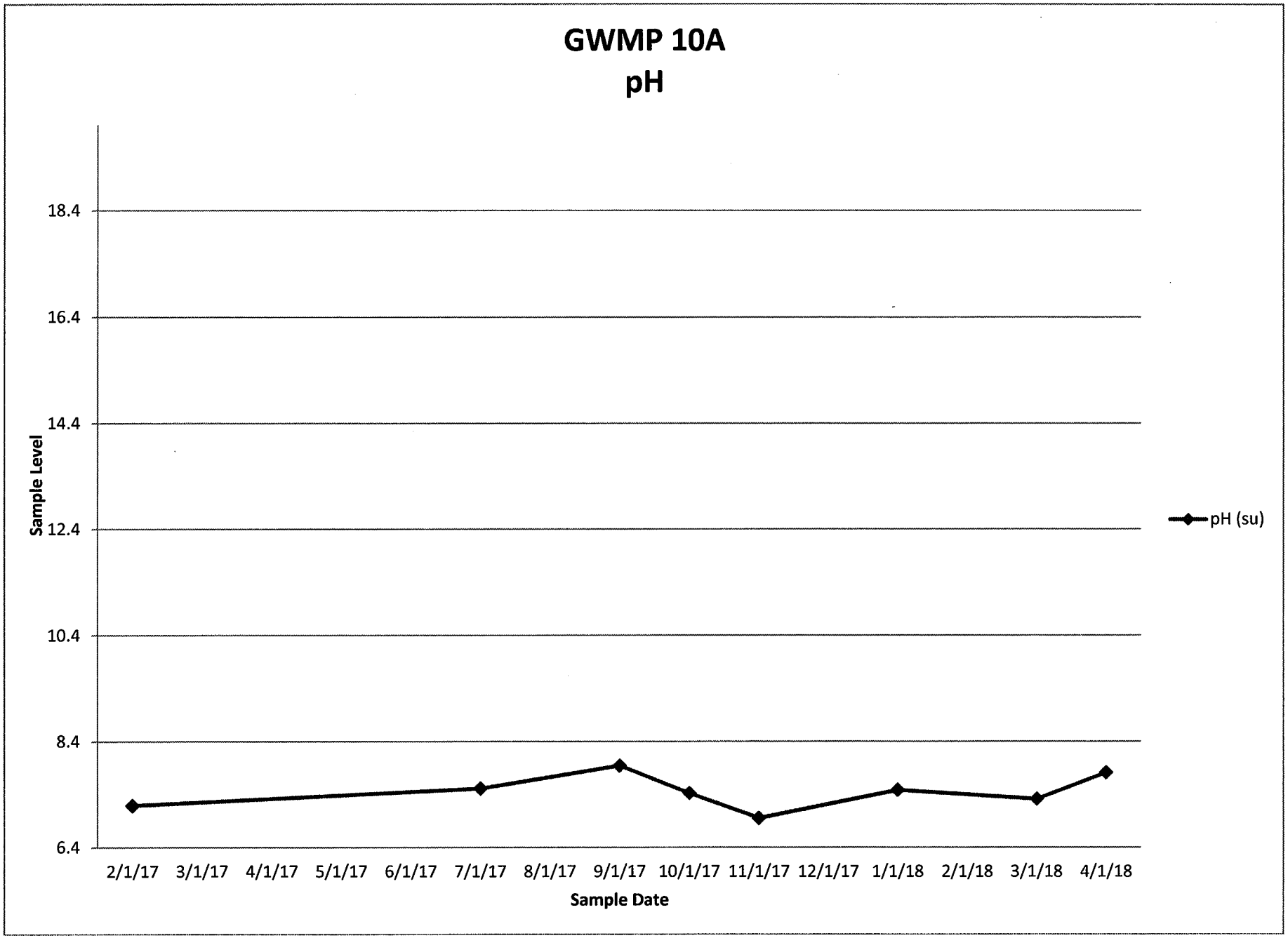

GWMP 9A
Chloride
400
350
300
250
200
150
100
50
0
Sample Level
2/1/17
3/1/17
4/1/17
5/1/17
6/1/17
7/1/17
8/1/17
9/1/17
10/1/17
11/1/17
12/1/17
1/1/18
2/1/18
3/1/18
4/1/18
Sample Date
Chloride (mg/l)

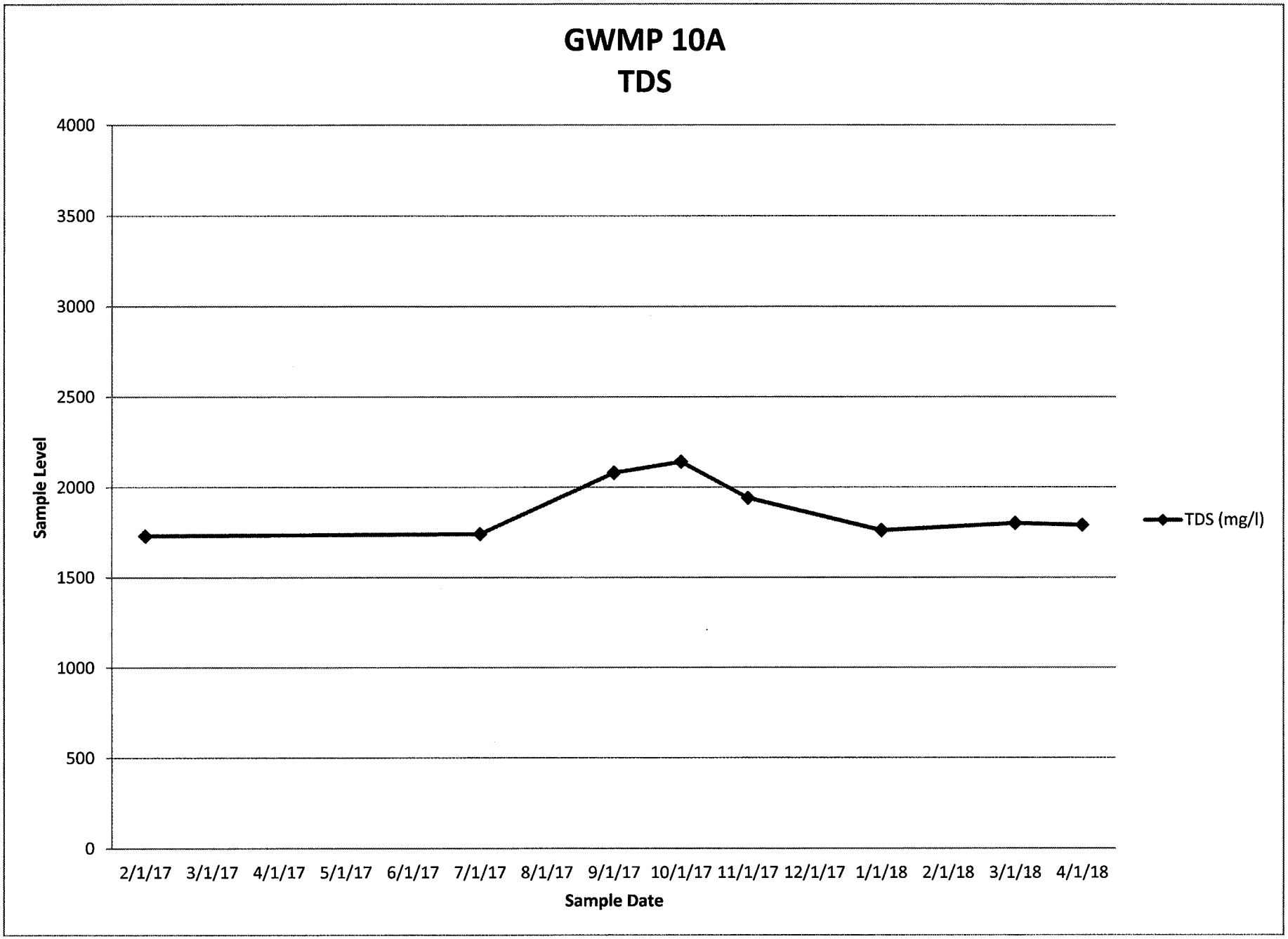

GWMP 9A
Fluoride
20
18
16
14
12
10
8
6
4
2
0
Sample Level
2/1/17
3/1/17
4/1/17
5/1/17
6/1/17
7/1/17
8/1/17
9/1/17
10/1/17
11/1/17
12/1/17
1/1/18
2/1/18
3/1/18
4/1/18
Sample Date
Fluoride (mg/l)

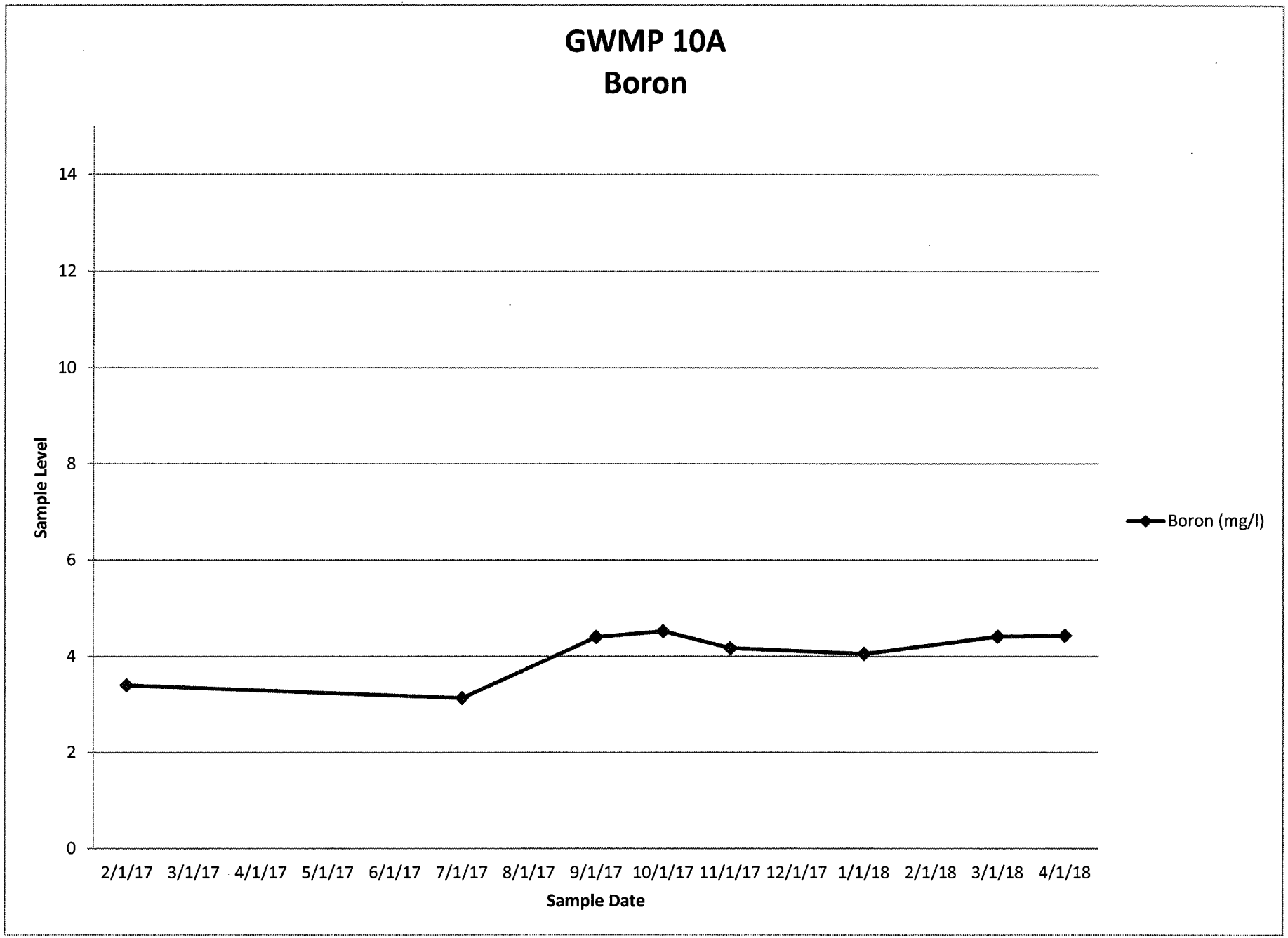

GWMP 9A
Sulfate
7000
6000
5000
4000
3000
2000
1000
0
Sample Level
2/1/17
3/1/17
4/1/17
5/1/17
6/1/17
7/1/17
8/1/17
9/1/17
10/1/17
11/1/17
12/1/17
1/1/18
2/1/18
3/1/18
4/1/18
Sample Date
Sulfate (mg/l)

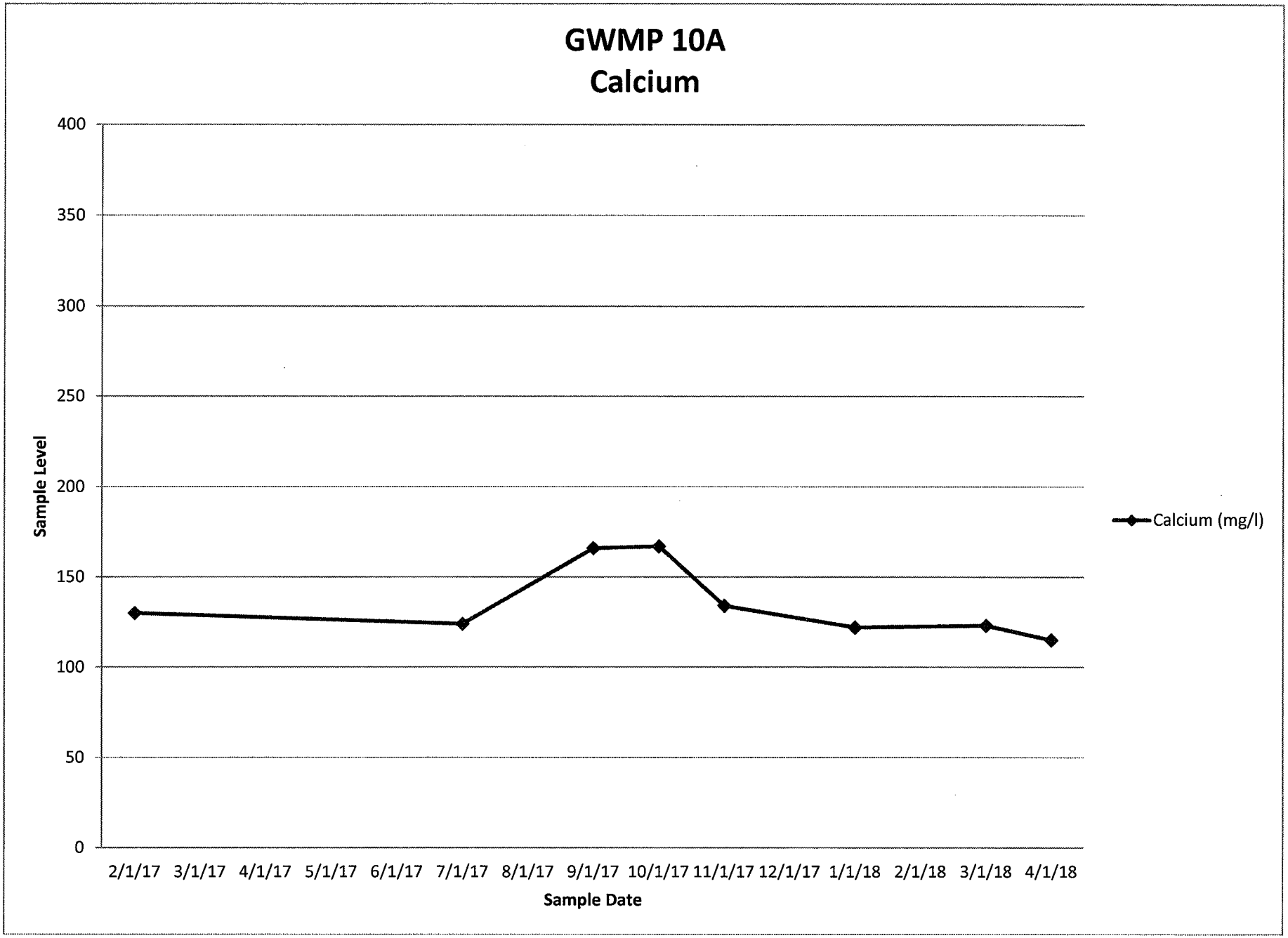
GWMP #10A

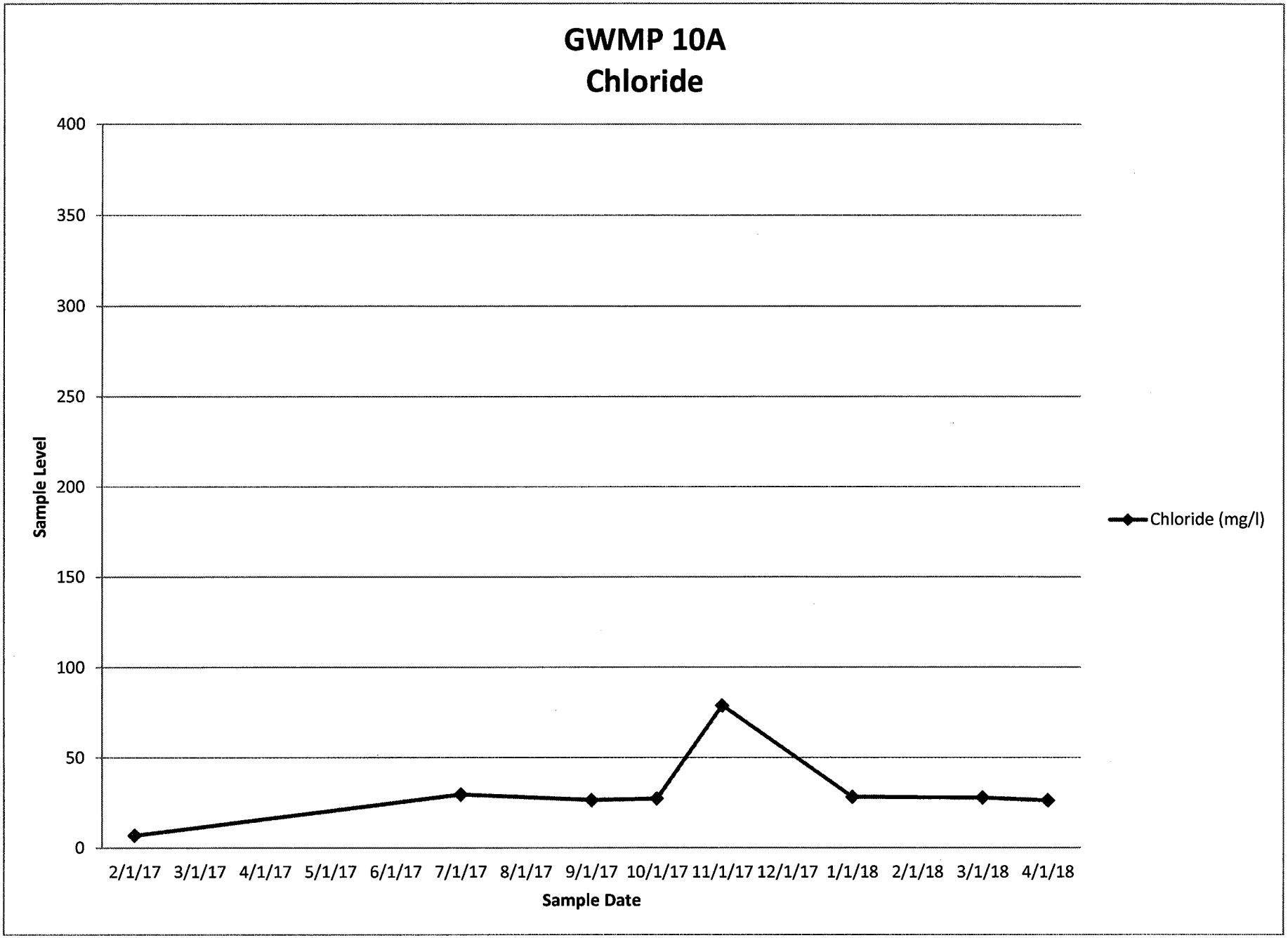
Groundwater Analyses Control Charts

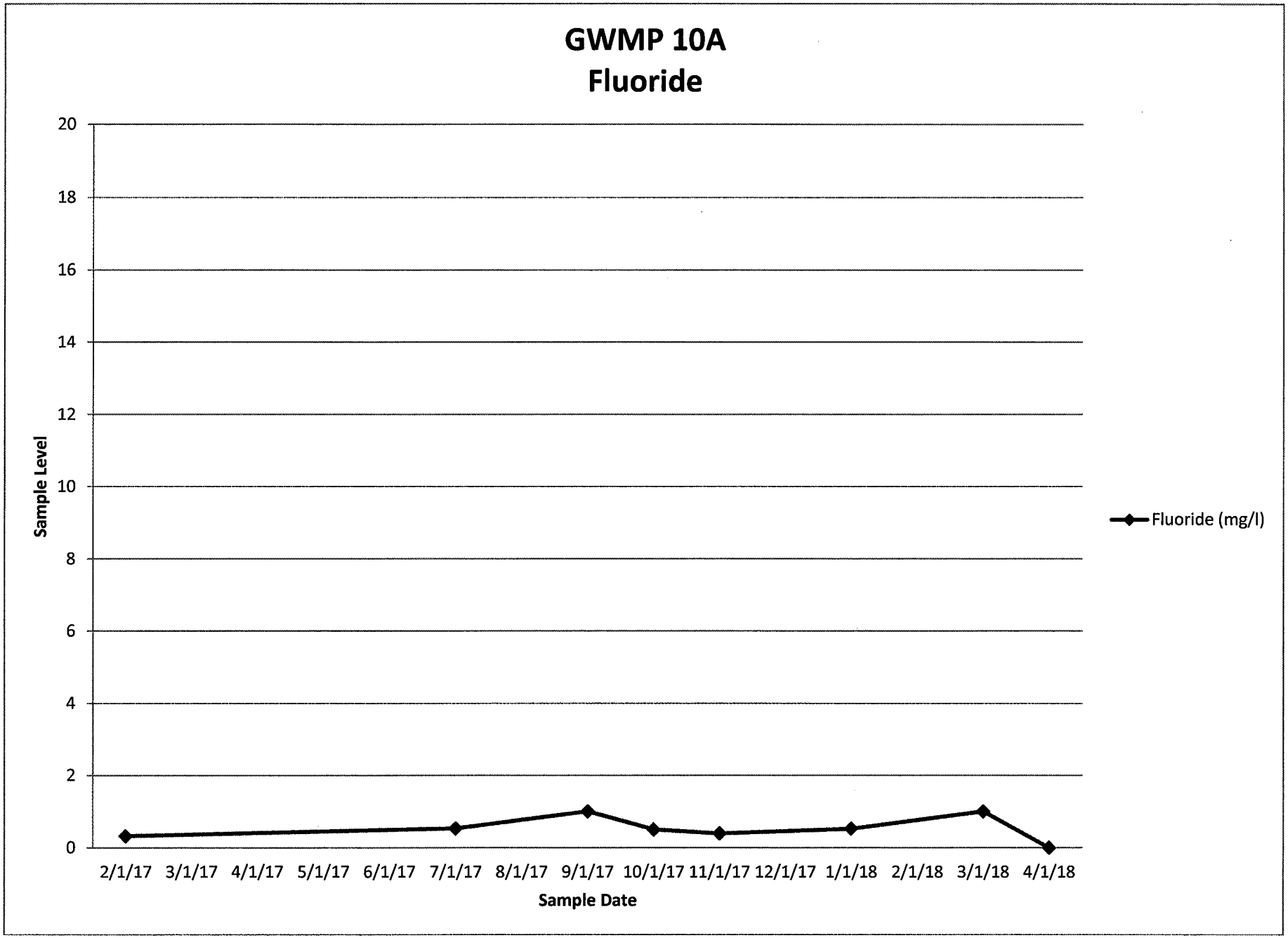

GWMP 10A
pH
18.4
16.4
14.4
12.4
10.4
8.4
6.4
Sample Level
2/1/17
3/1/17
4/1/17
5/1/17
6/1/17
7/1/17
8/1/17
9/1/17
10/1/17
11/1/17
12/1/17
1/1/18
2/1/18
3/1/18
4/1/18
Sample Date
pH (su)

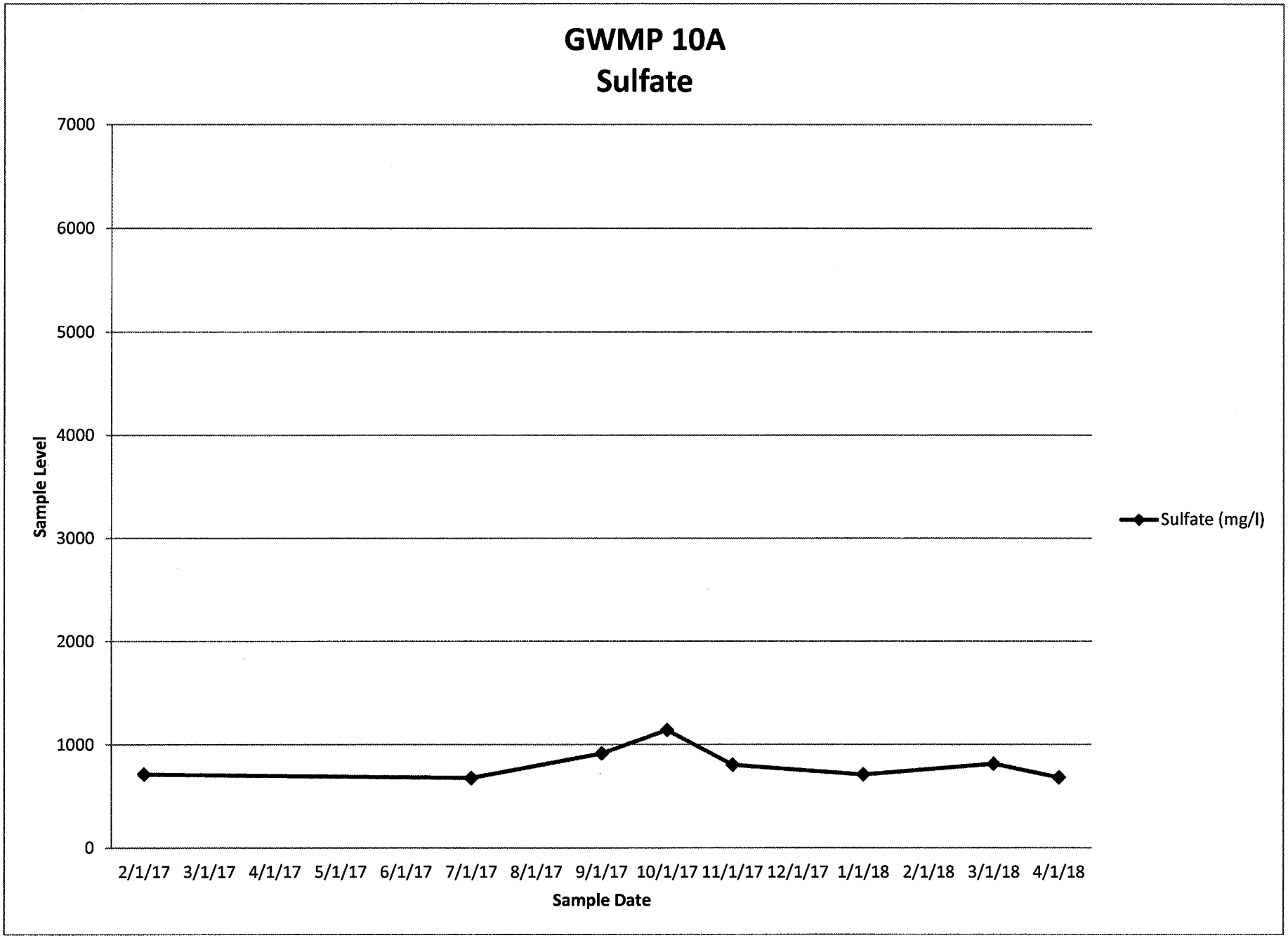

GWMP 10A
TDS
4000
3500
3000
2500
2000
1500
1000
500
0
Sample Level
2/1/17
3/1/17
4/1/17
5/1/17
6/1/17
7/1/17
8/1/17
9/1/17
10/1/17
11/1/17
12/1/17
1/1/18
2/1/18
3/1/18
4/1/18
Sample Date
TDS (mg/l)


GWMP 10A
Boron
14
12
10
8
6
4
2
0
Sample Level
2/1/17
3/1/17
4/1/17
5/1/17
6/1/17
7/1/17
8/1/17
9/1/17
10/1/17
11/1/17
12/1/17
1/1/18
2/1/18
3/1/18
4/1/18
Sample Date
Boron (mg/l)


GWMP 10A
Calcium
400
350
300
250
200
150
100
50
0
Sample Level
2/1/17
3/1/17
4/1/17
5/1/17
6/1/17
7/1/17
8/1/17
9/1/17
10/1/17
11/1/17
12/1/17
1/1/18
2/1/18
3/1/18
4/1/18
Sample Date
Calcium (mg/l)


GWMP 10A
Chloride
400
350
300
250
200
150
100
50
0
Sample Level
2/1/17
3/1/17
4/1/17
5/1/17
6/1/17
7/1/17
8/1/17
9/1/17
10/1/17
11/1/17
12/1/17
1/1/18
2/1/18
3/1/18
4/1/18
Sample Date
Chloride (mg/l)


GWMP 10A
Fluoride
20
18
16
14
12
10
8
6
4
2
0
Sample Level
2/1/17
3/1/17
4/1/17
5/1/17
6/1/17
7/1/17
8/1/17
9/1/17
10/1/17
11/1/17
12/1/17
1/1/18
2/1/18
3/1/18
4/1/18
Sample Date
Fluoride (mg/l)


GWMP 10A
Sulfate
7000
6000
5000
4000
3000
2000
1000
0
Sample Level
2/1/17
3/1/17
4/1/17
5/1/17
6/1/17
7/1/17
8/1/17
9/1/17
10/1/17
11/1/17
12/1/17
1/1/18
2/1/18
3/1/18
4/1/18
Sample Date
Sulfate (mg/l)

GWMP #6A

Groundwater Results Statistical Analyses

Groundwater Statistics Tool

Data input worksheet

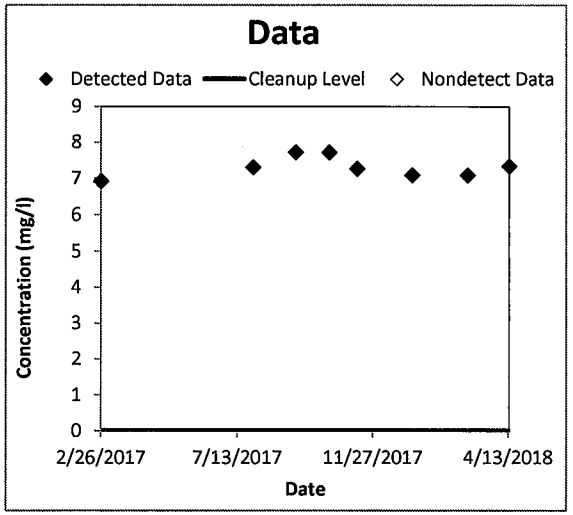
Site Name	Big Fork Ranch
Operating Unit (OU)	Big Fork Ranch
Type of Evaluation	Attainment
Date of Evaluation	7/1/2018
Person performing analysis	AJH

Chemical of Concern	pH
Well Name/Number	6A
Date Units	Date
Concentration Units	su

Confidence Level Desired	95%
Cleanup Level	
Source of cleanup level (e.g. MCL or risk-based concentration)	
Risk of False Outlier Rejection	1%
Random Seed (may be left blank)	
Significant figures to use	3

Number of data points	8
Number of detected results	8
Number of nondetect results	0
Detection frequency	1

Date (Date)	pH Concentration (su)	Data Qualifier	Detected? (Yes or No)
2/26/2017	6.92		Yes
7/29/2017	7.31		Yes
9/10/2017	7.72		Yes
10/14/2017	7.72		Yes
11/11/2017	7.27		Yes
1/6/2018	7.09		Yes
3/3/2018	7.09		Yes
4/14/2018	7.34		Yes



Axis Values			
Time		Concentration	
Min	Max	Min	Max
Auto	Auto	Auto	Auto

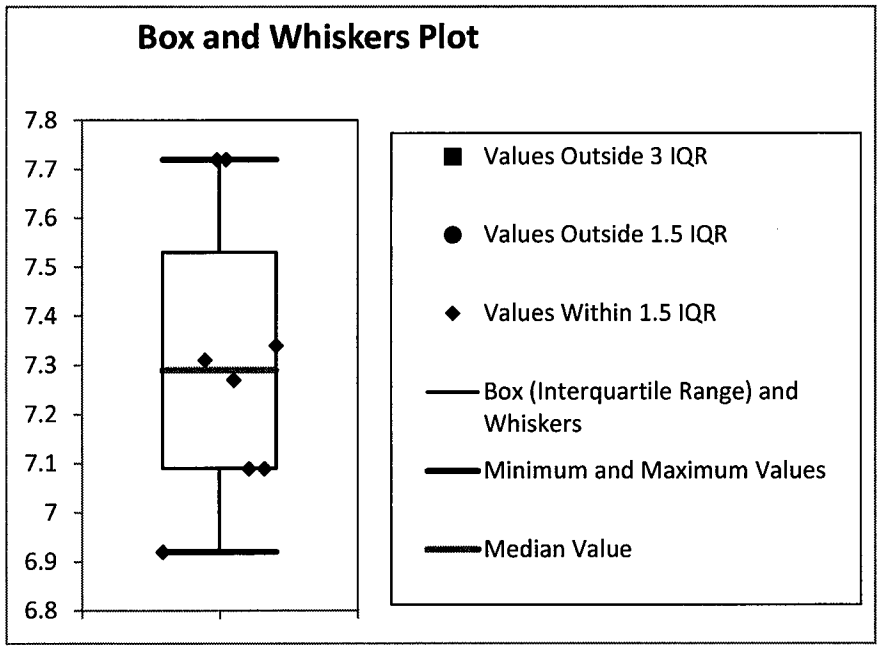
Reset Concentration Axis

Data Review		Recommendations
Are all necessary data fields entered, and in proper format?	Yes	None
Are at least 4 data points present for statistical analysis?	Yes	None
Are detection limits for nondetects ≤ maximum detected value?	Yes	None
Are all data within chart axis limits?	Yes	None

Groundwater Statistics Tool

Outlier testing worksheet

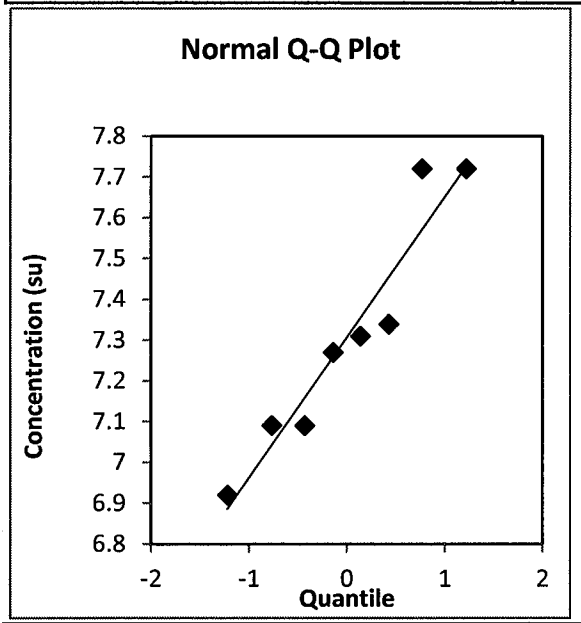
Dixon's Outlier Test Results		
Number of data points	8	
Risk of false rejection	1%	
Critical value	0.683	
Outlier type	**Low**	**High**
Test statistic	0.2125	0.0000
Potential Outlier?	No	No
Validity of Dixon'sTest	Valid	

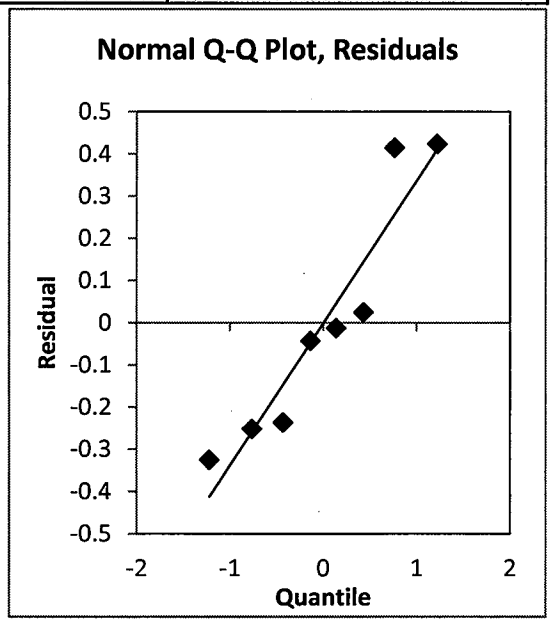


Groundwater Statistics Tool

Normality Testing Worksheet

Normality Test Results			
Parameter	**All Data**	**Minus Outliers**	**Residuals**
Number of data points	8	8	8
Shapiro-Wilk alpha value	10%	N/A	10%
Slope	0.344670012	N/A	0.337946536
Intercept	7.3075	N/A	-7.77156E-16
Correlation, R	0.960159497	N/A	0.947963354
Exact Test Value	0.905275355	N/A	0.873587398
Critical Value	0.851	N/A	0.851
Conclude sample distribution:	Appears normal	N/A	Appears normal





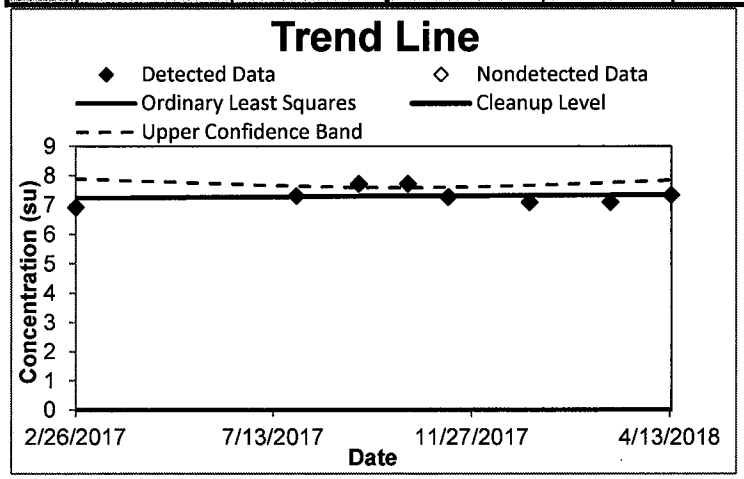
Previous Step: Outliers Screen | Next Step: Trend Screen | Skip Step: UCL Screen

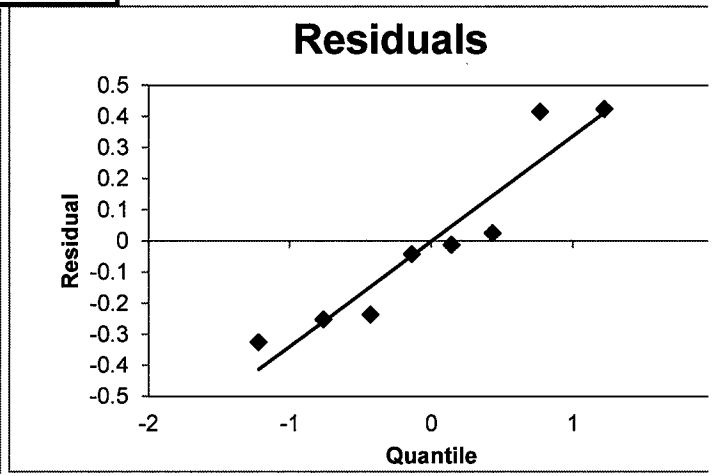
Groundwater Statistics Tool

Trend test results for datasets with normally distributed residuals (with our without transformation)

i	t (Date)	C (su)	C Predicted	Fit residual	Upper Confidence Band
1	2/26/2017	6.92	7.24	-0.32	7.89
2	7/29/2017	7.31	7.28	0.03	7.64
3	9/10/2017	7.72	7.3	0.42	7.6
4	10/14/2017	7.72	7.3	0.42	7.59
5	11/11/2017	7.27	7.31	-0.04	7.6
6	1/6/2018	7.09	7.33	-0.24	7.66
7	3/3/2018	7.09	7.34	-0.25	7.76
8	4/14/2018	7.34	7.35	-0.01	7.85
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Ordinary Least Squares	
Slope	0.000259923
Intercept	-3.877947471
Correlation, R^2	0.0137
Test Result	No trend
Test Statistic	0.289
Critical Value	1.943
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing





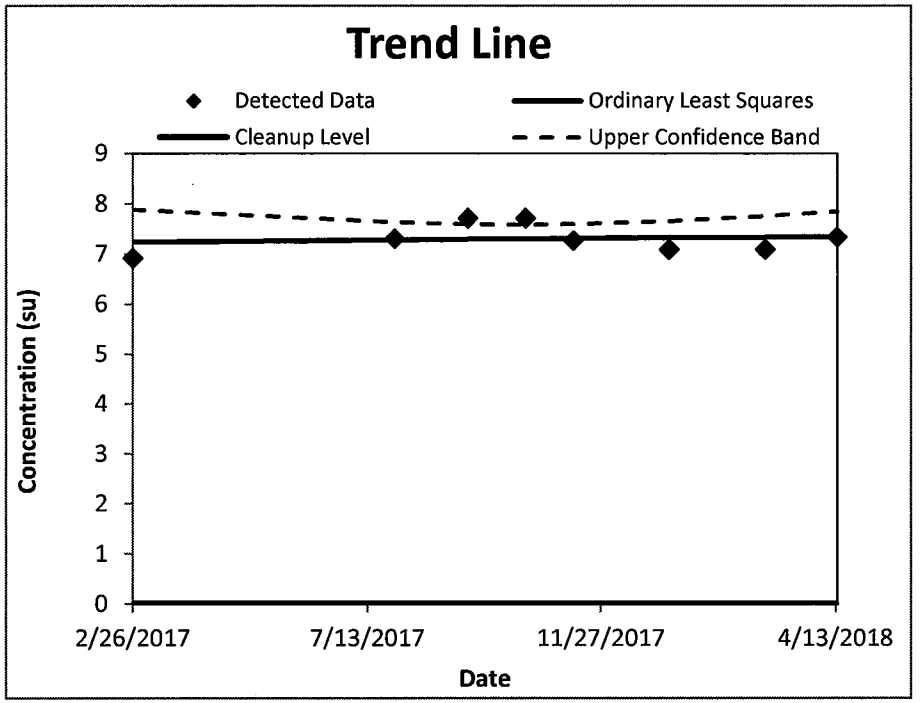
Groundwater Statistics Tool

UCL calculations and summary statistics for data sets that are normally distributed

Site Name	Big Fork Ranch
Operating Unit (OU)	Big Fork Ranch
Type of Evaluation	Attainment
Date of Evaluation	7/1/2018
Person performing analysis	AJH

Chemical of Concern	pH
Well Name/Number	6A
Date Units	Date
Concentration Units	su

Confidence Level	95%
Number of results	8
Number < cleanup level	0
Are any potential outliers present?	No
Mean of concentration	7.31
Standard deviation of concentration	0.29
t-value for UCL calculation	1.895



95% Upper Confidence Limit (UCL)	7.5
Method for calculating UCL	Student's t UCL
Value of 95% Upper Confidence Band value at final sampling event	7.85
Trend calculation method	Ordinary Least Squares
Cleanup level	0
Source of cleanup level	0
Is the trend decreasing or statistically insignificant?	**Yes**

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Message: None.	

Draft version - Do not distrubute

Groundwater Statistics Tool

Data input worksheet

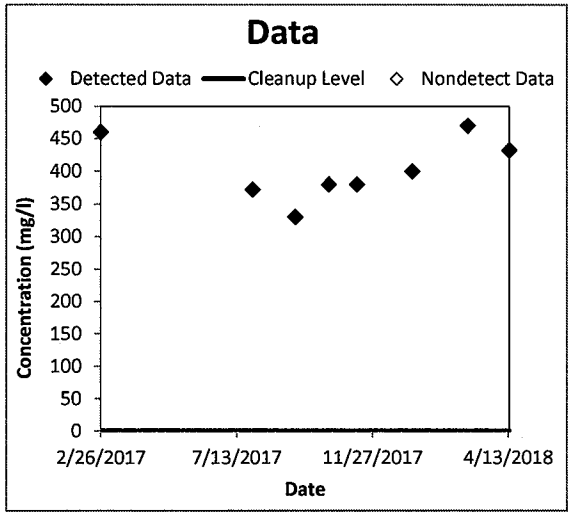
Site Name	Big Fork Ranch
Operating Unit (OU)	Big Fork Ranch
Type of Evaluation	Attainment
Date of Evaluation	7/1/2018
Person performing analysis	AJH

Chemical of Concern	TDS
Well Name/Number	6A
Date Units	Date
Concentration Units	mg/l

Confidence Level Desired	95%
Cleanup Level	
Source of cleanup level (e.g. MCL or risk-based concentration)	
Risk of False Outlier Rejection	1%
Random Seed (may be left blank)	
Significant figures to use	3

Number of data points:	8
Number of detected results:	8
Number of nondetect results:	0
Detection frequency:	1

Date (Date)	TDS Concentration (mg/l)	Data Qualifier	Detected? (Yes or No)
2/26/2017	460		Yes
7/29/2017	372		Yes
9/10/2017	330		Yes
10/14/2017	380		Yes
11/11/2017	380		Yes
1/6/2018	400		Yes
3/3/2018	470		Yes
4/14/2018	432		Yes



Axis Values			
Time		Concentration	
Min	Max	Min	Max
Auto	Auto	Auto	Auto

Reset Concentration Axis

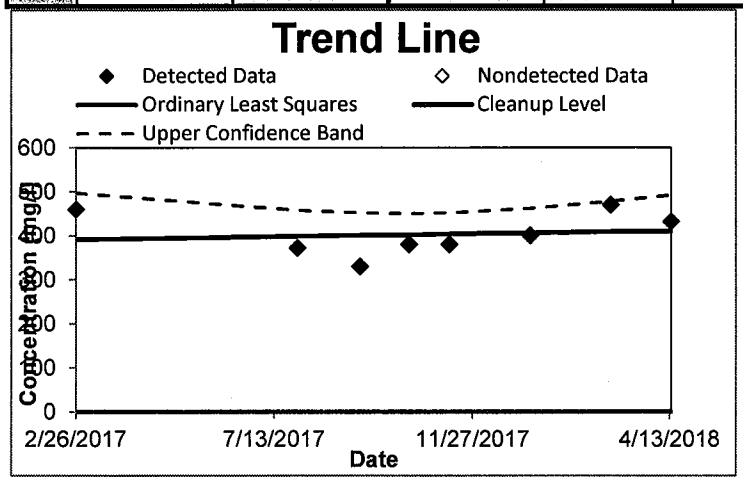
Data Review		Recommendations
Are all necessary data fields entered, and in proper format?	Yes	None
Are at least 4 data points present for statistical analysis?	Yes	None
Are detection limits for nondetects ≤ maximum detected value?	Yes	None
Are all data within chart axis limits?	Yes	None

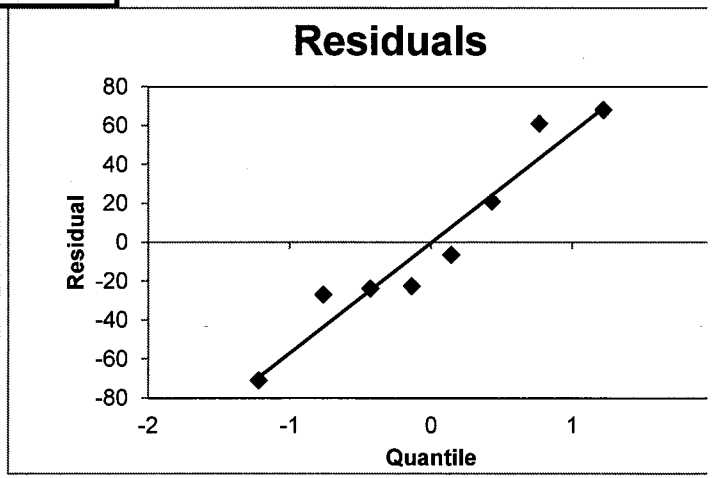
Groundwater Statistics Tool

Trend test results for datasets with normally distributed residuals (with our without transformation)

i	t (Date)	C (mg/l)	C Predicted	Fit residual	Upper Confidence Band
1	42792	460	392	68	497
2	42945	372	399	-27	458
3	42988	330	401	-71	452
4	43022	380	402	-22	450
5	43050	380	404	-24	452
6	43106	400	406	-6	462
7	43162	470	409	61	478
8	43204	432	411	21	492
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Ordinary Least Squares	
Slope	0.04621326
Intercept	-1585.724112
Correlation, R^2	0.0160
Test Result	No trend
Test Statistic	0.312
Critical Value	1.943
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing





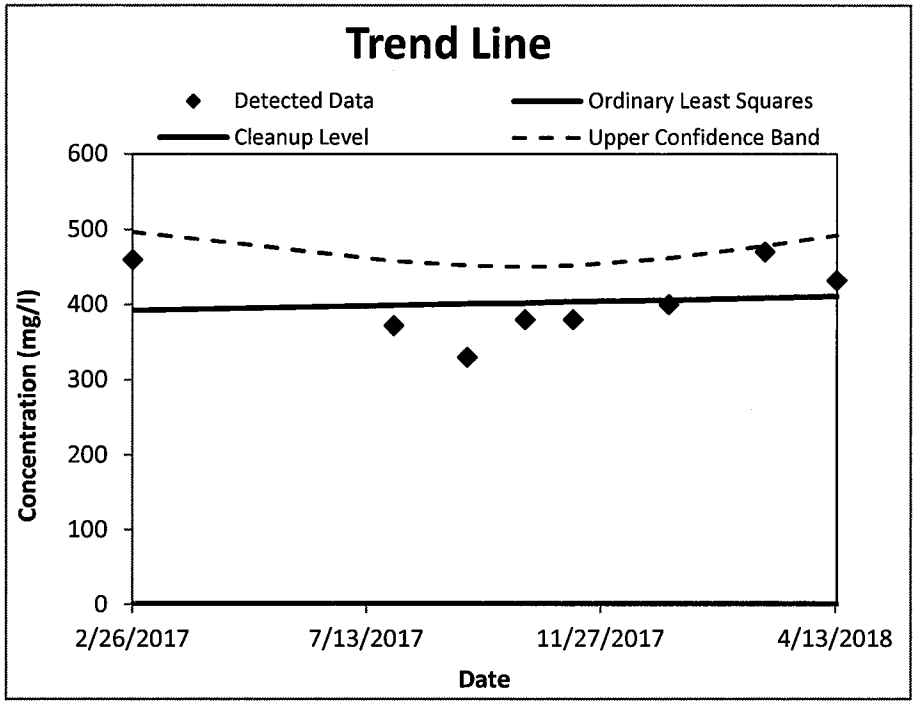
Groundwater Statistics Tool

UCL calculations and summary statistics for data sets that are normally distributed

Site Name	Evans & Assoc
Operating Unit (OU)	Big Fork Ranch
Type of Evaluation	Attainment
Date of Evaluation	7/1/2018
Person performing analysis	AJH

Chemical of Concern	TDS
Well Name/Number	6A
Date Units	Date
Concentration Units	mg/l

Confidence Level	95%
Number of results	8
Number < cleanup level	0
Are any potential outliers present?	No
Mean of concentration	403
Standard deviation of concentration	47.7
t-value for UCL calculation	1.895



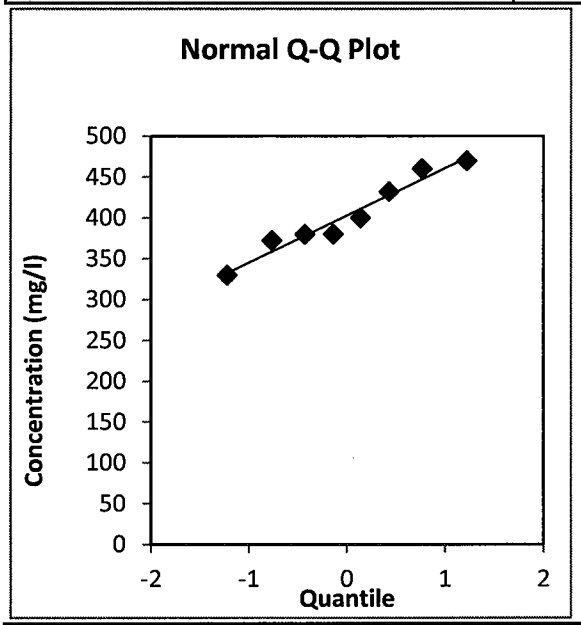
95% Upper Confidence Limit (UCL)	435
Method for calculating UCL	Student's t UCL
Value of 95% Upper Confidence Band value at final sampling event	492
Trend calculation method	Ordinary Least Squares
Cleanup level	0
Source of cleanup level	0
Is the trend decreasing or statistically insignificant?	Yes

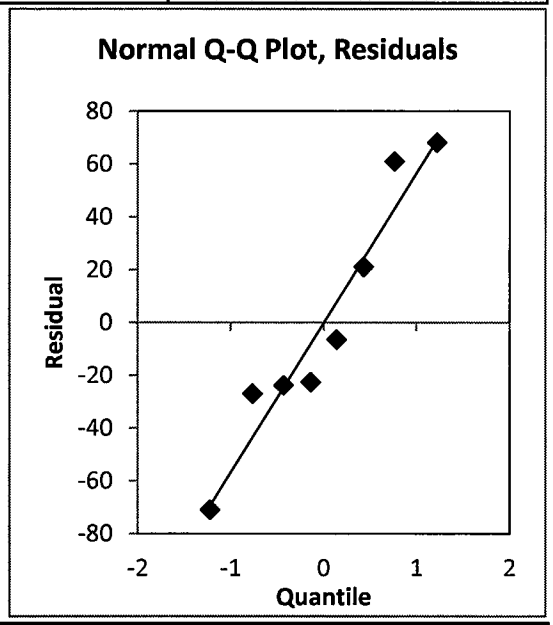
When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Message: None.	

Groundwater Statistics Tool

Normality Testing Worksheet

Normality Test Results			
Parameter	**All Data**	**Minus Outliers**	**Residuals**
Number of data points	8	8	8
Shapiro-Wilk alpha value	10%	N/A	10%
Slope	57.76327502	N/A	56.71504759
Intercept	403	N/A	-2.84217E-14
Correlation, R	0.977067227	N/A	0.967109629
Exact Test Value	0.945609434	N/A	0.929360684
Critical Value	0.851	N/A	0.851
Conclude sample distribution:	Appears normal	N/A	Appears normal



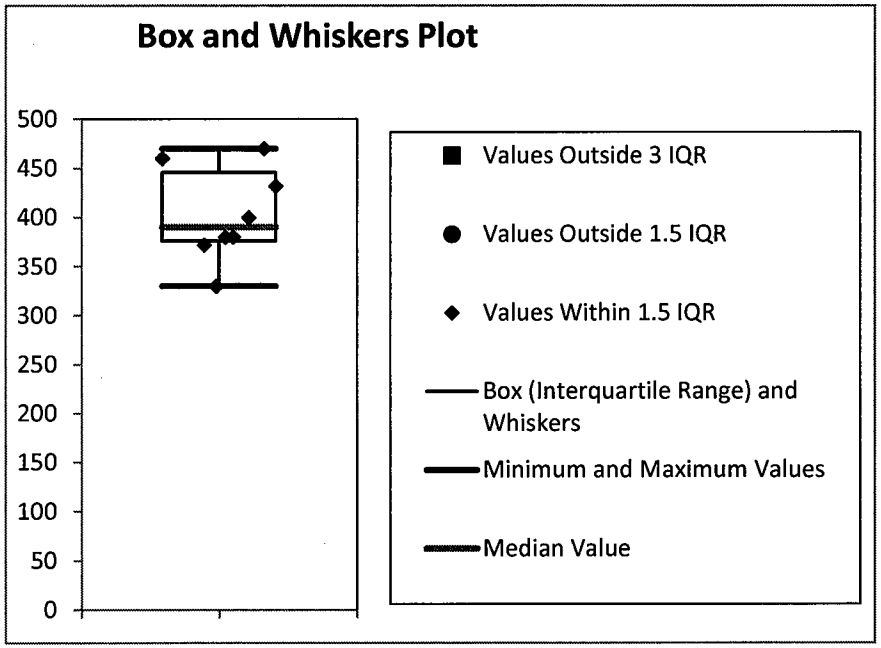


Previous Step: Outliers Screen | Next Step: Trend Screen | Skip Step: UCL Screen

Groundwater Statistics Tool

Outlier testing worksheet

Dixon's Outlier Test Results		
Number of data points	8	
Risk of false rejection	1%	
Critical value	0.683	
Outlier type	**Low**	**High**
Test statistic	0.3231	0.1020
Potential Outlier?	No	No
Validity of Dixon'sTest	Valid	



Groundwater Statistics Tool

Data input worksheet

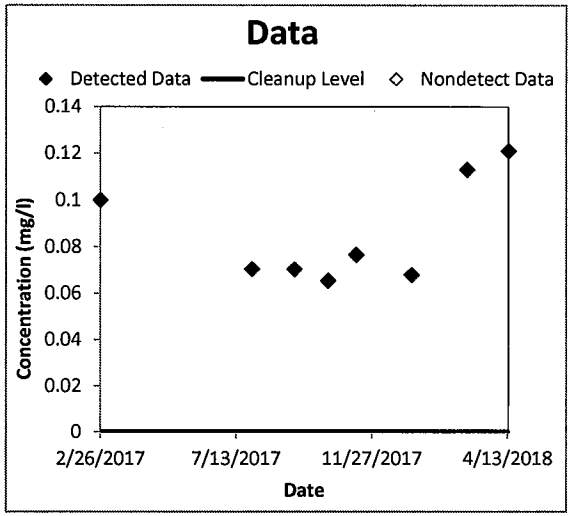
Site Name	Big Fork Ranch
Operating Unit (OU)	Big Fork Ranch
Type of Evaluation	Attainment
Date of Evaluation	
Person performing analysis	AJH

Chemical of Concern	Boron
Well Name/Number	6A
Date Units	Date
Concentration Units	mg/l

Confidence Level Desired	95%
Cleanup Level	
Source of cleanup level (e.g. MCL or risk-based concentration)	
Risk of False Outlier Rejection	1%
Random Seed (may be left blank)	
Significant figures to use	3

Number of data points:	8
Number of detected results:	8
Number of nondetect results:	0
Detection frequency:	1

Date (Date)	Boron Concentration (mg/l)	Data Qualifier	Detected? (Yes or No)
2/26/2017	0.1		Yes
7/29/2017	0.0705		Yes
9/10/2017	0.0704		Yes
10/14/2017	0.0654		Yes
11/11/2017	0.0766		Yes
1/6/2018	0.068		Yes
3/3/2018	0.113		Yes
4/14/2018	0.121		Yes



Axis Values			
Time		Concentration	
Min	Max	Min	Max
Auto	Auto	Auto	Auto

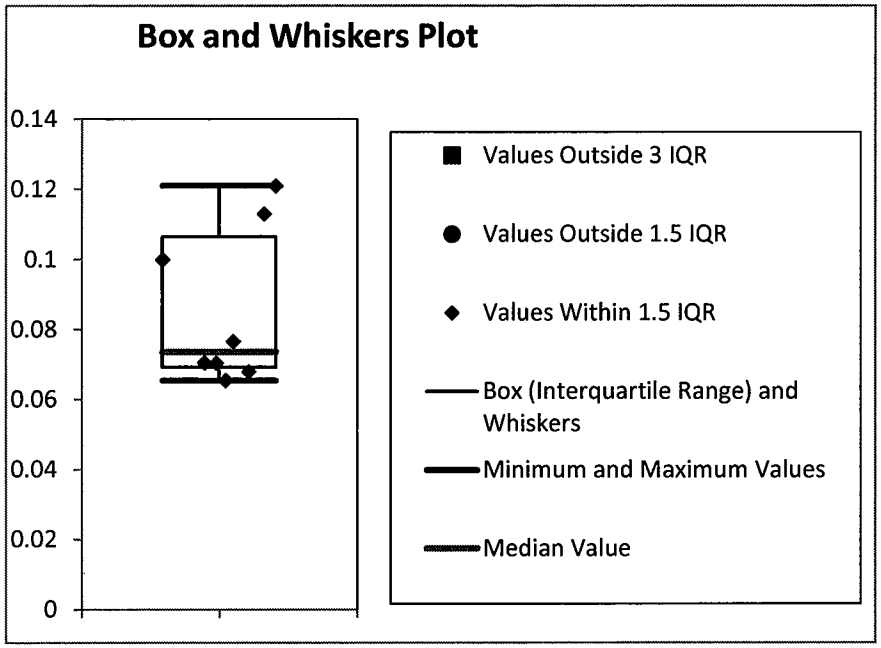
Reset Concentration Axis

Data Review		Recommendations
Are all necessary data fields entered, and in proper format?	Yes	None
Are at least 4 data points present for statistical analysis?	Yes	None
Are detection limits for nondetects ≤ maximum detected value?	Yes	None
Are all data within chart axis limits?	Yes	None

Groundwater Statistics Tool

Outlier testing worksheet

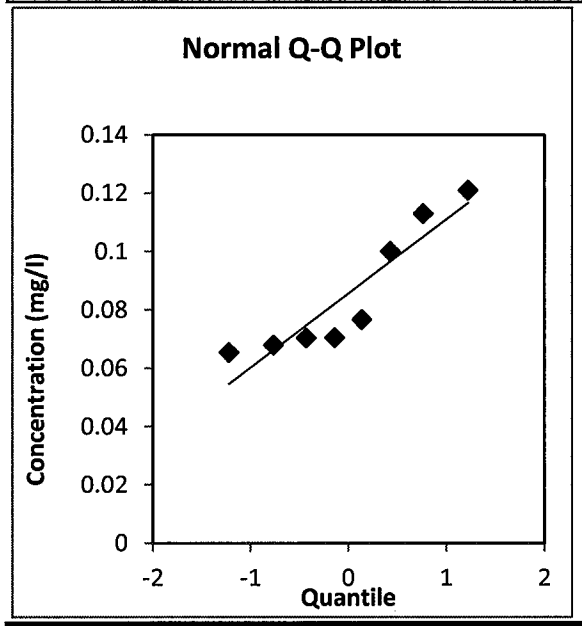
Dixon's Outlier Test Results		
Number of data points	8	
Risk of false rejection	1%	
Critical value	0.683	
Outlier type	**Low**	**High**
Test statistic	0.0546	0.1509
Potential Outlier?	No	No
Validity of Dixon'sTest	Valid	

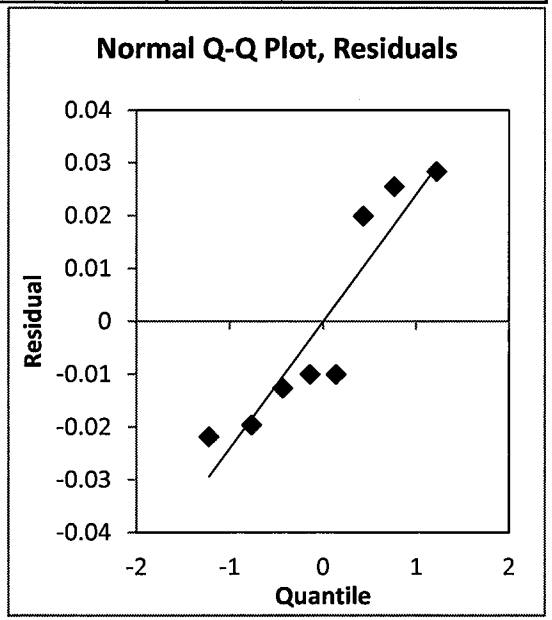


Groundwater Statistics Tool

Normality Testing Worksheet

Normality Test Results			
Parameter	**All Data**	**Minus Outliers**	**Residuals**
Number of data points	8	8	8
Shapiro-Wilk alpha value	10%	N/A	10%
Slope	0.025414921	N/A	0.024063904
Intercept	0.0856125	N/A	-3.46945E-17
Correlation, R	0.921384389	N/A	0.927548228
Exact Test Value	0.821630987	N/A	0.824273919
Critical Value	0.851	N/A	0.851
Conclude sample distribution:	Does not appear normal	N/A	Does not appear normal





Previous Step: Outliers Screen | Next Step: Trend Screen | Skip Step: UCL Screen

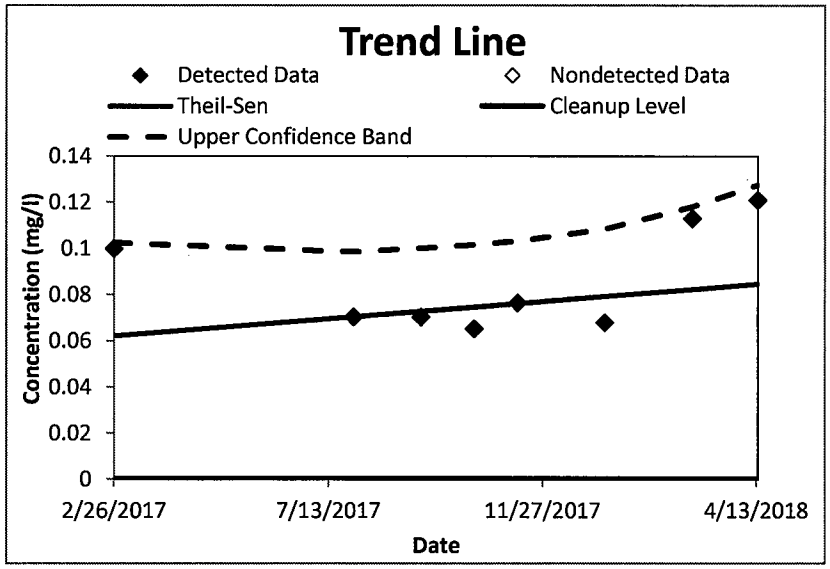
Groundwater Statistics Tool

Trend test results for datasets nonparametrically distributed residuals

i	t (Date)	C (mg/l)	C Predicted	Residual	Upper Confidence Band
1	2/26/2017	0.1	0.0622	0.0378	0.103
2	7/29/2017	0.0705	0.0705	0	0.0986
3	9/10/2017	0.0704	0.0728	-0.0024	0.1
4	10/14/2017	0.0654	0.0747	-0.0093	0.102
5	11/11/2017	0.0766	0.0762	0.0004	0.103
6	1/6/2018	0.068	0.0793	-0.0113	0.109
7	3/3/2018	0.113	0.0823	0.0307	0.118
8	4/14/2018	0.121	0.0846	0.0364	0.127
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Mann-Kendall	
Test Result	No trend
Test Statistic (S)	6
Normalized S	0.619
Critical Value	1.645

Theil-Sen	
Slope	0.0000545
Intercept	-2.27
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing



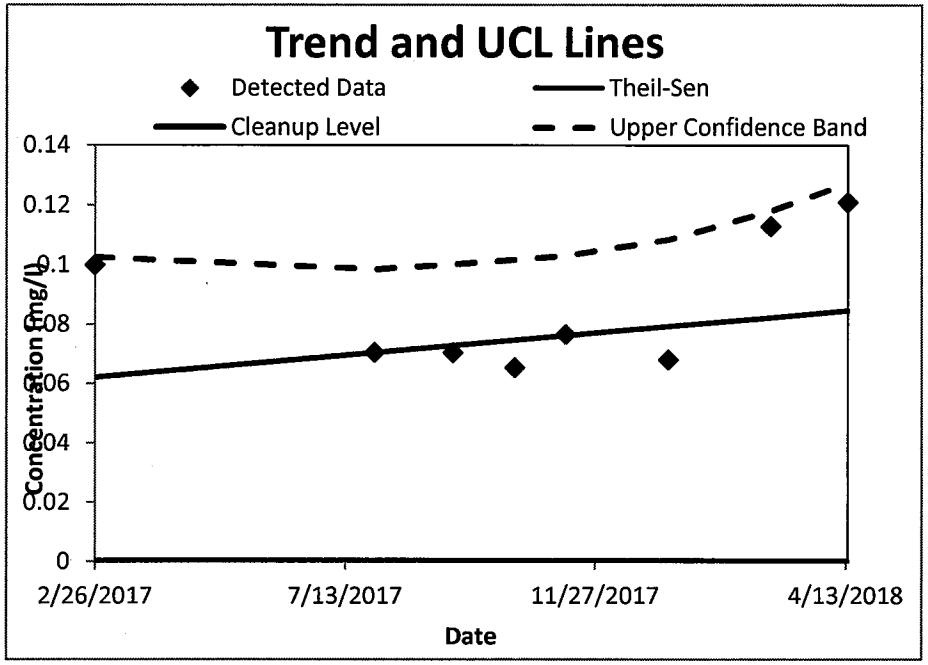
Groundwater Statistics Tool

UCL calculations and summary statistics for nonparametric data sets

Site Name	Big Fork Ranch
Operating Unit (OU)	Big Fork Ranch
Type of Evaluation	Attainment
Date of Evaluation	1/0/1900
Person performing analysis	AJH

Chemical of Concern	Boron
Well Name/Number	6A
Date Units	Date
Concentration Units	mg/l

Confidence Level	95%
Number of results	8
Number < cleanup level	0
Are any potential outliers present?	No
Mean of concentration	0.0856
Standard deviation of concentration	0.0223



95% Upper Confidence Limit (UCL)	0.12
Method for calculating UCL	Chebyshev UCL
Value of 95% Upper Confidence Band value at final sampling event	0.127
Trend calculation method	Theil-Sen/Mann-Kendall
Cleanup level	0
Source of cleanup level	0
Is the trend decreasing or statistically insignificant?	**Yes**

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Random Seed Used	54612.65234
Message: None.	

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Groundwater Statistics Tool

Data input worksheet

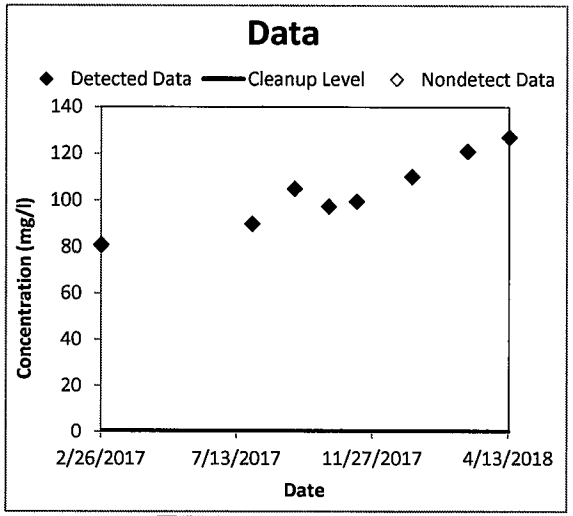
Site Name	Big Fork Ranch
Operating Unit (OU)	Big Fork Ranch
Type of Evaluation	Attainment
Date of Evaluation	7/1/2018
Person performing analysis	AJH

Chemical of Concern	Calcium
Well Name/Number	6A
Date Units	Date
Concentration Units	mg/l

Confidence Level Desired	95%
Cleanup Level	
Source of cleanup level (e.g. MCL or risk-based concentration)	
Risk of False Outlier Rejection	1%
Random Seed (may be left blank)	
Significant figures to use	3

Number of data points:	8
Number of detected results:	8
Number of nondetect results:	0
Detection frequency:	1

Date (Date)	Calcium Concentration (mg/l)	Data Qualifier	Detected? (Yes or No)
2/26/2017	81		Yes
7/29/2017	89.8		Yes
9/10/2017	105		Yes
10/14/2017	97.3		Yes
11/11/2017	99.4		Yes
1/6/2018	110		Yes
3/3/2018	121		Yes
4/14/2018	127		Yes



Axis Values			
Time		Concentration	
Min	Max	Min	Max
Auto	Auto	Auto	Auto

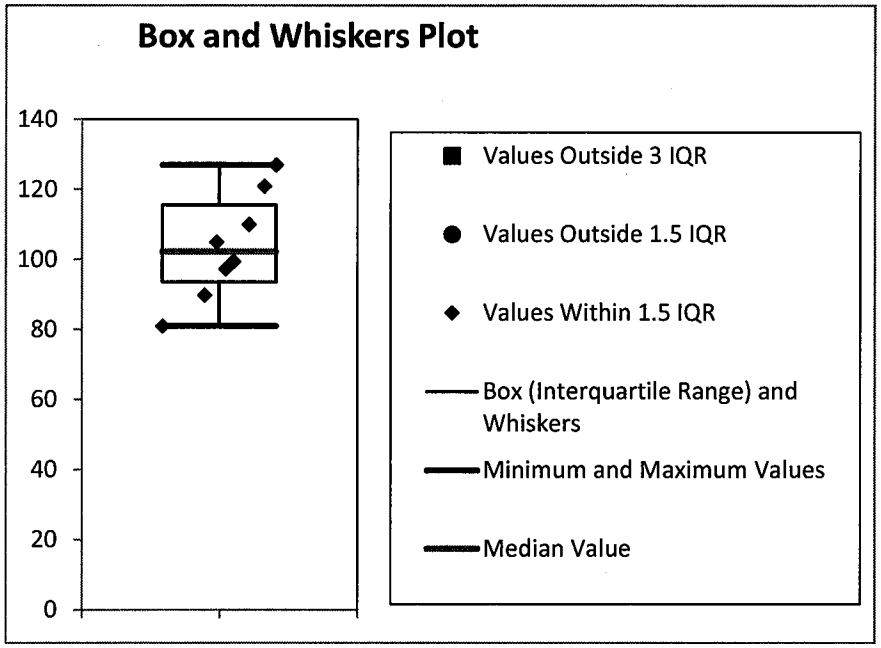
Reset Concentration Axis

Data Review		Recommendations
Are all necessary data fields entered, and in proper format?	Yes	None
Are at least 4 data points present for statistical analysis?	Yes	None
Are detection limits for nondetects ≤ maximum detected value?	Yes	None
Are all data within chart axis limits?	Yes	None

Groundwater Statistics Tool

Outlier testing worksheet

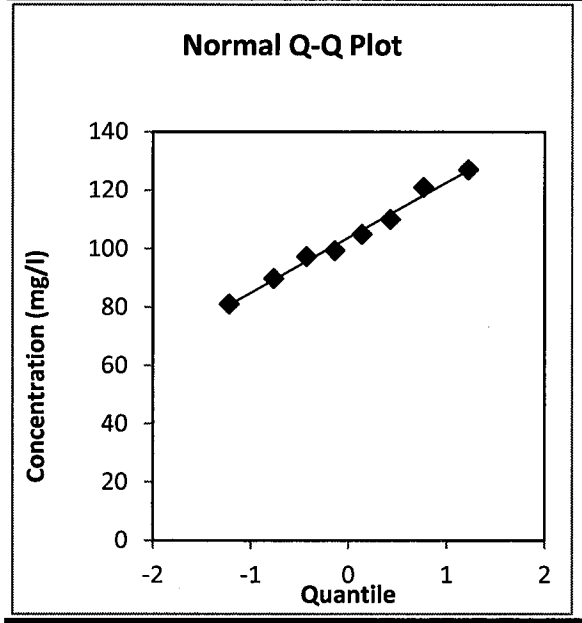
Dixon's Outlier Test Results		
Number of data points	8	
Risk of false rejection	1%	
Critical value	0.683	
Outlier type	**Low**	**High**
Test statistic	0.2200	0.1613
Potential Outlier?	No	No
Validity of Dixon'sTest	Valid	

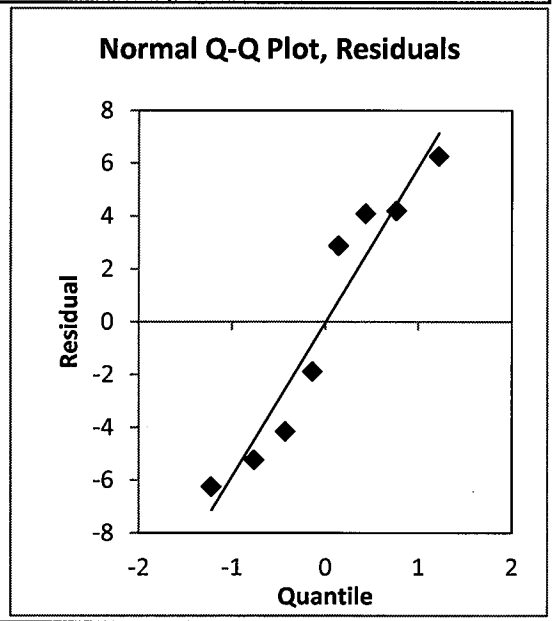


Groundwater Statistics Tool

Normality Testing Worksheet

Normality Test Results			
Parameter	**All Data**	**Minus Outliers**	**Residuals**
Number of data points	8	8	8
Shapiro-Wilk alpha value	10%	N/A	10%
Slope	18.91864177	N/A	5.853639786
Intercept	103.8125	N/A	-1.13687E-13
Correlation, R	0.994088298	N/A	0.961577028
Exact Test Value	0.980465287	N/A	0.888875201
Critical Value	0.851	N/A	0.851
Conclude sample distribution:	Appears normal	N/A	Appears normal





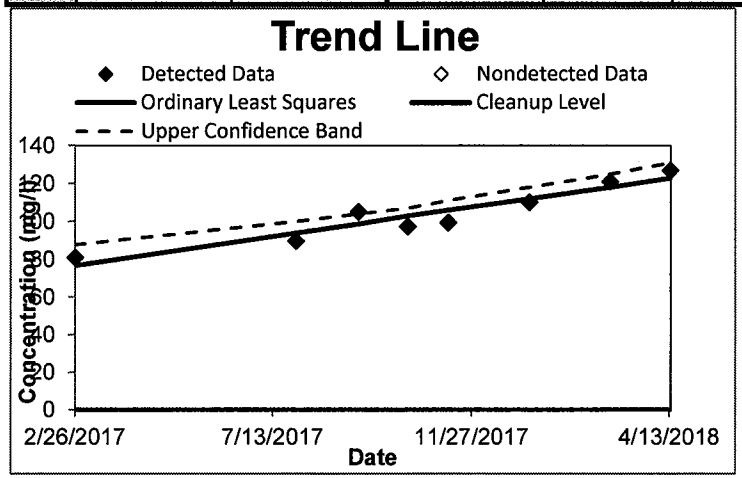
Previous Step: Outliers Screen | Next Step: Trend Screen | Skip Step: UCL Screen

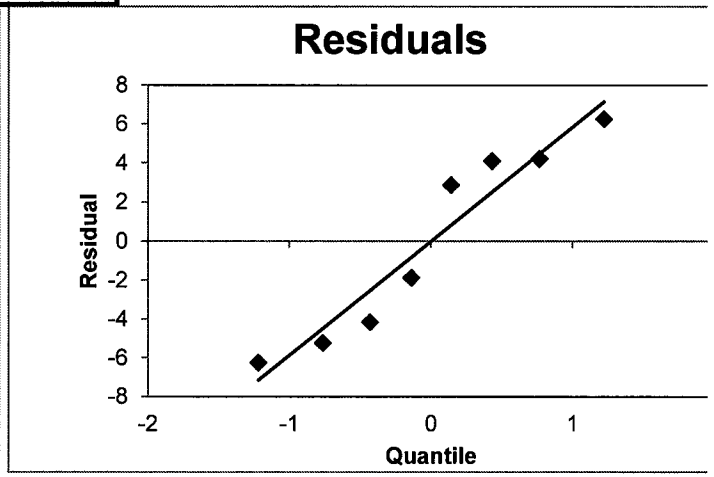
Groundwater Statistics Tool

Trend test results for datasets with normally distributed residuals (with our without transformation)

i	t (Date)	C (mg/l)	C Predicted	Fit residual	Upper Confidence Band
1	2/26/2017	81	76.9	4.1	87.8
2	7/29/2017	89.8	93.9	-4.1	100
3	9/10/2017	105	98.7	6.3	104
4	10/14/2017	97.3	103	-5.7	107
5	11/11/2017	99.4	106	-6.6	111
6	1/6/2018	110	112	-2	118
7	3/3/2018	121	118	3	125
8	4/14/2018	127	123	4	131
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Ordinary Least Squares	
Slope	0.111394276
Intercept	-4689.887022
Correlation, R^2	0.8977
Test Result	Increasing
Test Statistic	7.255
Critical Value	1.943
When is the concentration predicted to exceed the cleanup level?	MCL is already exceeded





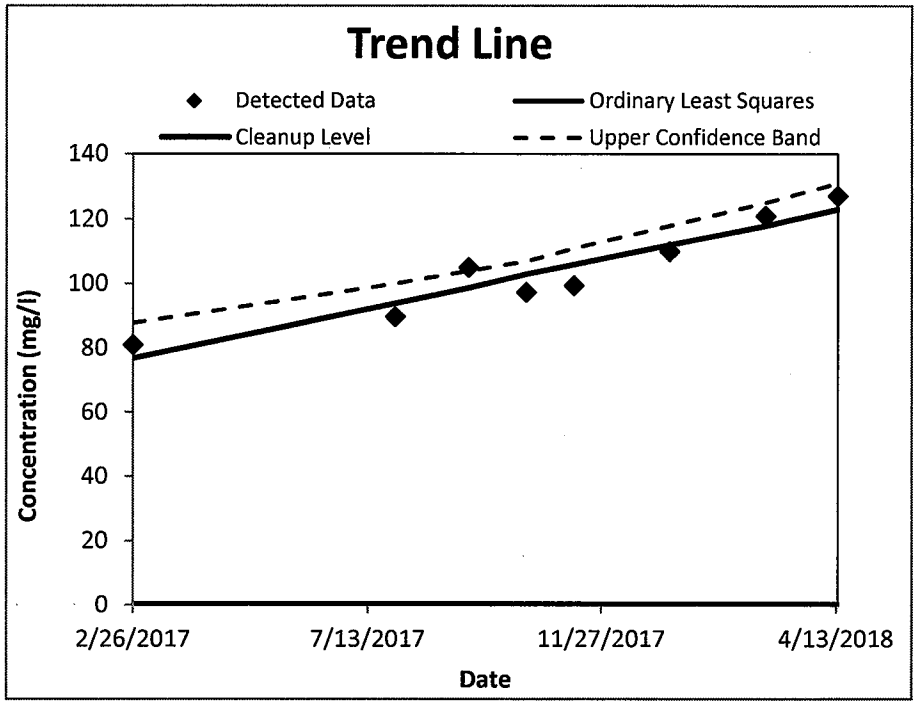
Groundwater Statistics Tool

UCL calculations and summary statistics for data sets that are normally distributed

Site Name	Big Fork Ranch
Operating Unit (OU)	Big Fork Ranch
Type of Evaluation	Attainment
Date of Evaluation	7/1/2018
Person performing analysis	AJH

Chemical of Concern	Calcium
Well Name/Number	6A
Date Units	Date
Concentration Units	mg/l

Confidence Level	95%
Number of results	8
Number < cleanup level	0
Are any potential outliers present?	No
Mean of concentration	104
Standard deviation of concentration	15.4
t-value for UCL calculation	1.895



95% Upper Confidence Limit (UCL)	114
Method for calculating UCL	Student's t UCL
Value of 95% Upper Confidence Band value at final sampling event	131
Trend calculation method	Ordinary Least Squares
Cleanup level	0
Source of cleanup level	0
Is the trend decreasing or statistically insignificant?	**No**

When is the concentration predicted to exceed the MCL?	MCL is already exceeded
Message: None.	

Groundwater Statistics Tool

Data input worksheet

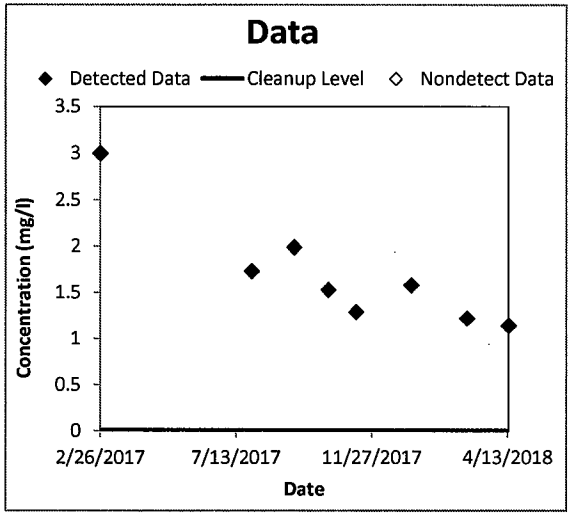
Site Name	Big Fork Ranch
Operating Unit (OU)	Big Fork Ranch
Type of Evaluation	Attainment
Date of Evaluation	7/1/2018
Person performing analysis	AJH

Chemical of Concern	Chloride
Well Name/Number	6A
Date Units	Date
Concentration Units	mg/l

Confidence Level Desired	95%
Cleanup Level	
Source of cleanup level (e.g. MCL or risk-based concentration)	
Risk of False Outlier Rejection	1%
Random Seed (may be left blank)	
Significant figures to use	3

Number of data points:	8
Number of detected results:	8
Number of nondetect results:	0
Detection frequency:	1

Date (Date)	Chloride Concentration (mg/l)	Data Qualifier	Detected? (Yes or No)
2/26/2017	3		Yes
7/29/2017	1.73		Yes
9/10/2017	1.99		Yes
10/14/2017	1.53		Yes
11/11/2017	1.29		Yes
1/6/2018	1.58		Yes
3/3/2018	1.22		Yes
4/14/2018	1.14		Yes



Axis Values			
Time		Concentration	
Min	Max	Min	Max
Auto	Auto	Auto	Auto

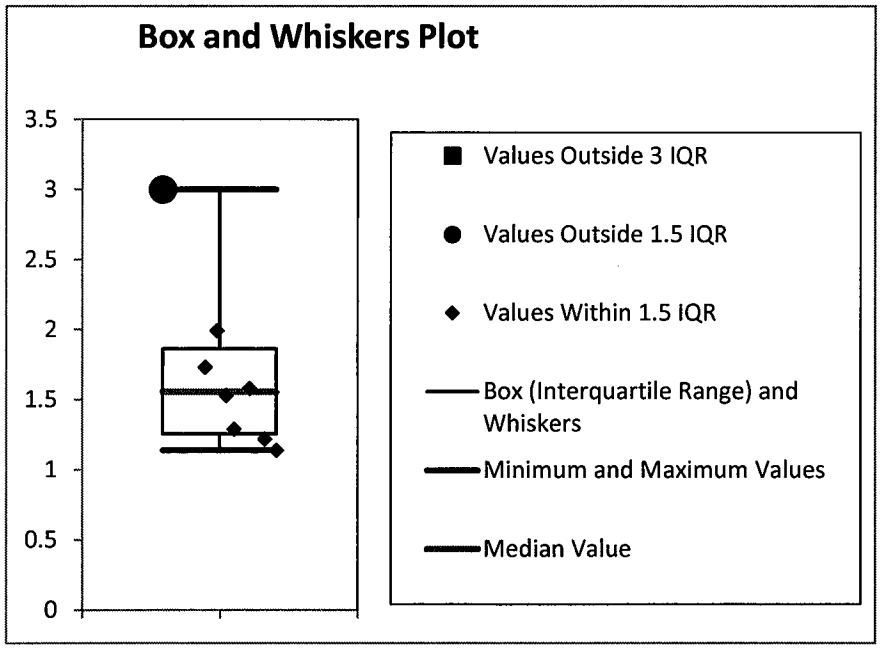
Reset Concentration Axis

Data Review		Recommendations
Are all necessary data fields entered, and in proper format?	Yes	None
Are at least 4 data points present for statistical analysis?	Yes	None
Are detection limits for nondetects ≤ maximum detected value?	Yes	None
Are all data within chart axis limits?	Yes	None

Groundwater Statistics Tool

Outlier testing worksheet

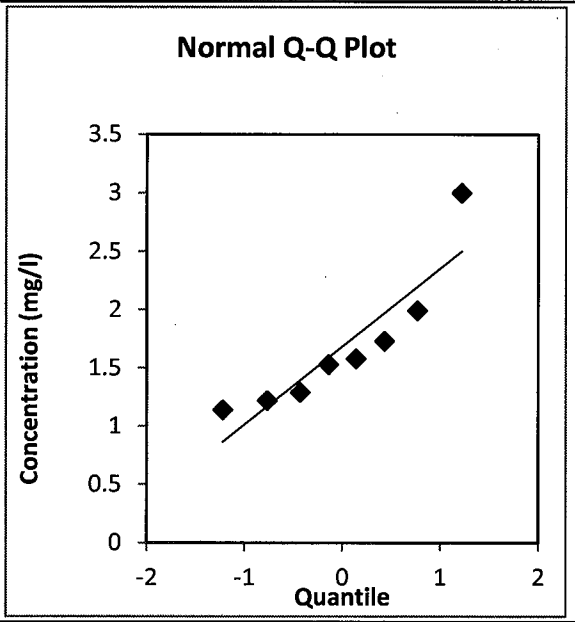
Dixon's Outlier Test Results		
Number of data points	8	
Risk of false rejection	1%	
Critical value	0.683	
Outlier type	**Low**	**High**
Test statistic	0.0941	0.5674
Potential Outlier?	No	No
Validity of Dixon'sTest	Valid	

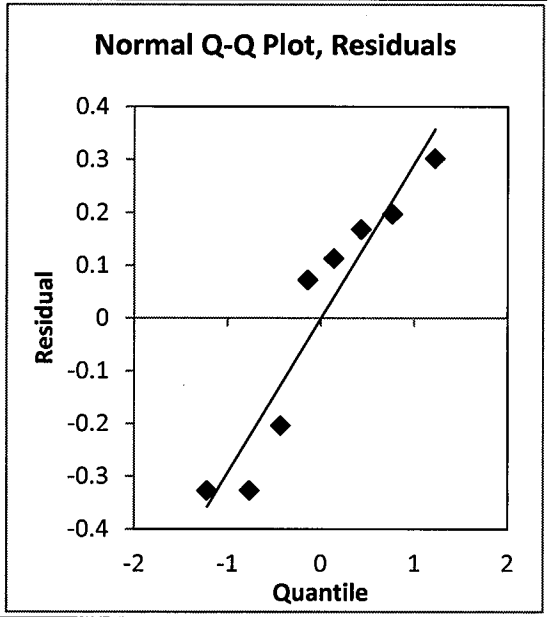


Groundwater Statistics Tool

Normality Testing Worksheet

Normality Test Results			
Parameter	**All Data**	**Minus Outliers**	**Residuals**
Number of data points	8	8	8
Shapiro-Wilk alpha value	10%	N/A	10%
Slope	0.670176801	N/A	0.292845243
Intercept	1.685	N/A	-9.38138E-15
Correlation, R	0.899935993	N/A	0.951195247
Exact Test Value	0.830108656	N/A	0.872195884
Critical Value	0.851	N/A	0.851
Conclude sample distribution:	Does not appear normal	N/A	Appears normal





Previous Step: Outliers Screen | Next Step: Trend Screen | Skip Step: UCL Screen

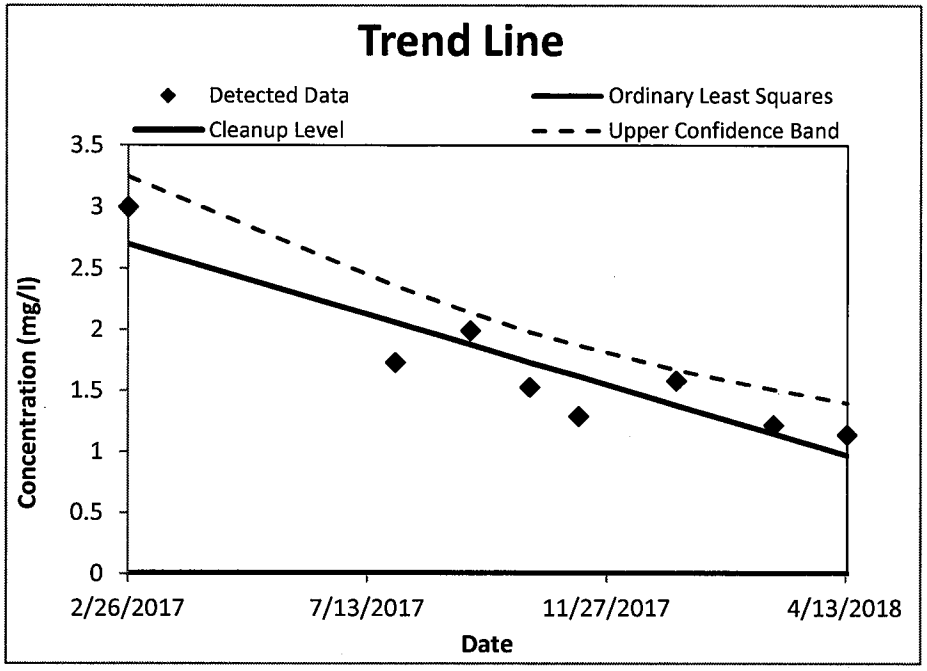
Groundwater Statistics Tool

UCL calculations and summary statistics for nonparametric data sets

Site Name	Big Fork Ranch
Operating Unit (OU)	Big Fork Ranch
Type of Evaluation	Attainment
Date of Evaluation	7/1/2018
Person performing analysis	AJH

Chemical of Concern	Chloride
Well Name/Number	6A
Date Units	Date
Concentration Units	mg/l

Confidence Level	95%
Number of results	8
Number < cleanup level	0
Are any potential outliers present?	No
Mean of concentration	1.69
Standard deviation of concentration	0.601



95% Upper Confidence Limit (UCL)	2.62
Method for calculating UCL	Chebyshev UCL
Value of 95% Upper Confidence Band value at final sampling event	1.4
Trend calculation method	Ordinary Least Squares
Cleanup level	0
Source of cleanup level	0
Is the trend decreasing or statistically insignificant?	**Yes**

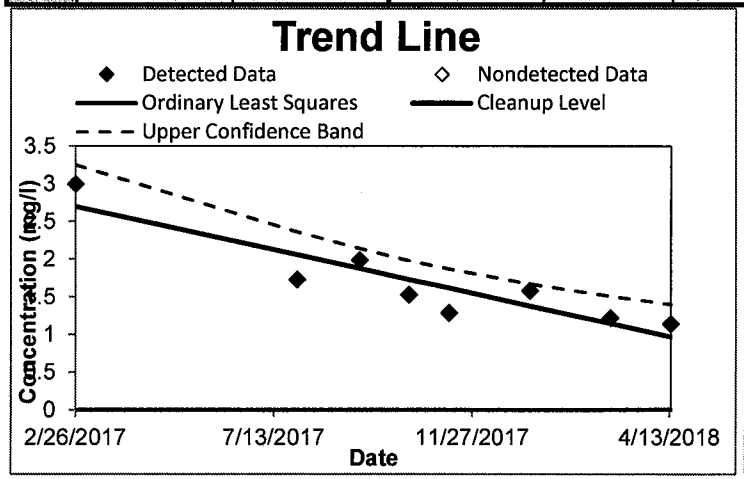
When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Random Seed Used	0
Message: None.	

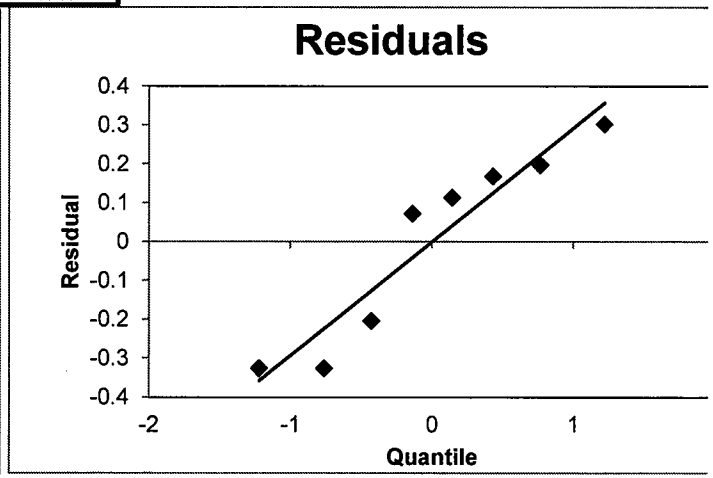
Groundwater Statistics Tool

Trend test results for datasets with normally distributed residuals (with our without transformation)

i	t (Date)	C (mg/l)	C Predicted	Fit residual	Upper Confidence Band
1	2/26/2017	3	2.7	0.3	3.25
2	7/29/2017	1.73	2.06	-0.33	2.36
3	9/10/2017	1.99	1.88	0.11	2.14
4	10/14/2017	1.53	1.73	-0.2	1.98
5	11/11/2017	1.29	1.62	-0.33	1.87
6	1/6/2018	1.58	1.38	0.2	1.67
7	3/3/2018	1.22	1.15	0.07	1.51
8	4/14/2018	1.14	0.971	0.169	1.4
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Ordinary Least Squares	
Slope	-0.004189034
Intercept	181.9543218
Correlation, R^2	0.8291
Test Result	Decreasing
Test Statistic	-5.395
Critical Value	1.943
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing





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Groundwater Statistics Tool

Data input worksheet

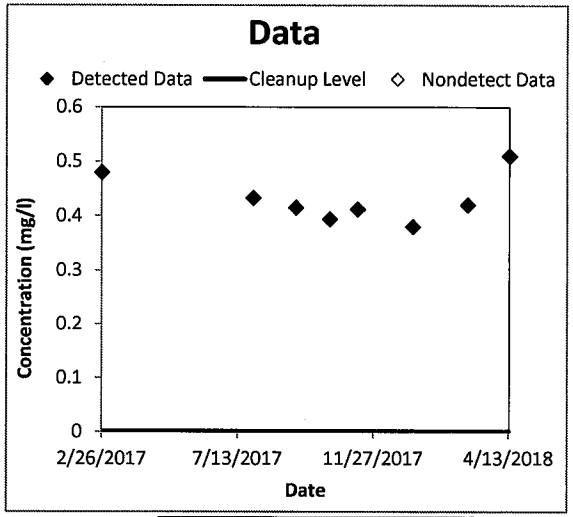
Site Name	Big Fork Ranch
Operating Unit (OU)	Big Fork Ranch
Type of Evaluation	Attainment
Date of Evaluation	7/1/2018
Person performing analysis	AJH

Chemical of Concern	Fluoride
Well Name/Number	6A
Date Units	Date
Concentration Units	mg/l

Confidence Level Desired	95%
Cleanup Level	
Source of cleanup level (e.g. MCL or risk-based concentration)	
Risk of False Outlier Rejection	1%
Random Seed (may be left blank)	
Significant figures to use	3

Number of data points:	8
Number of detected results:	8
Number of nondetect results:	0
Detection frequency:	1

Date (Date)	Fluoride Concentration (mg/l)	Data Qualifier	Detected? (Yes or No)
2/26/2017	0.48		Yes
7/29/2017	0.433		Yes
9/10/2017	0.415		Yes
10/14/2017	0.394		Yes
11/11/2017	0.412		Yes
1/6/2018	0.38		Yes
3/3/2018	0.42		Yes
4/14/2018	0.51		Yes



Axis Values			
Time		Concentration	
Min	Max	Min	Max
Auto	Auto	Auto	Auto

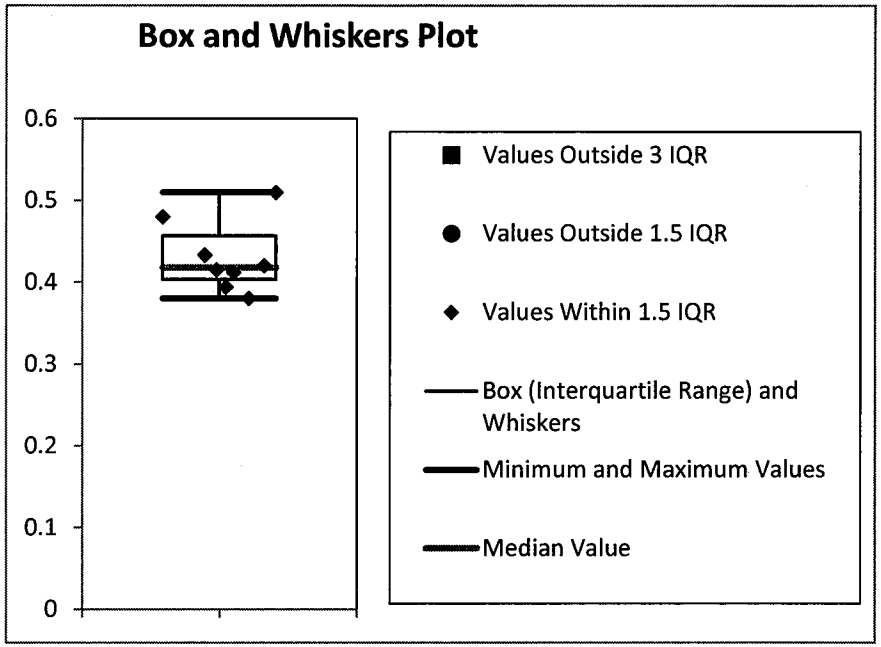
Reset Concentration Axis

Data Review		Recommendations
Are all necessary data fields entered, and in proper format?	Yes	None
Are at least 4 data points present for statistical analysis?	Yes	None
Are detection limits for nondetects ≤ maximum detected value?	Yes	None
Are all data within chart axis limits?	Yes	None

Groundwater Statistics Tool

Outlier testing worksheet

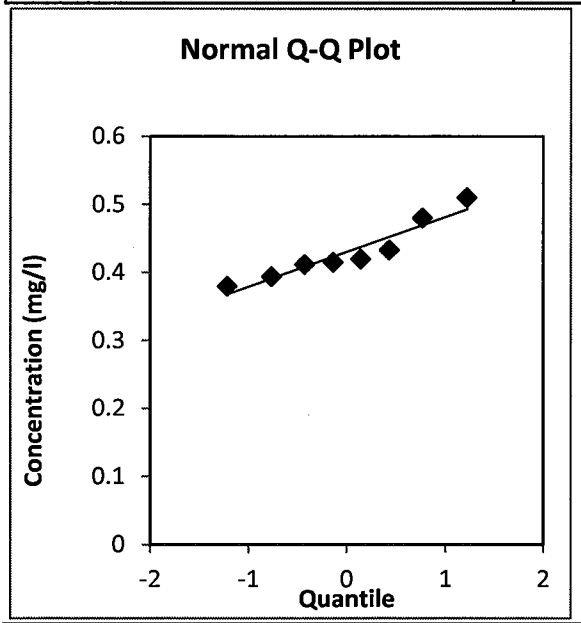
Dixon's Outlier Test Results		
Number of data points	8	
Risk of false rejection	1%	
Critical value	0.683	
Outlier type	**Low**	**High**
Test statistic	0.1400	0.2586
Potential Outlier?	No	No
Validity of Dixon'sTest	Valid	

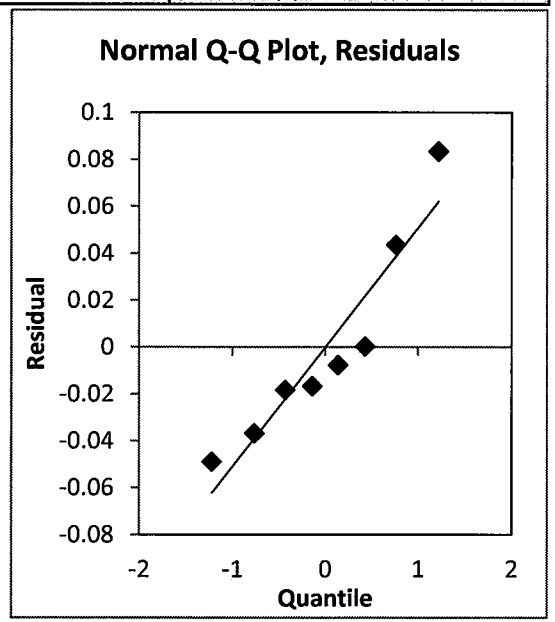


Groundwater Statistics Tool

Normality Testing Worksheet

Normality Test Results			
Parameter	**All Data**	**Minus Outliers**	**Residuals**
Number of data points	8	8	8
Shapiro-Wilk alpha value	10%	N/A	10%
Slope	0.051362677	N/A	0.050964339
Intercept	0.4305	N/A	2.77556E-17
Correlation, R	0.949154224	N/A	0.944135347
Exact Test Value	0.903386299	N/A	0.899344699
Critical Value	0.851	N/A	0.851
Conclude sample distribution:	Appears normal	N/A	Appears normal





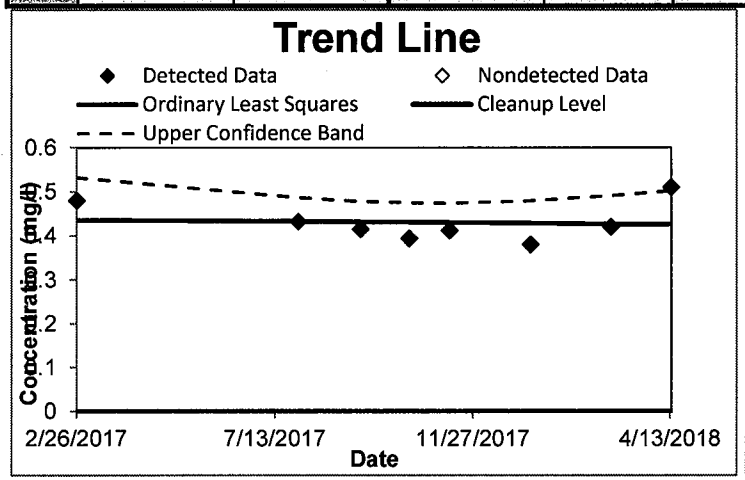
Previous Step: Outliers Screen | Next Step: Trend Screen | Skip Step: UCL Screen

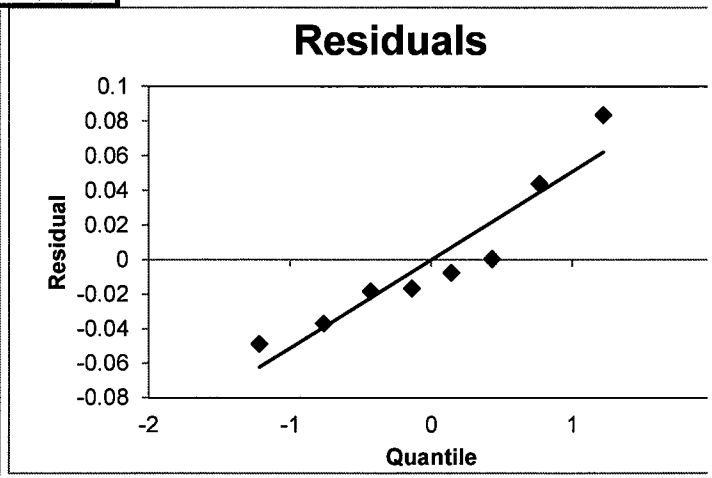
Groundwater Statistics Tool

Trend test results for datasets with normally distributed residuals (with our without transformation)

	t (Date)	C (mg/l)	C Predicted	Fit residual	Upper Confidence Band
1	2/26/2017	0.48	0.436	0.044	0.533
2	7/29/2017	0.433	0.433	0	0.487
3	9/10/2017	0.415	0.432	-0.017	0.478
4	10/14/2017	0.394	0.431	-0.037	0.475
5	11/11/2017	0.412	0.43	-0.018	0.474
6	1/6/2018	0.38	0.429	-0.049	0.48
7	3/3/2018	0.42	0.427	-0.007	0.491
8	4/14/2018	0.51	0.426	0.084	0.502
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Ordinary Least Squares	
Slope	-2.35335E-05
Intercept	1.443232809
Correlation, R^2	0.0050
Test Result	No trend
Test Statistic	-0.173
Critical Value	1.943
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing





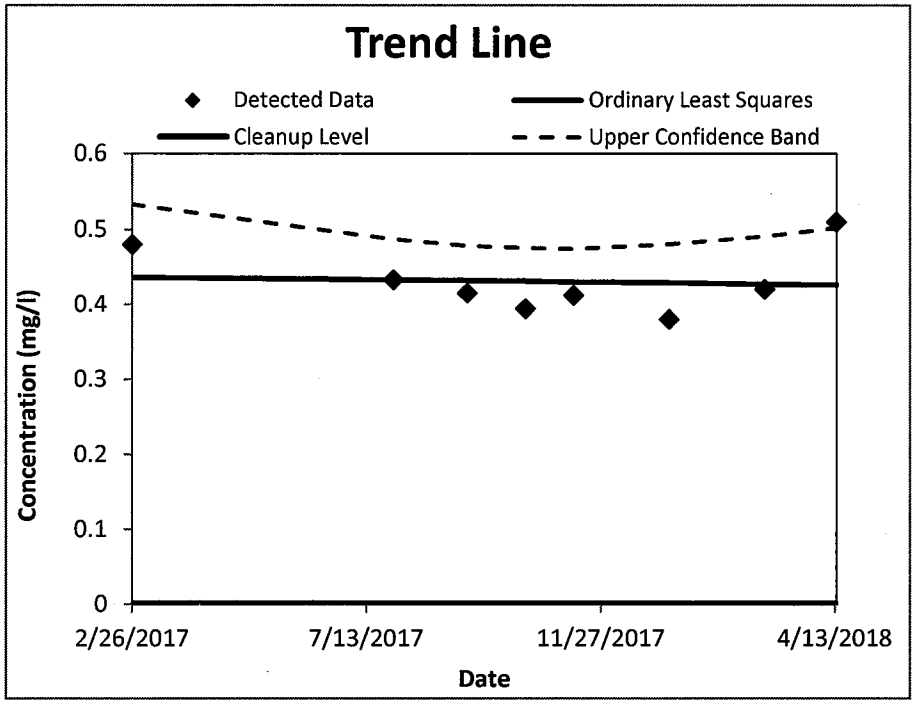
Groundwater Statistics Tool

UCL calculations and summary statistics for data sets that are normally distributed

Site Name	Big Fork Ranch
Operating Unit (OU)	Big Fork Ranch
Type of Evaluation	Attainment
Date of Evaluation	7/1/2018
Person performing analysis	AJH

Chemical of Concern	Fluoride
Well Name/Number	6A
Date Units	Date
Concentration Units	mg/l

Confidence Level	95%
Number of results	8
Number < cleanup level	0
Are any potential outliers present?	No
Mean of concentration	0.431
Standard deviation of concentration	0.0437
t-value for UCL calculation	1.895



95% Upper Confidence Limit (UCL)	0.46
Method for calculating UCL	Student's t UCL
Value of 95% Upper Confidence Band value at final sampling event	0.502
Trend calculation method	Ordinary Least Squares
Cleanup level	0
Source of cleanup level	0
Is the trend decreasing or statistically insignificant?	**Yes**

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Message: None.	

Groundwater Statistics Tool

Data input worksheet

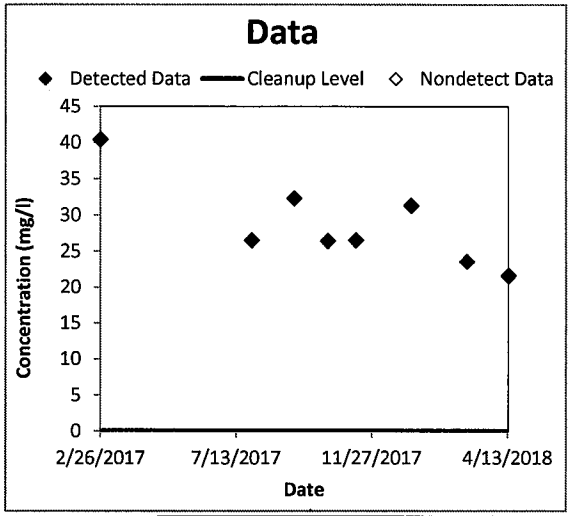
Site Name	Evans & Assoc
Operating Unit (OU)	Big Fork Ranch
Type of Evaluation	Attainment
Date of Evaluation	7/1/2018
Person performing analysis	AJH

Chemical of Concern	Sulfate
Well Name/Number	6A
Date Units	Date
Concentration Units	mg/l

Confidence Level Desired	95%
Cleanup Level	
Source of cleanup level (e.g. MCL or risk-based concentration)	
Risk of False Outlier Rejection	1%
Random Seed (may be left blank)	
Significant figures to use	3

Number of data points:	8
Number of detected results:	8
Number of nondetect results:	0
Detection frequency:	1

Date (Date)	Sulfate Concentration (mg/l)	Data Qualifier	Detected? (Yes or No)
2/26/2017	40.45		Yes
7/29/2017	26.5		Yes
9/10/2017	32.3		Yes
10/14/2017	26.4		Yes
11/11/2017	26.5		Yes
1/6/2018	31.3		Yes
3/3/2018	23.6		Yes
4/14/2018	21.6		Yes



Axis Values			
Time		Concentration	
Min	Max	Min	Max
Auto	Auto	Auto	Auto

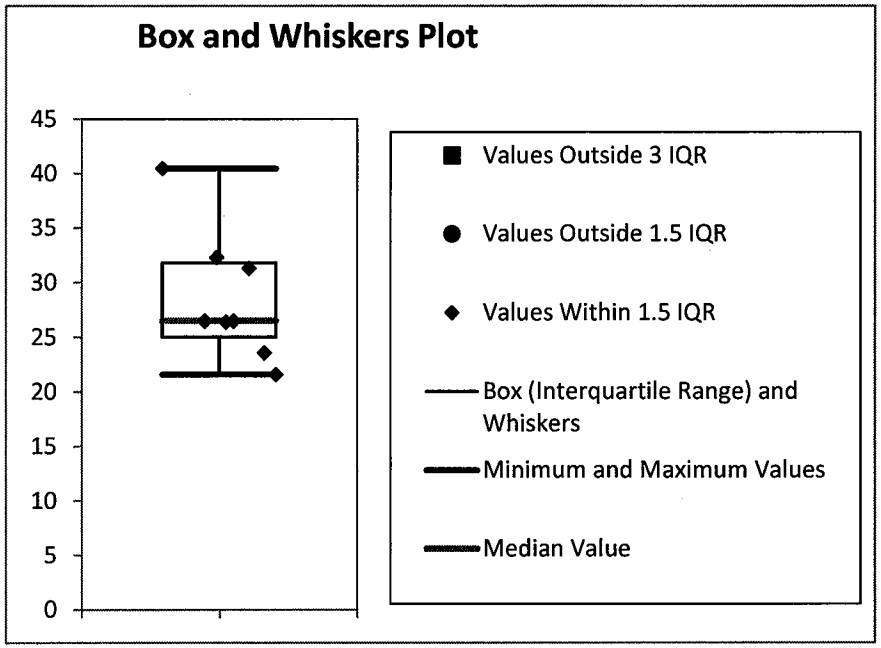
Reset Concentration Axis

Data Review		Recommendations
Are all necessary data fields entered, and in proper format?	Yes	None
Are at least 4 data points present for statistical analysis?	Yes	None
Are detection limits for nondetects ≤ maximum detected value?	Yes	None
Are all data within chart axis limits?	Yes	None

Groundwater Statistics Tool

Outlier testing worksheet

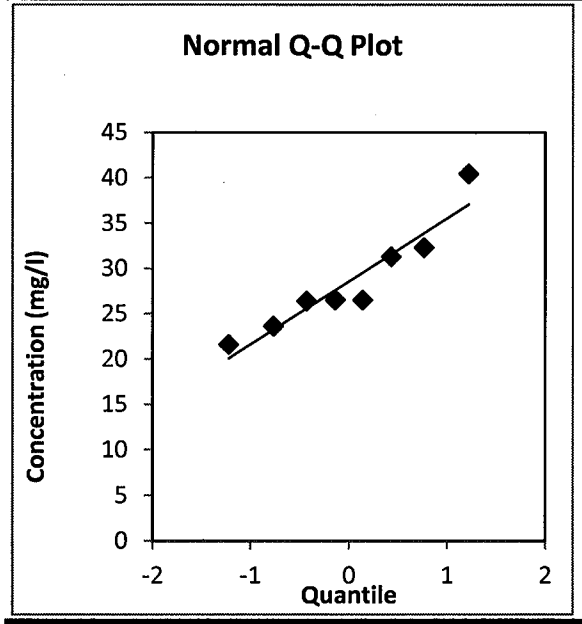
Dixon's Outlier Test Results		
Number of data points	8	
Risk of false rejection	1%	
Critical value	0.683	
Outlier type	**Low**	**High**
Test statistic	0.1869	0.4837
Potential Outlier?	No	No
Validity of Dixon'sTest	Valid	

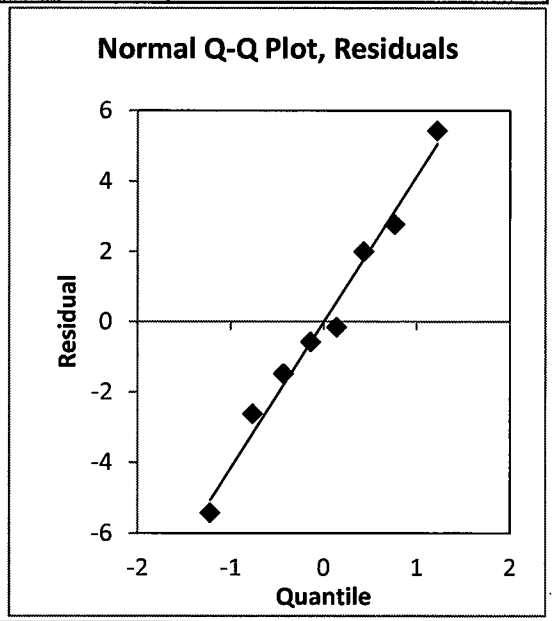


Groundwater Statistics Tool

Normality Testing Worksheet

Normality Test Results			
Parameter	**All Data**	**Minus Outliers**	**Residuals**
Number of data points	8	8	8
Shapiro-Wilk alpha value	10%	N/A	10%
Slope	6.968323034	N/A	4.15214233
Intercept	28.58125	N/A	1.02585E-13
Correlation, R	0.942841856	N/A	0.991137039
Exact Test Value	0.905177873	N/A	0.9912478
Critical Value	0.851	N/A	0.851
Conclude sample distribution:	Appears normal	N/A	Appears normal





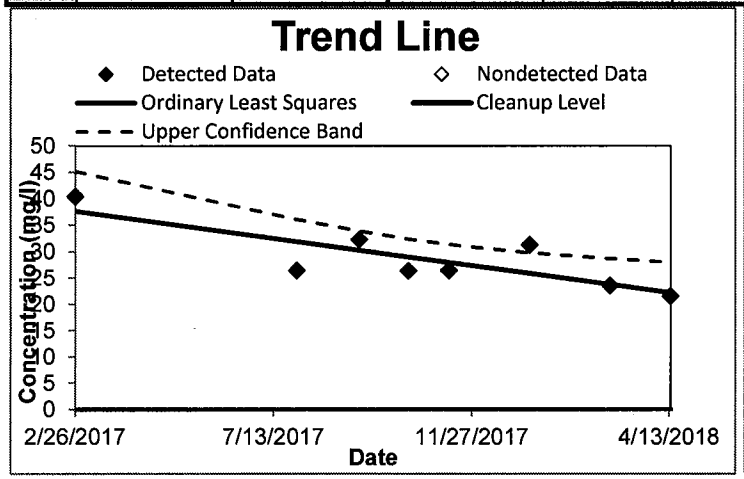
Previous Step: Outliers Screen | Next Step: Trend Screen | Skip Step: UCL Screen

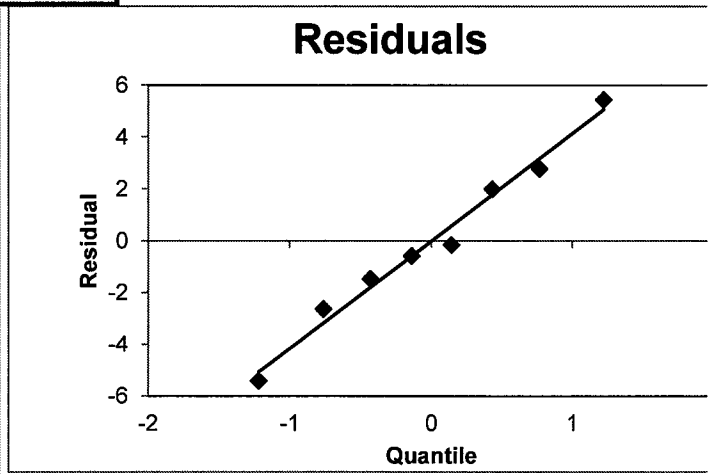
Groundwater Statistics Tool

Trend test results for datasets with normally distributed residuals (with our without transformation)

i	t (Date)	C (mg/l)	C' Predicted	Fit residual	Upper Confidence Band
1	2/26/2017	40.45	37.7	2.75	45.2
2	7/29/2017	26.5	31.9	-5.4	36.1
3	9/10/2017	32.3	30.3	2	33.9
4	10/14/2017	26.4	29	-2.6	32.4
5	11/11/2017	26.5	28	-1.5	31.4
6	1/6/2018	31.3	25.9	5.4	29.8
7	3/3/2018	23.6	23.8	-0.2	28.7
8	4/14/2018	21.6	22.2	-0.6	28
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Ordinary Least Squares	
Slope	-0.037615604
Intercept	1647.317037
Correlation, R^2	0.6787
Test Result	Decreasing
Test Statistic	-3.560
Critical Value	1.943
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing





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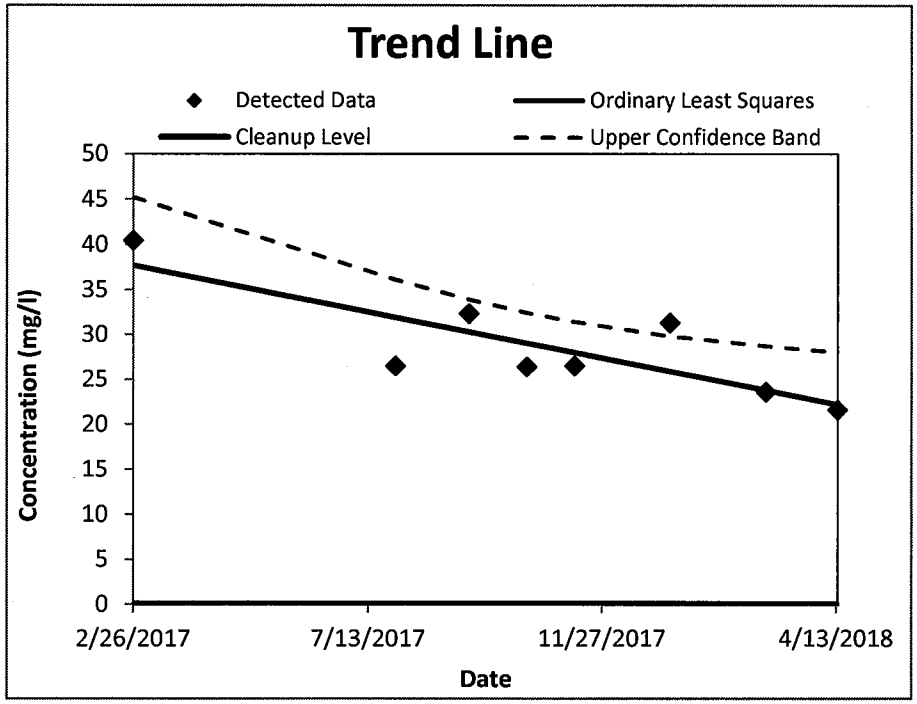
Groundwater Statistics Tool

UCL calculations and summary statistics for data sets that are normally distributed

Site Name	Evans & Assoc
Operating Unit (OU)	Big Fork Ranch
Type of Evaluation	Attainment
Date of Evaluation	7/1/2018
Person performing analysis	AJH

Chemical of Concern	Sulfate
Well Name/Number	6A
Date Units	Date
Concentration Units	mg/l

Confidence Level	95%
Number of results	8
Number < cleanup level	0
Are any potential outliers present?	No
Mean of concentration	28.6
Standard deviation of concentration	5.96
t-value for UCL calculation	1.895



95% Upper Confidence Limit (UCL)	32.6
Method for calculating UCL	Student's t UCL
Value of 95% Upper Confidence Band value at final sampling event	28
Trend calculation method	Ordinary Least Squares
Cleanup level	0
Source of cleanup level	0
Is the trend decreasing or statistically insignificant?	**Yes**

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Message: None.	

GWMP #8A

Groundwater Results Statistical Analyses

Groundwater Statistics Tool

Data input worksheet

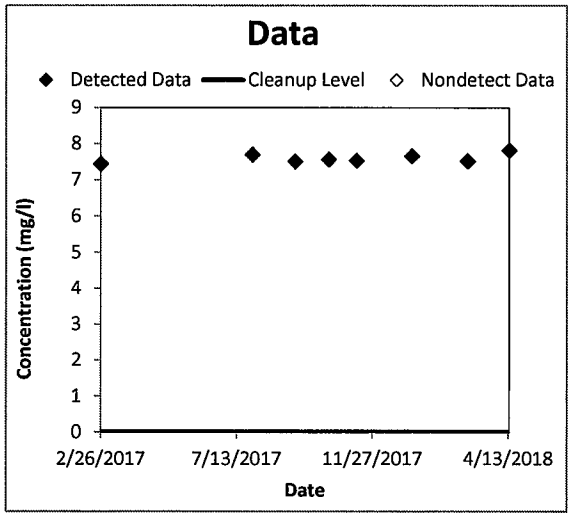
Site Name	Big Fork Ranch
Operating Unit (OU)	Big Fork Ranch
Type of Evaluation	Attainment
Date of Evaluation	7/1/2018
Person performing analysis	AJH

Chemical of Concern	pH
Well Name/Number	8A
Date Units	Date
Concentration Units	su

Confidence Level Desired	95%
Cleanup Level	
Source of cleanup level (e.g. MCL or risk-based concentration)	
Risk of False Outlier Rejection	1%
Random Seed (may be left blank)	
Significant figures to use	3

Number of data points:	8
Number of detected results:	8
Number of nondetect results:	0
Detection frequency:	1

Date (Date)	pH Concentration (su)	Data Qualifier	Detected? (Yes or No)
2/26/2017	7.44		Yes
7/29/2017	7.7		Yes
9/10/2017	7.51		Yes
10/14/2017	7.57		Yes
11/11/2017	7.53		Yes
1/6/2018	7.66		Yes
3/3/2018	7.52		Yes
4/14/2018	7.81		Yes



Axis Values			
Time		Concentration	
Min	Max	Min	Max
Auto	Auto	Auto	Auto

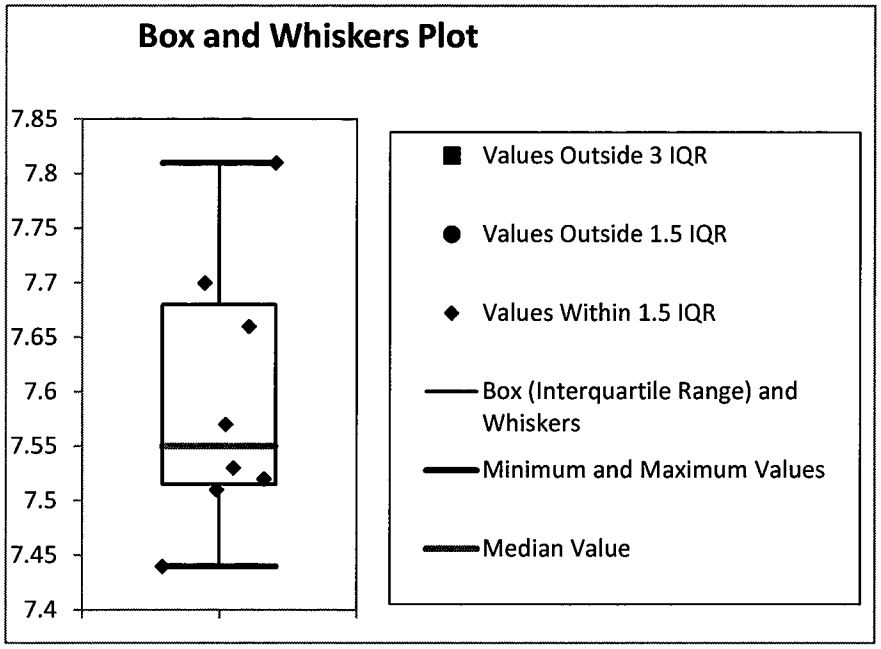
Reset Concentration Axis

Data Review		Recommendations
Are all necessary data fields entered, and in proper format?	Yes	None
Are at least 4 data points present for statistical analysis?	Yes	None
Are detection limits for nondetects ≤ maximum detected value?	Yes	None
Are all data within chart axis limits?	Yes	None

Groundwater Statistics Tool

Outlier testing worksheet

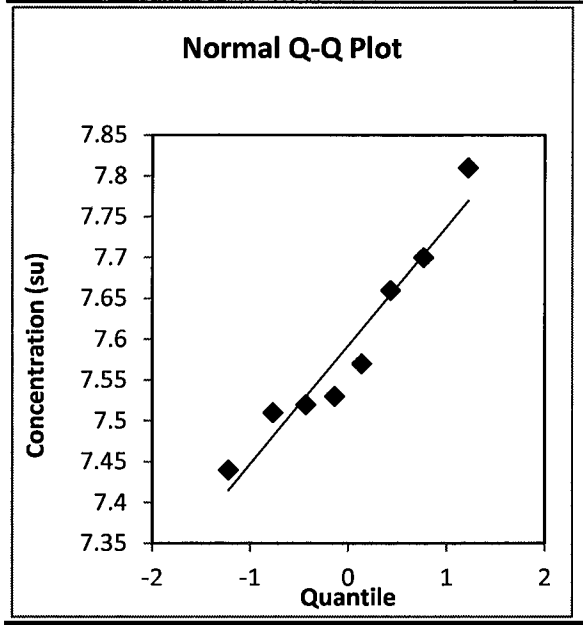
Dixon's Outlier Test Results		
Number of data points	8	
Risk of false rejection	1%	
Critical value	0.683	
Outlier type	**Low**	**High**
Test statistic	0.2692	0.3667
Potential Outlier?	No	No
Validity of Dixon'sTest	Valid	

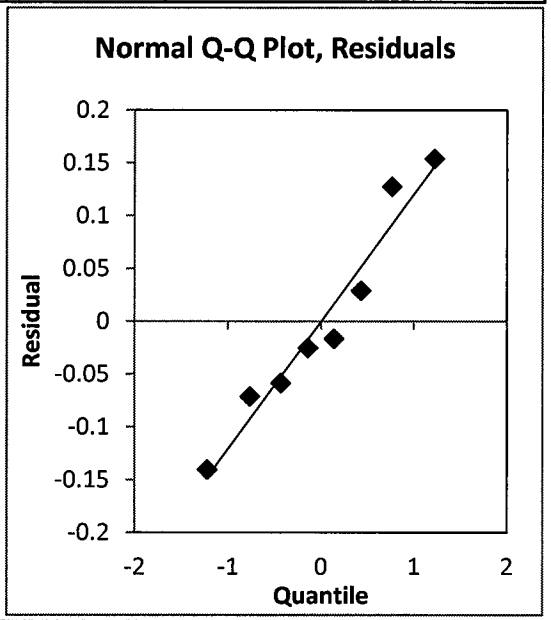


Groundwater Statistics Tool

Normality Testing Worksheet

Normality Test Results			
Parameter	**All Data**	**Minus Outliers**	**Residuals**
Number of data points	8	8	8
Shapiro-Wilk alpha value	10%	N/A	10%
Slope	0.145369173	N/A	0.120715946
Intercept	7.5925	N/A	1.11022E-15
Correlation, R	0.966495867	N/A	0.974458345
Exact Test Value	0.93578081	N/A	0.942884758
Critical Value	0.851	N/A	0.851
Conclude sample distribution:	Appears normal	N/A	Appears normal





Previous Step: Outliers Screen | Next Step: Trend Screen | Skip Step: UCL Screen

Groundwater Statistics Tool

Trend test results for datasets with normally distributed residuals (with our without transformation)

i	t (Date)	C (su)	C Predicted	Fit residual	Upper Confidence Band
1	2/26/2017	7.44	7.47	-0.03	7.69
2	7/29/2017	7.7	7.55	0.15	7.67
3	9/10/2017	7.51	7.57	-0.06	7.68
4	10/14/2017	7.57	7.59	-0.02	7.69
5	11/11/2017	7.53	7.6	-0.07	7.7
6	1/6/2018	7.66	7.63	0.03	7.75
7	3/3/2018	7.52	7.66	-0.14	7.81
8	4/14/2018	7.81	7.68	0.13	7.85
9					
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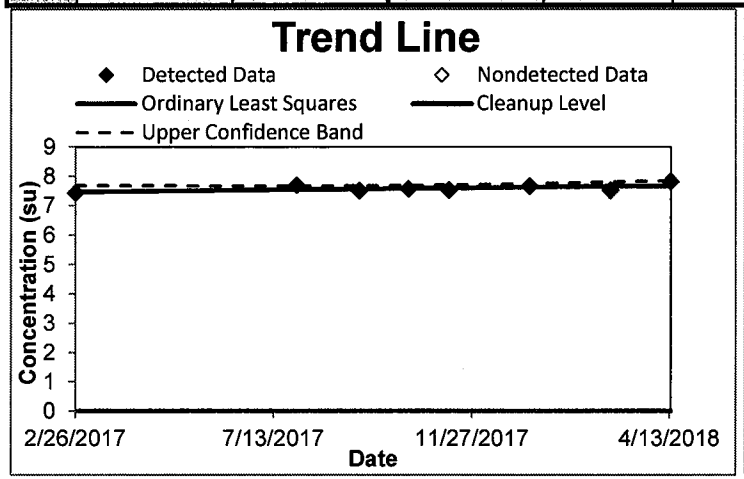
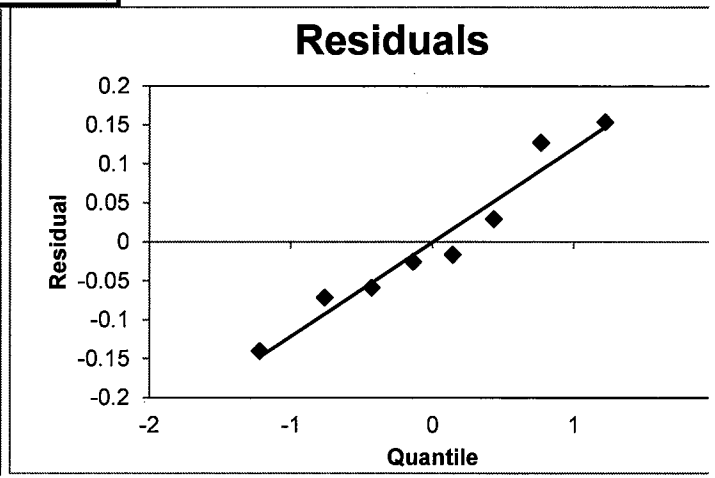
19					
20					

Ordinary Least Squares	
Slope	0.000526983
Intercept	-15.08547469
Correlation, R^2	0.3216
Test Result	No trend
Test Statistic	1.687
Critical Value	1.943
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing





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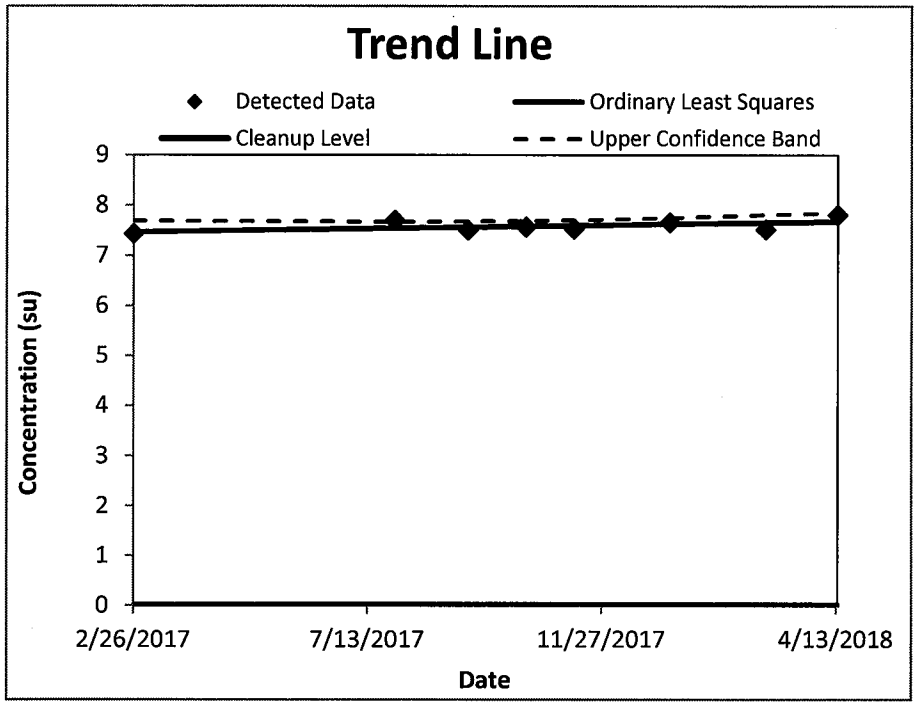
Groundwater Statistics Tool

UCL calculations and summary statistics for data sets that are normally distributed

Site Name	Big Fork Ranch
Operating Unit (OU)	Big Fork Ranch
Type of Evaluation	Attainment
Date of Evaluation	7/1/2018
Person performing analysis	AJH

Chemical of Concern	pH
Well Name/Number	8A
Date Units	Date
Concentration Units	su

Confidence Level	95%
Number of results	8
Number < cleanup level	0
Are any potential outliers present?	No
Mean of concentration	7.59
Standard deviation of concentration	0.121
t-value for UCL calculation	1.895



95% Upper Confidence Limit (UCL)	7.67
Method for calculating UCL	Student's t UCL
Value of 95% Upper Confidence Band value at final sampling event	7.85
Trend calculation method	Ordinary Least Squares
Cleanup level	0
Source of cleanup level	0
Is the trend decreasing or statistically insignificant?	**Yes**

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Message: None.	

Groundwater Statistics Tool

Data input worksheet

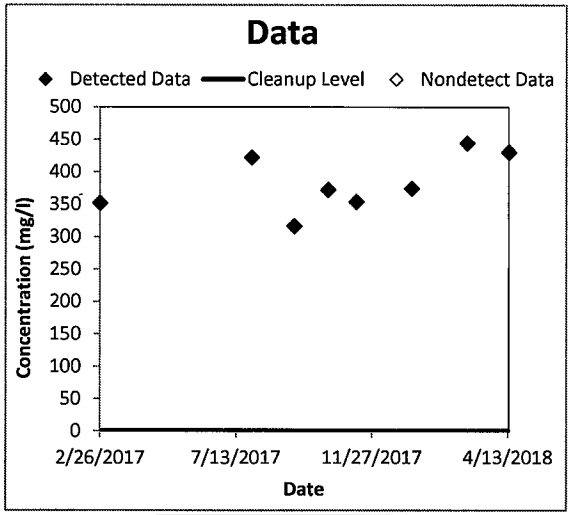
Site Name	Big Fork Ranch
Operating Unit (OU)	Big Fork Ranch
Type of Evaluation	Attainment
Date of Evaluation	7/1/2018
Person performing analysis	AJH

Chemical of Concern	TDS
Well Name/Number	8A
Date Units	Date
Concentration Units	mg/l

Confidence Level Desired	95%
Cleanup Level	
Source of cleanup level (e.g. MCL or risk-based concentration)	
Risk of False Outlier Rejection	1%
Random Seed (may be left blank)	
Significant figures to use	3

Number of data points	8
Number of detected results	8
Number of nondetect results	0
Detection frequency	1

Date (Date)	TDS Concentration (mg/l)	Data Qualifier	Detected? (Yes or No)
2/26/2017	352		Yes
7/29/2017	422		Yes
9/10/2017	316		Yes
10/14/2017	372		Yes
11/11/2017	354		Yes
1/6/2018	374		Yes
3/3/2018	444		Yes
4/14/2018	430		Yes



Axis Values			
Time		Concentration	
Min	Max	Min	Max
Auto	Auto	Auto	Auto

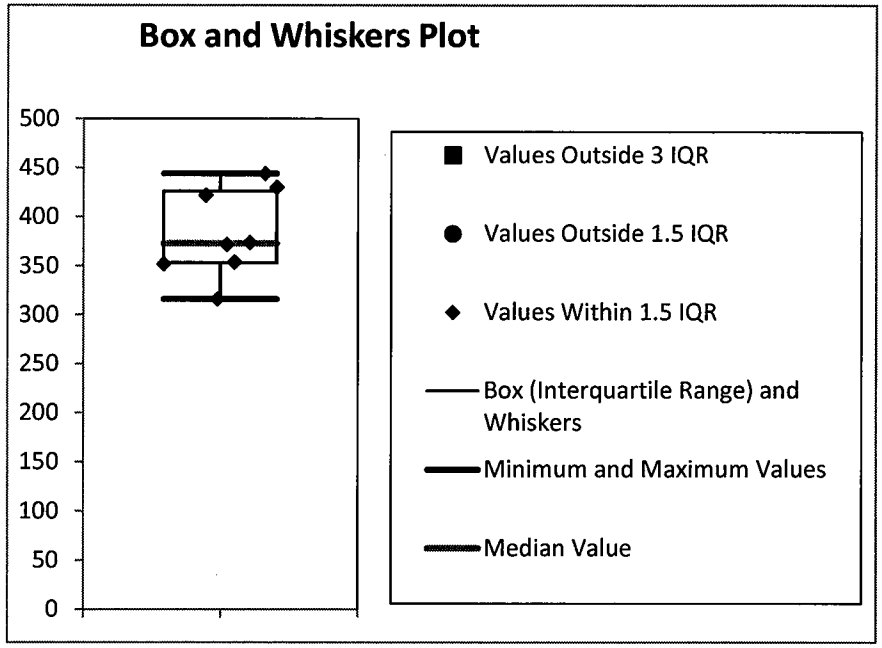
Reset Concentration Axis

Data Review		Recommendations
Are all necessary data fields entered, and in proper format?	Yes	None
Are at least 4 data points present for statistical analysis?	Yes	None
Are detection limits for nondetects ≤ maximum detected value?	Yes	None
Are all data within chart axis limits?	Yes	None

Groundwater Statistics Tool

Outlier testing worksheet

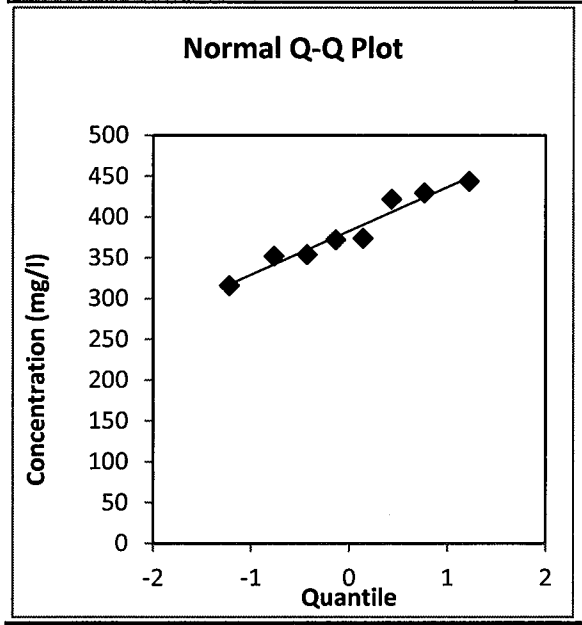
Dixon's Outlier Test Results		
Number of data points	8	
Risk of false rejection	1%	
Critical value	0.683	
Outlier type	**Low**	**High**
Test statistic	0.3158	0.1522
Potential Outlier?	No	No
Validity of Dixon'sTest	Valid	

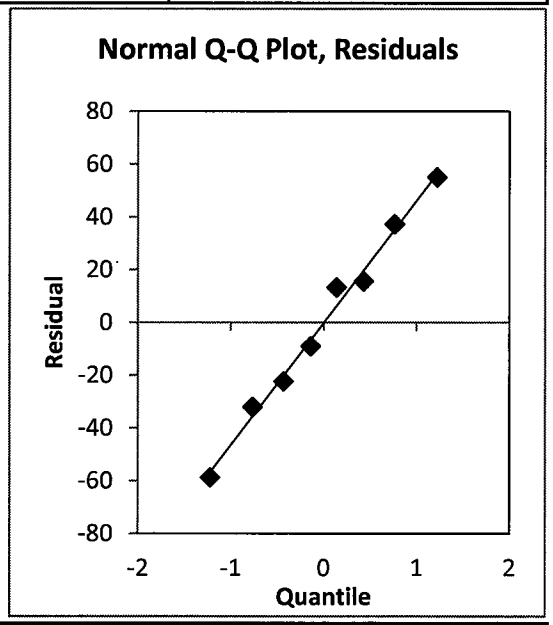


Groundwater Statistics Tool

Normality Testing Worksheet

Normality Test Results			
Parameter	**All Data**	**Minus Outliers**	**Residuals**
Number of data points	8	8	8
Shapiro-Wilk alpha value	10%	N/A	10%
Slope	53.83354035	N/A	46.40802749
Intercept	383	N/A	1.13687E-13
Correlation, R	0.973467716	N/A	0.995042714
Exact Test Value	0.93380344	N/A	0.983628636
Critical Value	0.851	N/A	0.851
Conclude sample distribution:	Appears normal	N/A	Appears normal





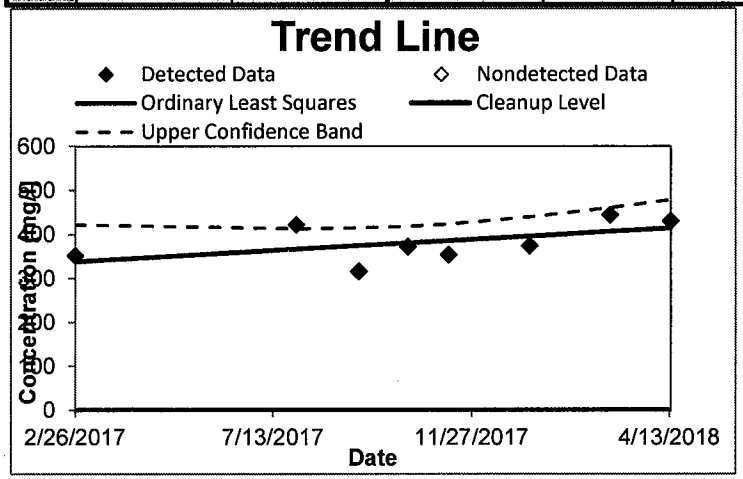
Previous Step: Outliers Screen | Next Step: Trend Screen | Skip Step: UCL Screen

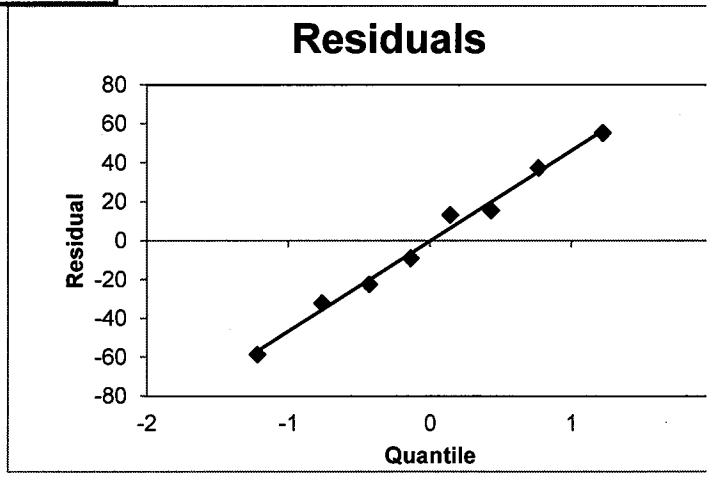
Groundwater Statistics Tool

Trend test results for datasets with normally distributed residuals (with our without transformation)

	t (Date)	C (mg/l)	C Predicted	Fit residual	Upper Confidence Band
1	2/26/2017	352	339	13	422
2	7/29/2017	422	367	55	413
3	9/10/2017	316	375	-59	415
4	10/14/2017	372	381	-9	419
5	11/11/2017	354	386	-32	424
6	1/6/2018	374	396	-22	440
7	3/3/2018	444	407	37	461
8	4/14/2018	430	414	16	479
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Ordinary Least Squares	
Slope	0.183572362
Intercept	-7516.784188
Correlation, R^2	0.2887
Test Result	No trend
Test Statistic	1.561
Critical Value	1.943
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing





Draft version - Do not distrubute

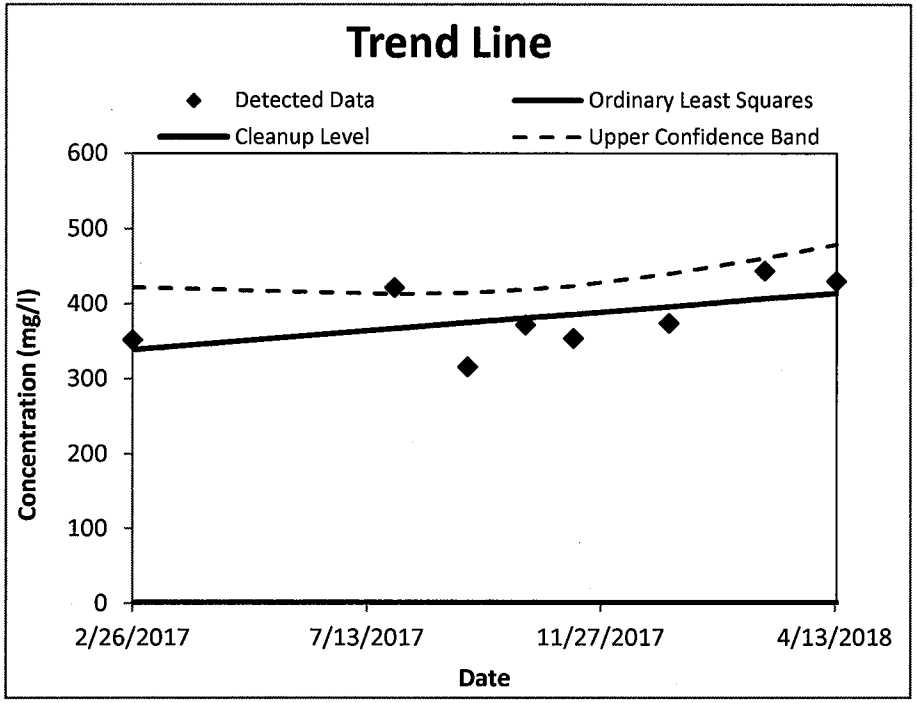
Groundwater Statistics Tool

UCL calculations and summary statistics for data sets that are normally distributed

Site Name	Big Fork Ranch
Operating Unit (OU)	Big Fork Ranch
Type of Evaluation	Attainment
Date of Evaluation	7/1/2018
Person performing analysis	AJH

Chemical of Concern	TDS
Well Name/Number	8A
Date Units	Date
Concentration Units	mg/l

Confidence Level	95%
Number of results	8
Number < cleanup level	0
Are any potential outliers present?	No
Mean of concentration	383
Standard deviation of concentration	44.6
t-value for UCL calculation	1.895



95% Upper Confidence Limit (UCL)	413
Method for calculating UCL	Student's t UCL
Value of 95% Upper Confidence Band value at final sampling event	479
Trend calculation method	Ordinary Least Squares
Cleanup level	0
Source of cleanup level	0
Is the trend decreasing or statistically insignificant?	**Yes**

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Message: None.	

Groundwater Statistics Tool

Data input worksheet

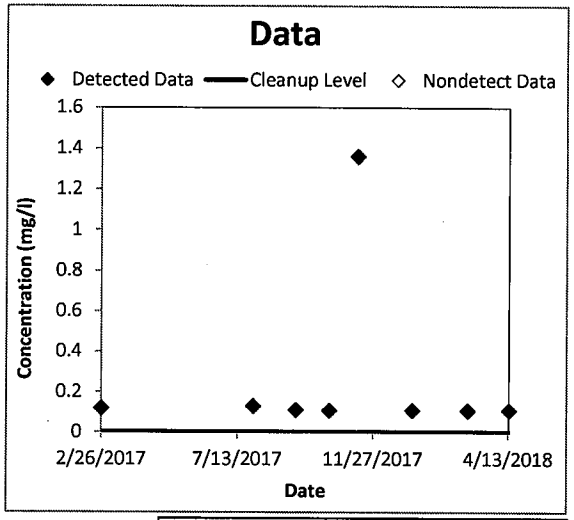
Site Name	Big Fork Ranch
Operating Unit (OU)	Big Fork Ranch
Type of Evaluation	Attainment
Date of Evaluation	7/1/2018
Person performing analysis	AJH

Chemical of Concern	Boron
Well Name/Number	8A
Date Units	Date
Concentration Units	mg/l

Confidence Level Desired	95%
Cleanup Level	
Source of cleanup level (e.g. MCL or risk-based concentration)	
Risk of False Outlier Rejection	1%
Random Seed (may be left blank)	
Significant figures to use	3

Number of data points	8
Number of detected results	8
Number of nondetect results	0
Detection frequency	1

Date (Date)	Boron Concentration (mg/l)	Data Qualifier	Detected? (Yes or No)
2/26/2017	0.12		Yes
7/29/2017	0.13		Yes
9/10/2017	0.111		Yes
10/14/2017	0.108		Yes
11/11/2017	1.36		Yes
1/6/2018	0.11		Yes
3/3/2018	0.107		Yes
4/14/2018	0.108		Yes



Axis Values			
Time		Concentration	
Min	Max	Min	Max
Auto	Auto	Auto	Auto

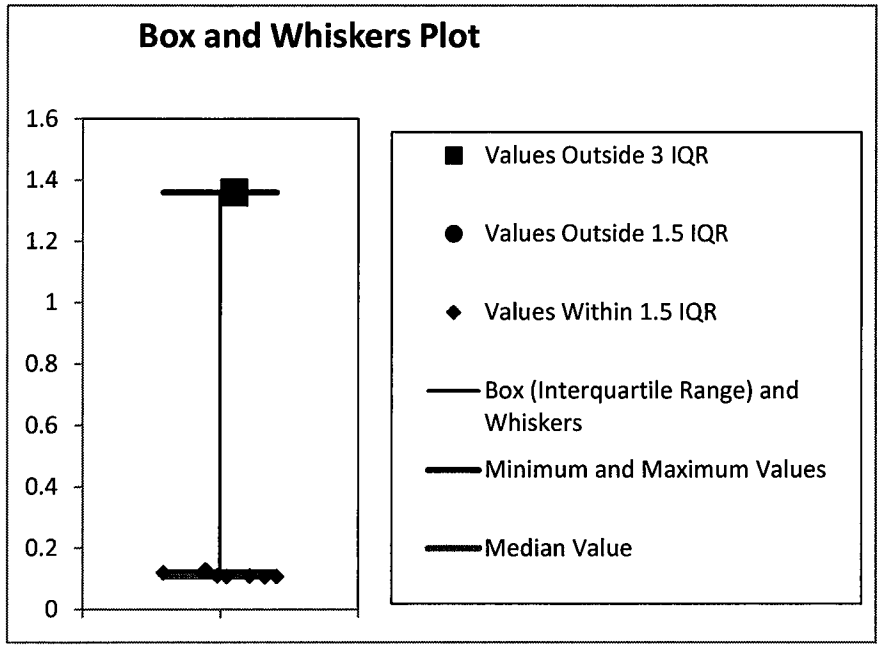
Reset Concentration Axis

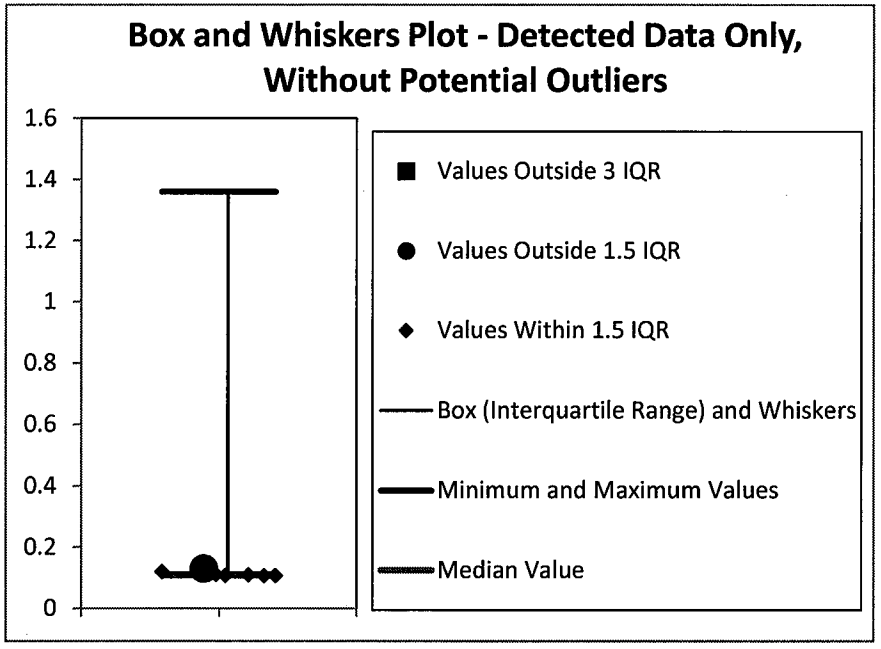
Data Review		Recommendations
Are all necessary data fields entered, and in proper format?	Yes	None
Are at least 4 data points present for statistical analysis?	Yes	None
Are detection limits for nondetects ≤ maximum detected value?	Yes	None
Are all data within chart axis limits?	Yes	None

Groundwater Statistics Tool

Outlier testing worksheet

Dixon's Outlier Test Results		
Number of data points	8	
Risk of false rejection	1%	
Critical value	0.683	
Outlier type	**Low**	**High**
Test statistic	0.0435	0.9824
Potential Outlier?	No	Yes
Validity of Dixon'sTest	Not Valid - data do not appear normal after removal of outlier.	

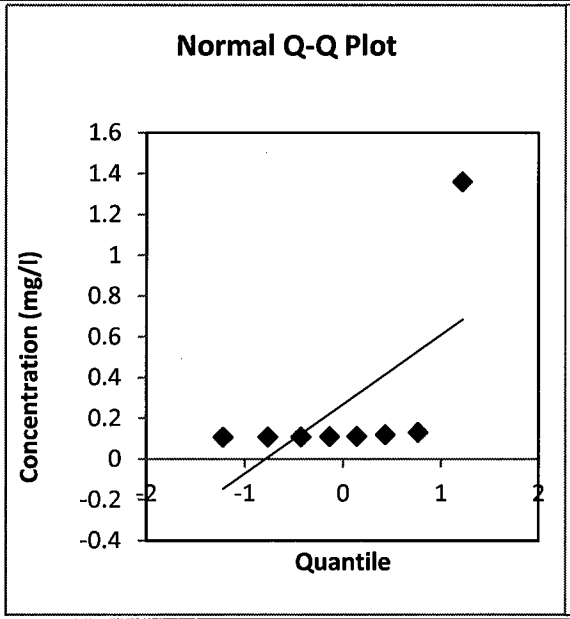


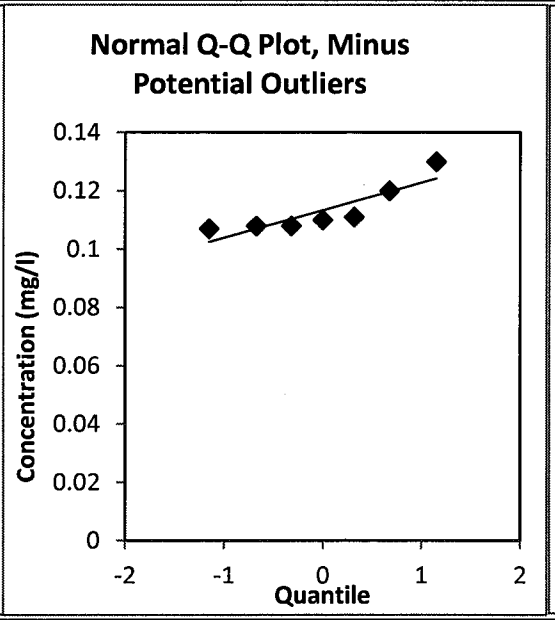


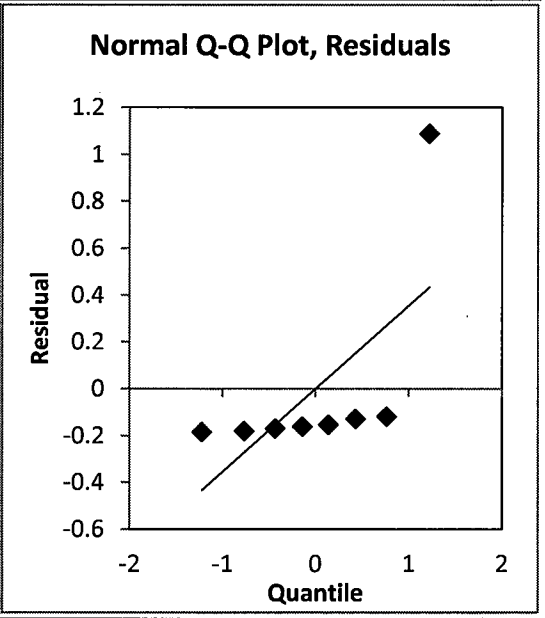
Groundwater Statistics Tool

Normality Testing Worksheet

Normality Test Results			
Parameter	**All Data**	**Minus Outliers**	**Residuals**
Number of data points	8	7	8
Shapiro-Wilk alpha value	10%	10%	10%
Slope	0.340293465	0.009444722	0.354873508
Intercept	0.26925	0.113428571	-9.71445E-16
Correlation, R	0.623053211	0.877315401	0.65023108
Exact Test Value	0.433001429	0.776465621	0.467374557
Critical Value	0.851	0.838	0.851
Conclude sample distribution:	Does not appear normal	Does not appear normal	Does not appear normal







Previous Step: Outliers Screen | Next Step: Trend Screen | Skip Step: UCL Screen

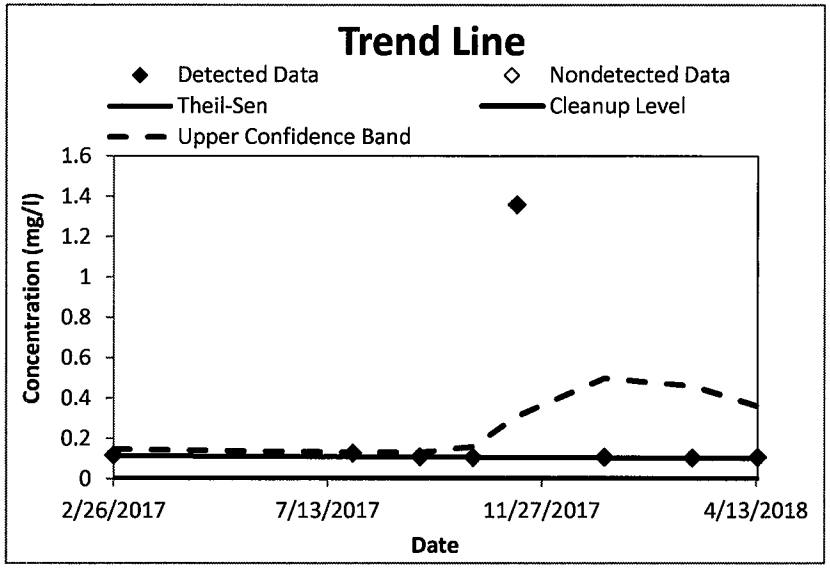
Groundwater Statistics Tool

Trend test results for datasets nonparametrically distributed residuals

i	t (Date)	C (mg/l)	C Predicted	Residual	Upper Confidence Band
1	2/26/2017	0.12	0.115	0.005	0.147
2	7/29/2017	0.13	0.11	0.02	0.132
3	9/10/2017	0.111	0.109	0.002	0.131
4	10/14/2017	0.108	0.108	0	0.16
5	11/11/2017	1.36	0.107	1.253	0.311
6	1/6/2018	0.11	0.105	0.005	0.499
7	3/3/2018	0.107	0.104	0.003	0.461
8	4/14/2018	0.108	0.102	0.006	0.361
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Mann-Kendall	
Test Result	No trend
Test Statistic (S)	-13
Normalized S	-1.496
Critical Value	1.645

Theil-Sen	
Slope	-0.0000305
Intercept	1.42
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing



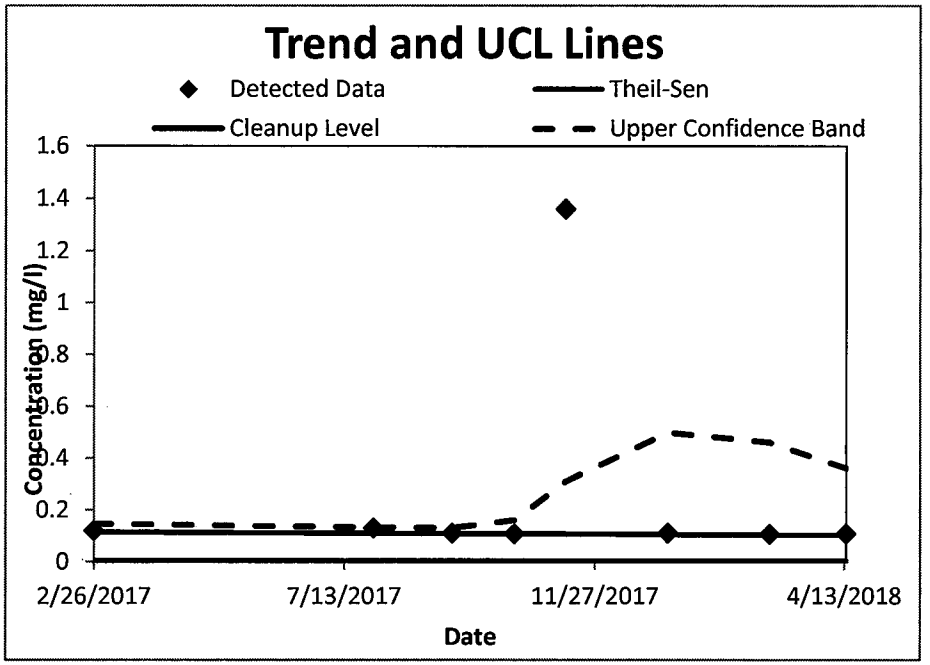
Groundwater Statistics Tool

UCL calculations and summary statistics for nonparametric data sets

Site Name	Big Fork Ranch
Operating Unit (OU)	Big Fork Ranch
Type of Evaluation	Attainment
Date of Evaluation	7/1/2018
Person performing analysis	AJH

Chemical of Concern	Boron
Well Name/Number	8A
Date Units	Date
Concentration Units	mg/l

Confidence Level	95%
Number of results	8
Number < cleanup level	0
Are any potential outliers present?	Yes
Mean of concentration	0.269
Standard deviation of concentration	0.441



95% Upper Confidence Limit (UCL)	0.95
Method for calculating UCL	Chebyshev UCL
Value of 95% Upper Confidence Band value at final sampling event	0.361
Trend calculation method	Theil-Sen/Mann-Kendall
Cleanup level	0
Source of cleanup level	0
Is the trend decreasing or statistically insignificant?	**Yes**

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Random Seed Used	58721.31641
Message: None.	

Groundwater Statistics Tool

Data input worksheet

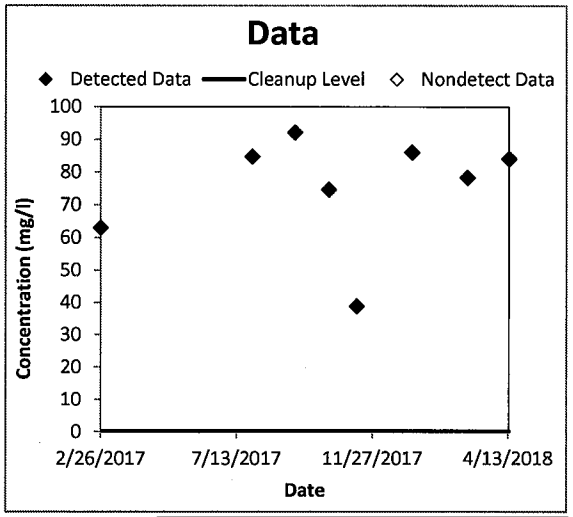
Site Name	Big Fork Ranch
Operating Unit (OU)	Big Fork Ranch
Type of Evaluation	Attainment
Date of Evaluation	7/1/2018
Person performing analysis	AJH

Chemical of Concern	Calcium
Well Name/Number	8A
Date Units	Date
Concentration Units	mg/l

Confidence Level Desired	95%
Cleanup Level	
Source of cleanup level (e.g. MCL or risk-based concentration)	
Risk of False Outlier Rejection	1%
Random Seed (may be left blank)	
Significant figures to use	3

Number of data points:	8
Number of detected results:	8
Number of nondetect results:	0
Detection frequency:	1

Date (Date)	Calcium Concentration (mg/l)	Data Qualifier	Detected? (Yes or No)
2/26/2017	63		Yes
7/29/2017	84.8		Yes
9/10/2017	92.1		Yes
10/14/2017	74.7		Yes
11/11/2017	38.9		Yes
1/6/2018	86		Yes
3/3/2018	78.3		Yes
4/14/2018	84.1		Yes



Axis Values			
Time		Concentration	
Min	Max	Min	Max
Auto	Auto	Auto	Auto

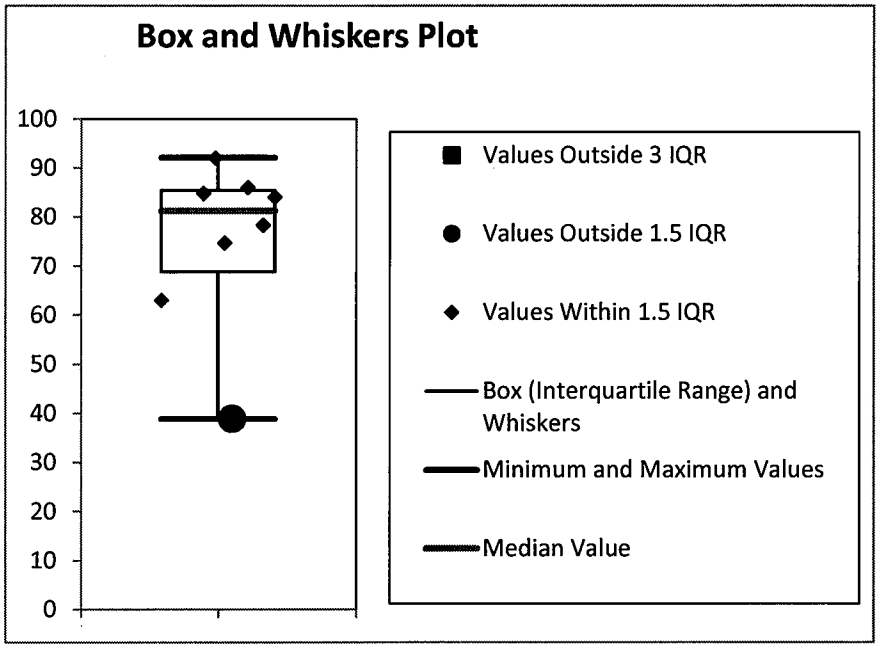
Reset Concentration Axis

Data Review		Recommendations
Are all necessary data fields entered, and in proper format?	Yes	None
Are at least 4 data points present for statistical analysis?	Yes	None
Are detection limits for nondetects ≤ maximum detected value?	Yes	None
Are all data within chart axis limits?	Yes	None

Groundwater Statistics Tool

Outlier testing worksheet

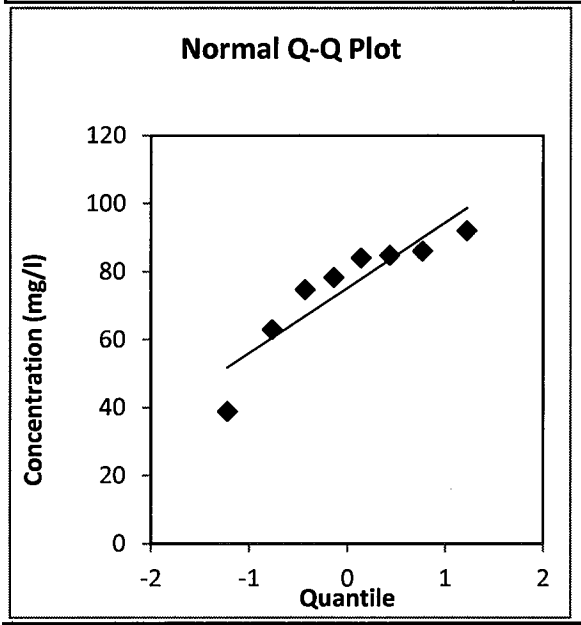
Dixon's Outlier Test Results		
Number of data points	8	
Risk of false rejection	1%	
Critical value	0.683	
Outlier type	**Low**	**High**
Test statistic	0.5117	0.2096
Potential Outlier?	No	No
Validity of Dixon'sTest	Valid	

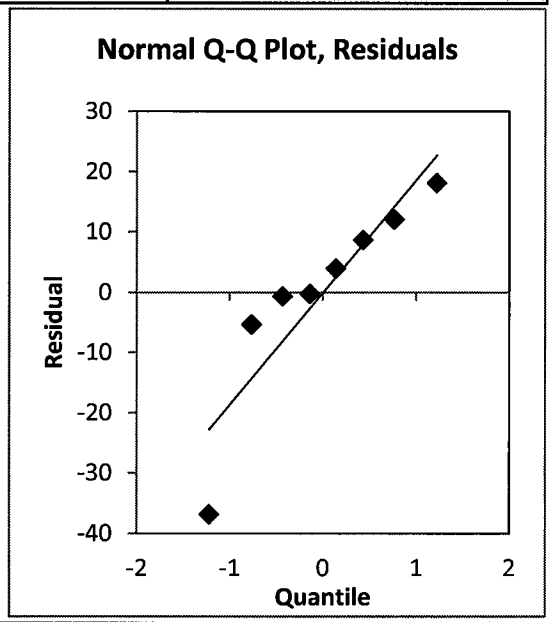


Groundwater Statistics Tool

Normality Testing Worksheet

Normality Test Results			
Parameter	**All Data**	**Minus Outliers**	**Residuals**
Number of data points	8	8	8
Shapiro-Wilk alpha value	10%	N/A	10%
Slope	19.23139932	N/A	18.64505488
Intercept	75.2375	N/A	-4.17444E-14
Correlation, R	0.906977233	N/A	0.901281589
Exact Test Value	0.842539298	N/A	0.846311038
Critical Value	0.851	N/A	0.851
Conclude sample distribution:	Does not appear normal	N/A	Does not appear normal





Previous Step: Outliers Screen | Next Step: Trend Screen | Skip Step: UCL Screen

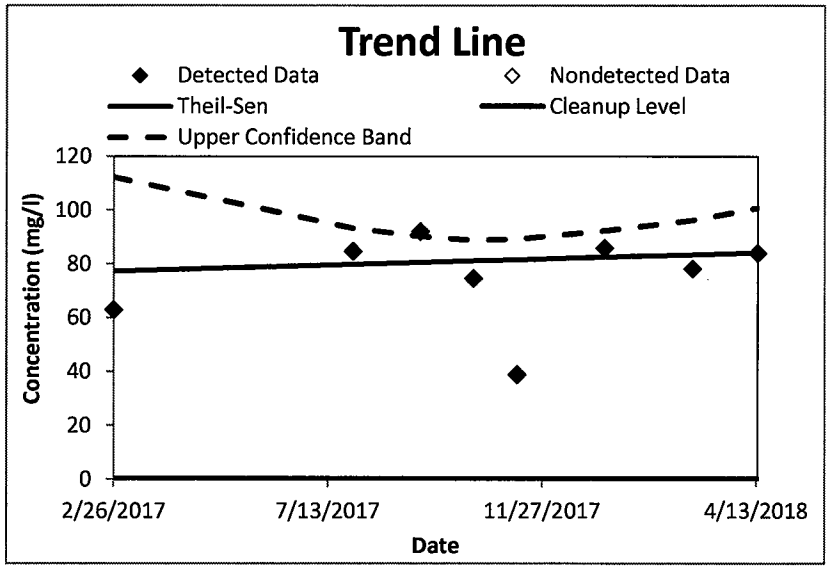
Groundwater Statistics Tool

Trend test results for datasets nonparametrically distributed residuals

	t (Date)	C (mg/l)	C Predicted	Residual	Upper Confidence Band
1	2/26/2017	63	77.3	-14.3	112
2	7/29/2017	84.8	79.9	4.9	93.4
3	9/10/2017	92.1	80.6	11.5	90.3
4	10/14/2017	74.7	81.2	-6.5	88.9
5	11/11/2017	38.9	81.6	-42.7	89.2
6	1/6/2018	86	82.6	3.4	92.3
7	3/3/2018	78.3	83.5	-5.2	96.3
8	4/14/2018	84.1	84.2	-0.1	101
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Mann-Kendall	
Test Result	No trend
Test Statistic (S)	2
Normalized S	0.124
Critical Value	1.645

Theil-Sen	
Slope	0.0166
Intercept	-633
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing



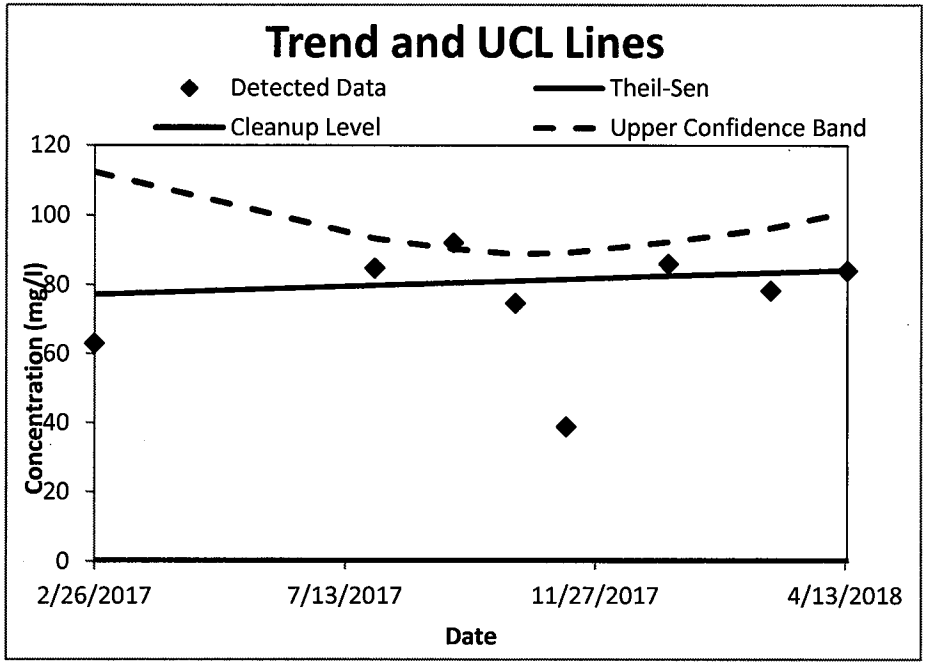
Groundwater Statistics Tool

UCL calculations and summary statistics for nonparametric data sets

Site Name	Big Fork Ranch
Operating Unit (OU)	Big Fork Ranch
Type of Evaluation	Attainment
Date of Evaluation	7/1/2018
Person performing analysis	AJH

Chemical of Concern	Calcium
Well Name/Number	8A
Date Units	Date
Concentration Units	mg/l

Confidence Level	95%
Number of results	8
Number < cleanup level	0
Are any potential outliers present?	No
Mean of concentration	75.2
Standard deviation of concentration	17.1



95% Upper Confidence Limit (UCL)	101.6
Method for calculating UCL	Chebyshev UCL
Value of 95% Upper Confidence Band value at final sampling event	101
Trend calculation method	Theil-Sen/Mann-Kendall
Cleanup level	0
Source of cleanup level	0
Is the trend decreasing or statistically insignificant?	**Yes**

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Random Seed Used	58999.96875
Message: None.	

Groundwater Statistics Tool

Data input worksheet

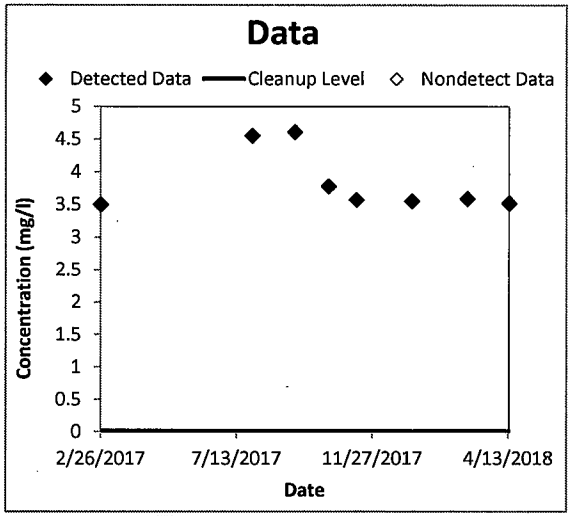
Site Name	Big Fork Ranch
Operating Unit (OU)	Big Fork Ranch
Type of Evaluation	Attainment
Date of Evaluation	7/1/2018
Person performing analysis	AJH

Chemical of Concern	Chloride
Well Name/Number	8A
Date Units	Date
Concentration Units	mg/l

Confidence Level Desired	95%
Cleanup Level	
Source of cleanup level (e.g. MCL or risk-based concentration)	
Risk of False Outlier Rejection	1%
Random Seed (may be left blank)	
Significant figures to use	3

Number of data points	8
Number of detected results	8
Number of nondetect results	0
Detection frequency	1

Date (Date)	Chloride Concentration (mg/l)	Data Qualifier	Detected? (Yes or No)
2/26/2017	3.5		Yes
7/29/2017	4.55		Yes
9/10/2017	4.61		Yes
10/14/2017	3.78		Yes
11/11/2017	3.57		Yes
1/6/2018	3.55		Yes
3/3/2018	3.59		Yes
4/14/2018	3.52		Yes



Axis Values			
Time		Concentration	
Min	Max	Min	Max
Auto	Auto	Auto	Auto

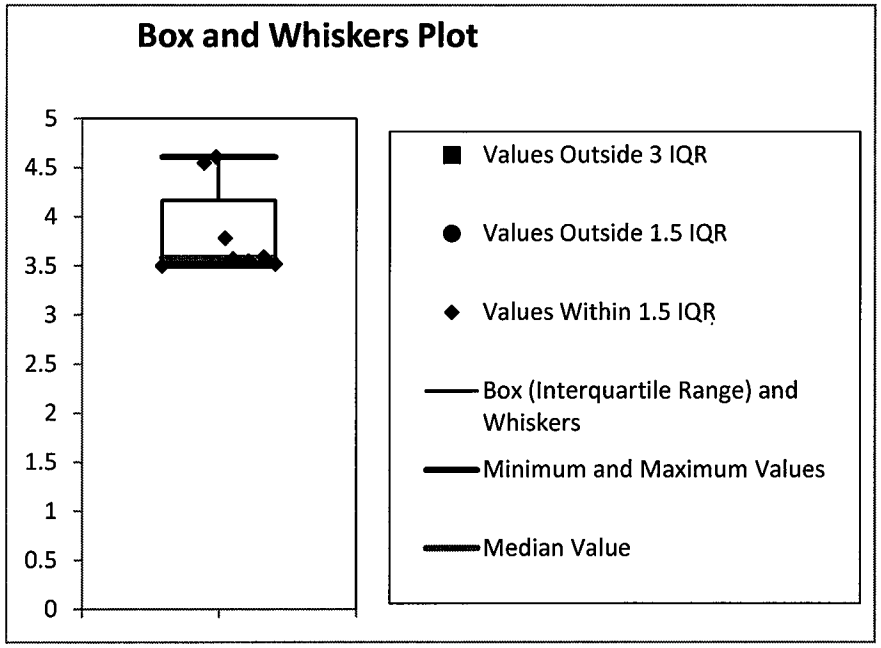
Reset Concentration Axis

Data Review		Recommendations
Are all necessary data fields entered, and in proper format?	Yes	None
Are at least 4 data points present for statistical analysis?	Yes	None
Are detection limits for nondetects ≤ maximum detected value?	Yes	None
Are all data within chart axis limits?	Yes	None

Groundwater Statistics Tool

Outlier testing worksheet

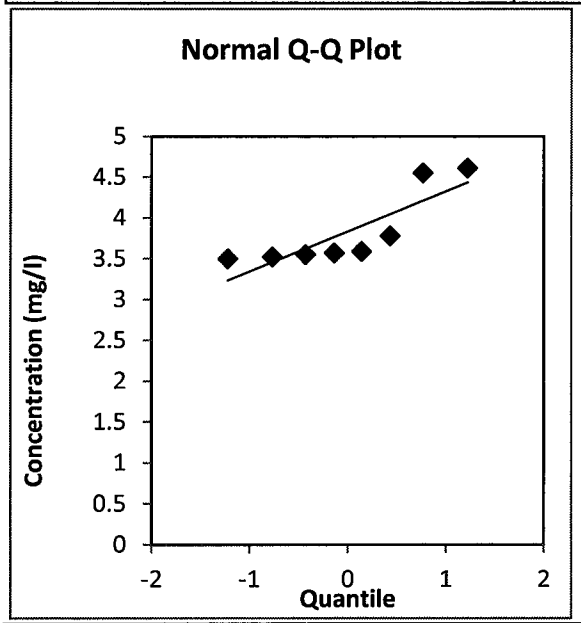
Dixon's Outlier Test Results		
Number of data points	8	
Risk of false rejection	1%	
Critical value	0.683	
Outlier type	**Low**	**High**
Test statistic	0.0190	0.0550
Potential Outlier?	No	No
Validity of Dixon'sTest	Valid	

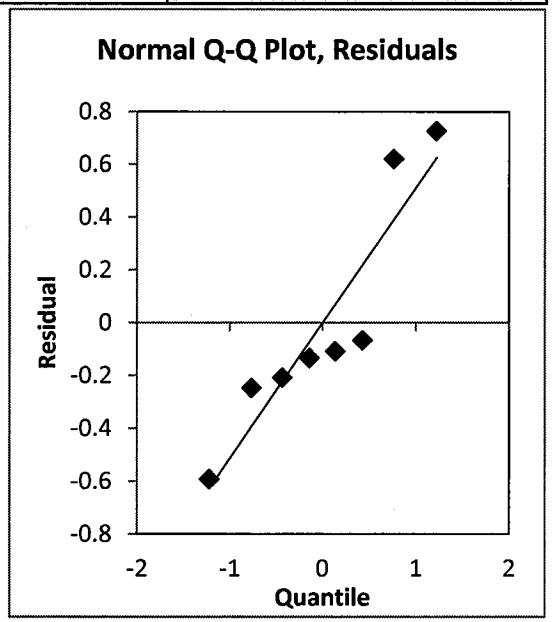


Groundwater Statistics Tool

Normality Testing Worksheet

Normality Test Results			
Parameter	**All Data**	**Minus Outliers**	**Residuals**
Number of data points	8	8	8
Shapiro-Wilk alpha value	10%	N/A	10%
Slope	0.492243693	N/A	0.512694336
Intercept	3.83375	N/A	6.10623E-16
Correlation, R	0.847606532	N/A	0.924488098
Exact Test Value	0.701827311	N/A	0.860838701
Critical Value	0.851	N/A	0.851
Conclude sample distribution:	Does not appear normal	N/A	Appears normal





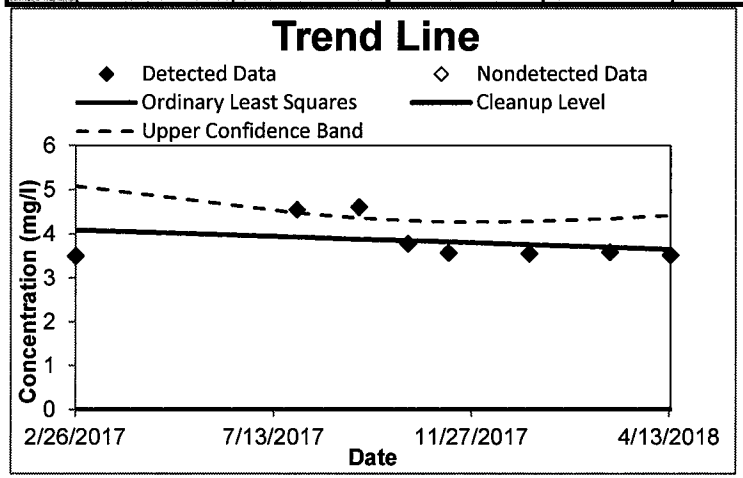
Previous Step: Outliers Screen | Next Step: Trend Screen | Skip Step: UCL Screen

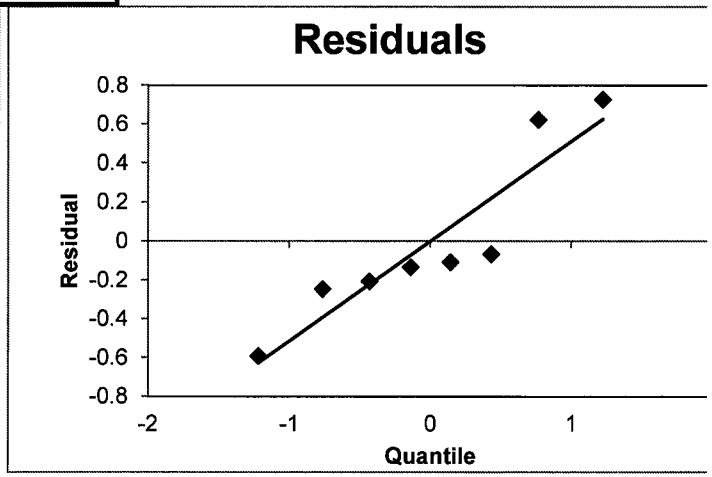
Groundwater Statistics Tool

Trend test results for datasets with normally distributed residuals (with our without transformation)

	t (Date)	C (mg/l)	C Predicted	Fit Residual	Upper Confidence Band
1	2/26/2017	3.5	4.09	-0.59	5.09
2	7/29/2017	4.55	3.93	0.62	4.48
3	9/10/2017	4.61	3.88	0.73	4.36
4	10/14/2017	3.78	3.85	-0.07	4.3
5	11/11/2017	3.57	3.82	-0.25	4.27
6	1/6/2018	3.55	3.76	-0.21	4.28
7	3/3/2018	3.59	3.7	-0.11	4.35
8	4/14/2018	3.52	3.65	-0.13	4.42
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Ordinary Least Squares	
Slope	-0.001064962
Intercept	49.66292639
Correlation, R^2	0.0881
Test Result	No trend
Test Statistic	-0.761
Critical Value	1.943
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing





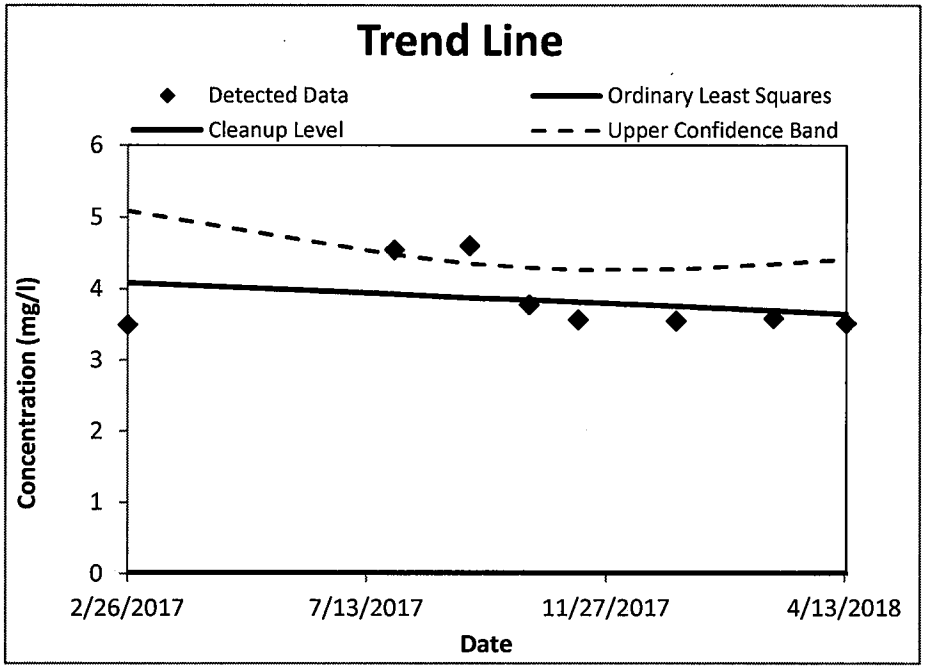
Groundwater Statistics Tool

UCL calculations and summary statistics for nonparametric data sets

Site Name	Big Fork Ranch
Operating Unit (OU)	Big Fork Ranch
Type of Evaluation	Attainment
Date of Evaluation	7/1/2018
Person performing analysis	AJH

Chemical of Concern	Chloride
Well Name/Number	8A
Date Units	Date
Concentration Units	mg/l

Confidence Level	95%
Number of results	8
Number < cleanup level	0
Are any potential outliers present?	No
Mean of concentration	3.83
Standard deviation of concentration	0.469



95% Upper Confidence Limit (UCL)	4.55
Method for calculating UCL	Chebyshev UCL
Value of 95% Upper Confidence Band at final sampling event	4.42
Trend calculation method	Ordinary Least Squares
Cleanup level	0
Source of cleanup level	0
Is the trend decreasing or statistically insignificant?	**Yes**

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Random Seed Used	0
Message: None.	

Groundwater Statistics Tool

Data input worksheet

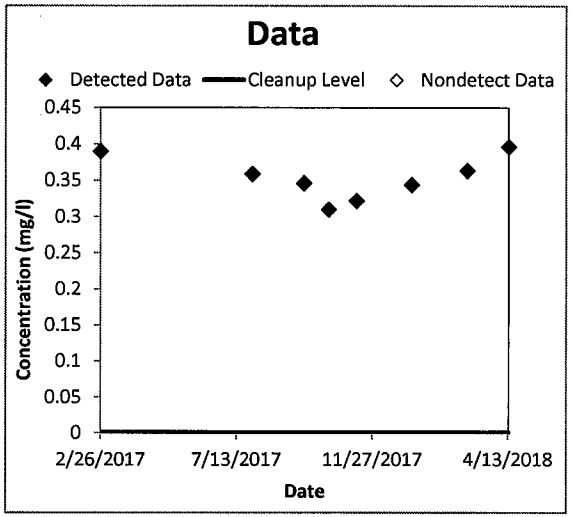
Site Name	Big Fork Ranch
Operating Unit (OU)	Big Fork Ranch
Type of Evaluation	Attainment
Date of Evaluation	7/1/2018
Person performing analysis	AJH

Chemical of Concern	Fluordie
Well Name/Number	8A
Date Units	Date
Concentration Units	mg/l

Confidence Level Desired	95%
Cleanup Level	
Source of cleanup level (e.g. MCL or risk-based concentration)	
Risk of False Outlier Rejection	1%
Random Seed (may be left blank)	
Significant figures to use	3

Number of data points	8
Number of detected results	8
Number of nondetect results	0
Detection frequency	1

Date (Date)	Fluordie Concentration (mg/l)	Data Qualifier	Detected? (Yes or No)
2/26/2017	0.39		Yes
7/29/2017	0.359		Yes
9/19/2017	0.346		Yes
10/14/2017	0.31		Yes
11/11/2017	0.322		Yes
1/6/2018	0.344		Yes
3/3/2018	0.363		Yes
4/14/2018	0.396		Yes



Axis Values			
Time		Concentration	
Min	Max	Min	Max
Auto	Auto	Auto	Auto

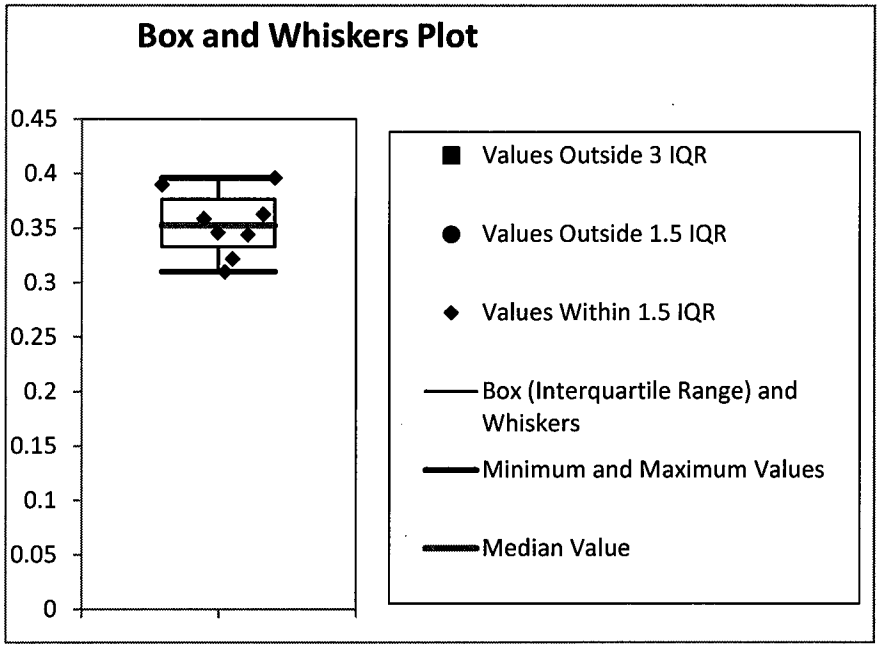
Reset Concentration Axis

Data Review		Recommendations
Are all necessary data fields entered, and in proper format?	Yes	None
Are at least 4 data points present for statistical analysis?	Yes	None
Are detection limits for nondetects ≤ maximum detected value?	Yes	None
Are all data within chart axis limits?	Yes	None

Groundwater Statistics Tool

Outlier testing worksheet

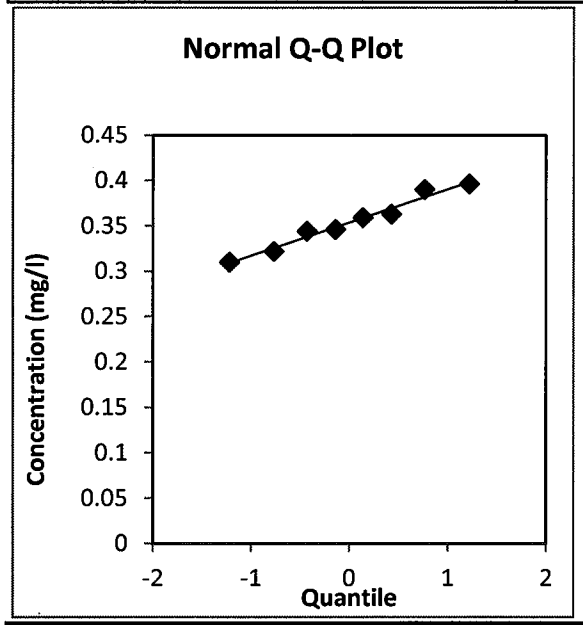
Dixon's Outlier Test Results		
Number of data points	8	
Risk of false rejection	1%	
Critical value	0.683	
Outlier type	**Low**	**High**
Test statistic	0.1500	0.0811
Potential Outlier?	No	No
Validity of Dixon'sTest	Valid	

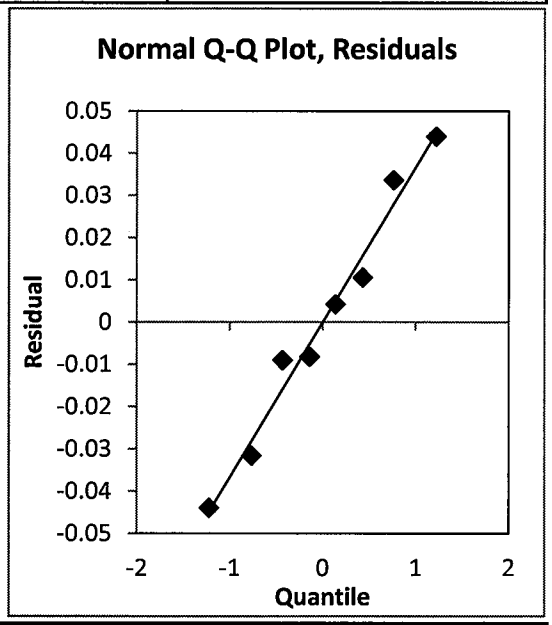


Groundwater Statistics Tool

Normality Testing Worksheet

Normality Test Results			
Parameter	**All Data**	**Minus Outliers**	**Residuals**
Number of data points	8	8	8
Shapiro-Wilk alpha value	10%	N/A	10%
Slope	0.036620802	N/A	0.036718794
Intercept	0.35375	N/A	-5.55112E-17
Correlation, R	0.986011733	N/A	0.989722234
Exact Test Value	0.957514539	N/A	0.968980708
Critical Value	0.851	N/A	0.851
Conclude sample distribution:	Appears normal	N/A	Appears normal





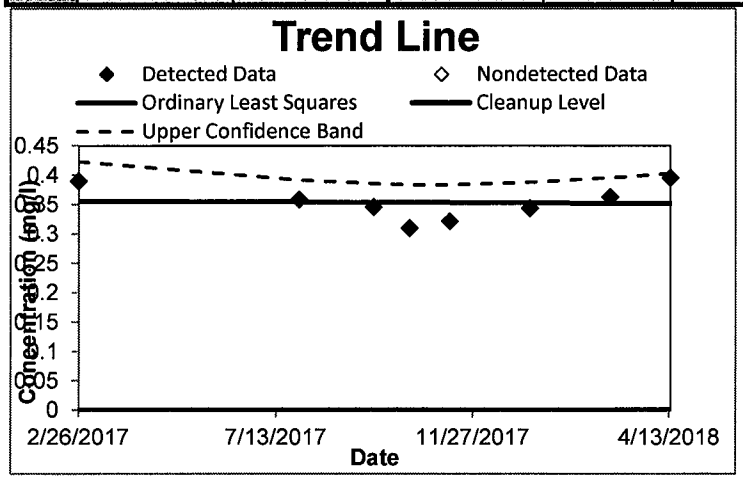
Previous Step: Outliers Screen | Next Step: Trend Screen | Skip Step: UCL Screen

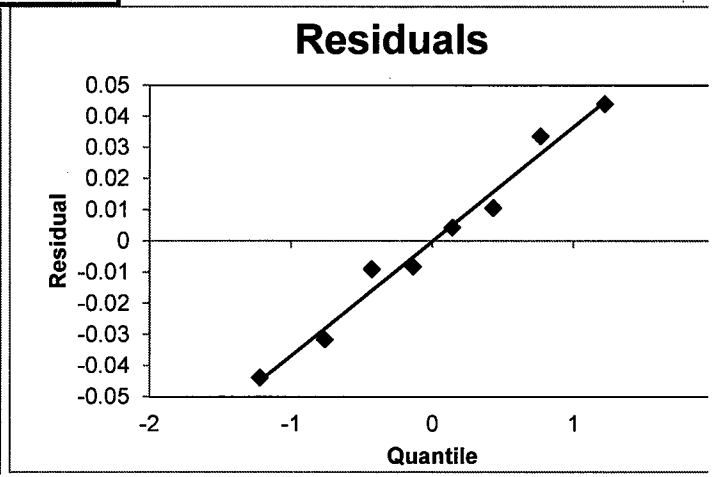
Groundwater Statistics Tool

Trend test results for datasets with normally distributed residuals (with our without transformation)

	t (Date)	C (mg/l)	C Predicted	C Fit Residual	Upper Confidence Band
1	2/26/2017	0.39	0.356	0.034	0.423
2	7/29/2017	0.359	0.355	0.004	0.392
3	9/19/2017	0.346	0.354	-0.008	0.386
4	10/14/2017	0.31	0.354	-0.044	0.384
5	11/11/2017	0.322	0.354	-0.032	0.384
6	1/6/2018	0.344	0.353	-0.009	0.388
7	3/3/2018	0.363	0.352	0.011	0.396
8	4/14/2018	0.396	0.352	0.044	0.403
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Ordinary Least Squares	
Slope	-1.07103E-05
Intercept	0.814665068
Correlation, R^2	0.0022
Test Result	No trend
Test Statistic	-0.114
Critical Value	1.943
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing





Draft version - Do not distrubute

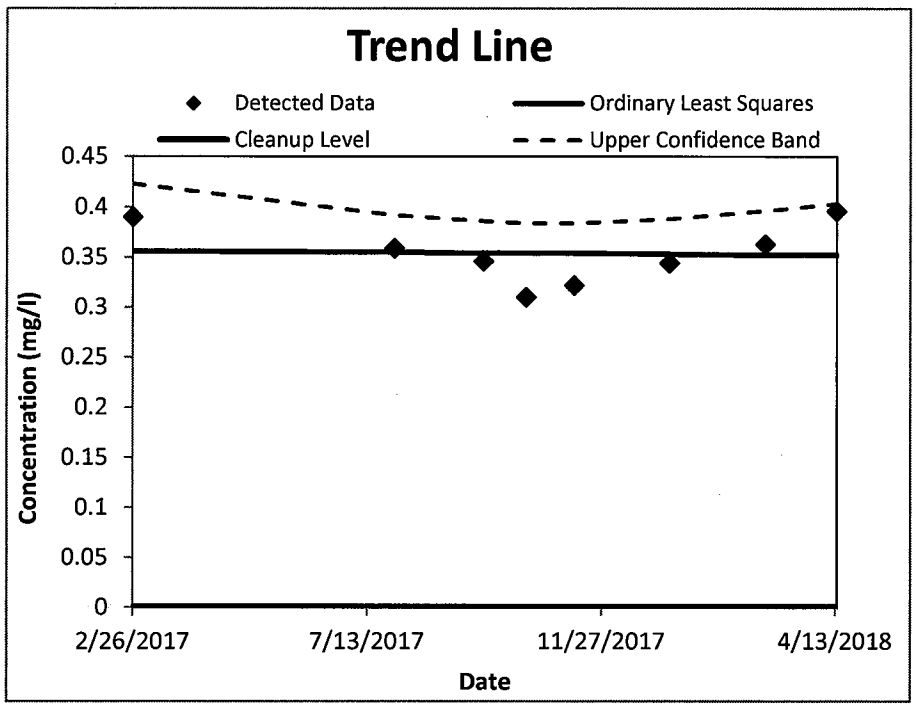
Groundwater Statistics Tool

UCL calculations and summary statistics for data sets that are normally distributed

Site Name	Big Fork Ranch
Operating Unit (OU)	Big Fork Ranch
Type of Evaluation	Attainment
Date of Evaluation	7/1/2018
Person performing analysis	AJH

Chemical of Concern	Fluordie
Well Name/Number	8A
Date Units	Date
Concentration Units	mg/l

Confidence Level	95%
Number of results	8
Number < cleanup level	0
Are any potential outliers present?	No
Mean of concentration	0.354
Standard deviation of concentration	0.03
t-value for UCL calculation	1.895



95% Upper Confidence Limit (UCL)	0.374
Method for calculating UCL	Student's t UCL
Value of 95% Upper Confidence Band value at final sampling event	0.403
Trend calculation method	Ordinary Least Squares
Cleanup level	0
Source of cleanup level	0
Is the trend decreasing or statistically insignificant?	**Yes**

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Message: None.	

Groundwater Statistics Tool

Data input worksheet

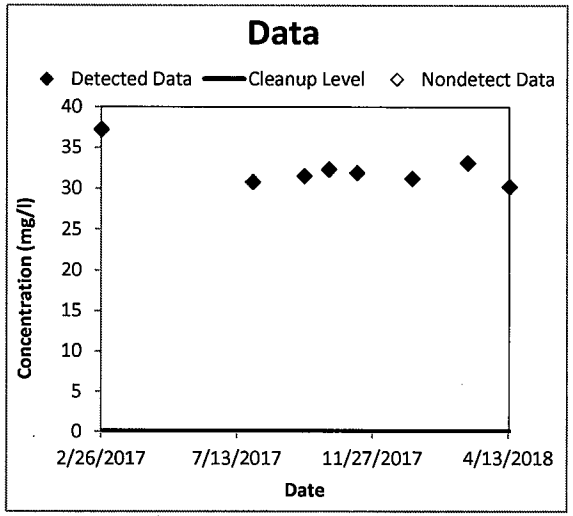
Site Name	Big Fork Ranch
Operating Unit (OU)	Big Fork Ranch
Type of Evaluation	Attainment
Date of Evaluation	7/1/2018
Person performing analysis	AJH

Chemical of Concern	Sulfate
Well Name/Number	8A
Date Units	Date
Concentration Units	mg/l

Confidence Level Desired	95%
Cleanup Level	
Source of cleanup level (e.g. MCL or risk-based concentration)	
Risk of False Outlier Rejection	1%
Random Seed (may be left blank)	
Significant figures to use	3

Number of data points	8
Number of detected results	8
Number of nondetect results	0
Detection frequency	1

Date (Date)	Sulfate Concentration (mg/l)	Data Qualifier	Detected? (Yes or No)
2/26/2017	37.21		Yes
7/29/2017	30.8		Yes
9/19/2017	31.5		Yes
10/14/2017	32.3		Yes
11/11/2017	31.9		Yes
1/6/2018	31.2		Yes
3/3/2018	33.1		Yes
4/14/2018	30.2		Yes



Axis Values			
Time		Concentration	
Min	Max	Min	Max
Auto	Auto	Auto	Auto

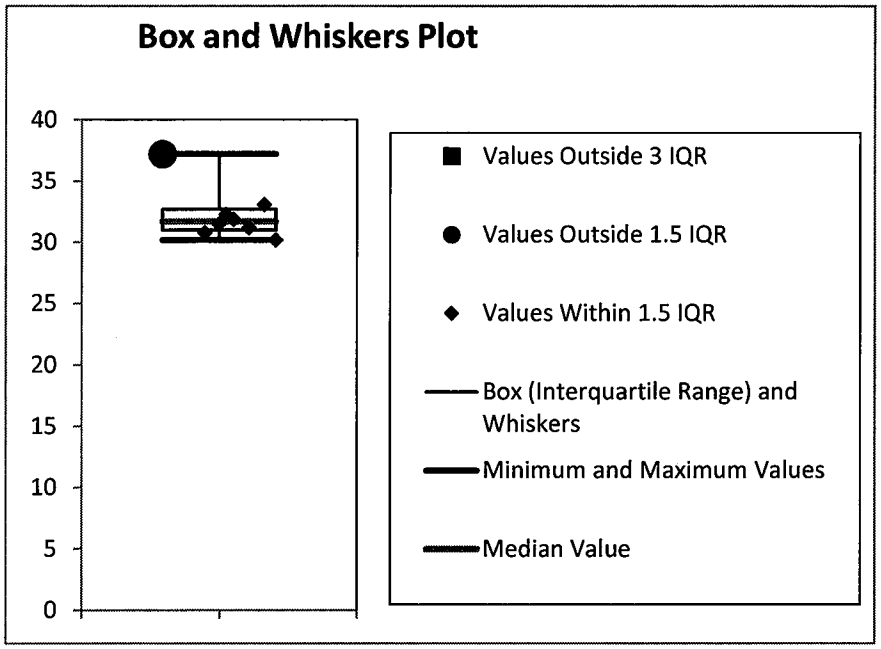
Reset Concentration Axis

Data Review		Recommendations
Are all necessary data fields entered, and in proper format?	Yes	None
Are at least 4 data points present for statistical analysis?	Yes	None
Are detection limits for nondetects ≤ maximum detected value?	Yes	None
Are all data within chart axis limits?	Yes	None

Groundwater Statistics Tool

Outlier testing worksheet

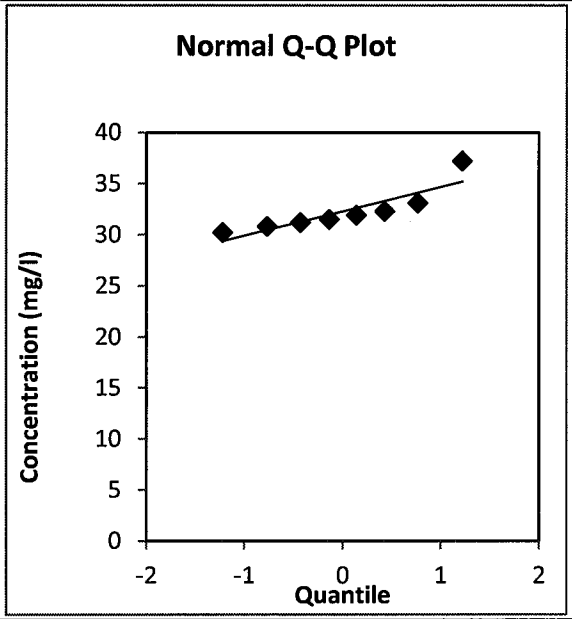
Dixon's Outlier Test Results		
Number of data points	8	
Risk of false rejection	1%	
Critical value	0.683	
Outlier type	**Low**	**High**
Test statistic	0.2069	0.6412
Potential Outlier?	No	No
Validity of Dixon'sTest	Valid	

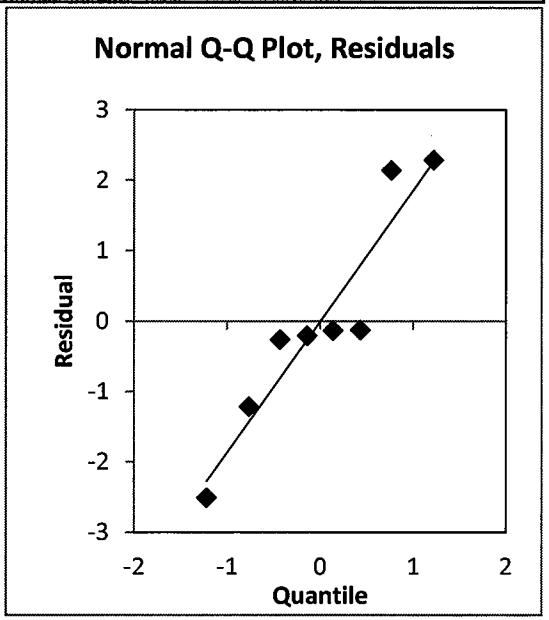


Groundwater Statistics Tool

Normality Testing Worksheet

Normality Test Results			
Parameter	**All Data**	**Minus Outliers**	**Residuals**
Number of data points	8	8	8
Shapiro-Wilk alpha value	10%	N/A	10%
Slope	2.378554896	N/A	1.8608849
Intercept	32.27625	N/A	2.22045E-15
Correlation, R	0.878645975	N/A	0.944088108
Exact Test Value	0.804385401	N/A	0.898805779
Critical Value	0.851	N/A	0.851
Conclude sample distribution:	Does not appear normal	N/A	Appears normal





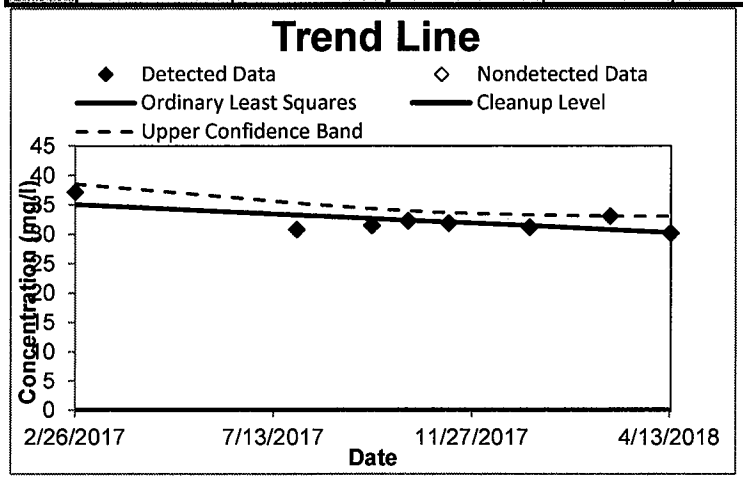
Previous Step: Outliers Screen | Next Step: Trend Screen | Skip Step: UCL Screen

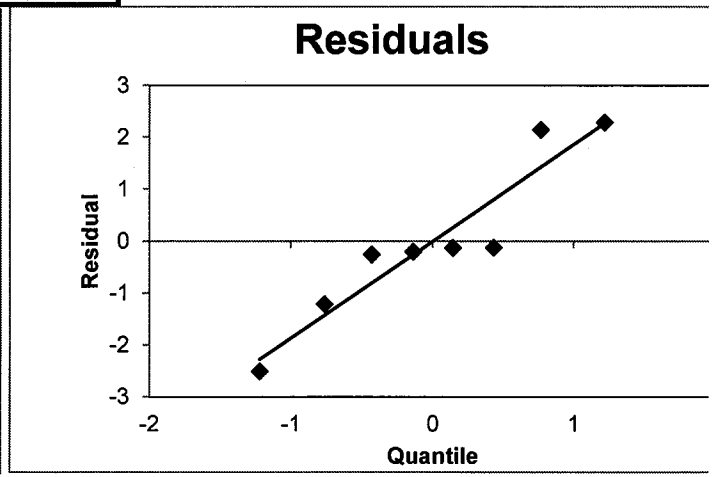
Groundwater Statistics Tool

Trend test results for datasets with normally distributed residuals (with our without transformation)

	t (Date)	C (mg/l)	C Predicted	Fit residual	Upper Confidence Band
1	2/26/2017	37.21	35.1	2.11	38.6
2	7/29/2017	30.8	33.3	-2.5	35.3
3	9/19/2017	31.5	32.7	-1.2	34.4
4	10/14/2017	32.3	32.4	-0.1	34
5	11/11/2017	31.9	32.1	-0.2	33.7
6	1/6/2018	31.2	31.5	-0.3	33.3
7	3/3/2018	33.1	30.8	2.3	33.1
8	4/14/2018	30.2	30.3	-0.1	33.1
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Ordinary Least Squares	
Slope	-0.011499379
Intercept	527.1491408
Correlation, R^2	0.4698
Test Result	Decreasing
Test Statistic	-2.306
Critical Value	1.943
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing





Draft version - Do not distrubute

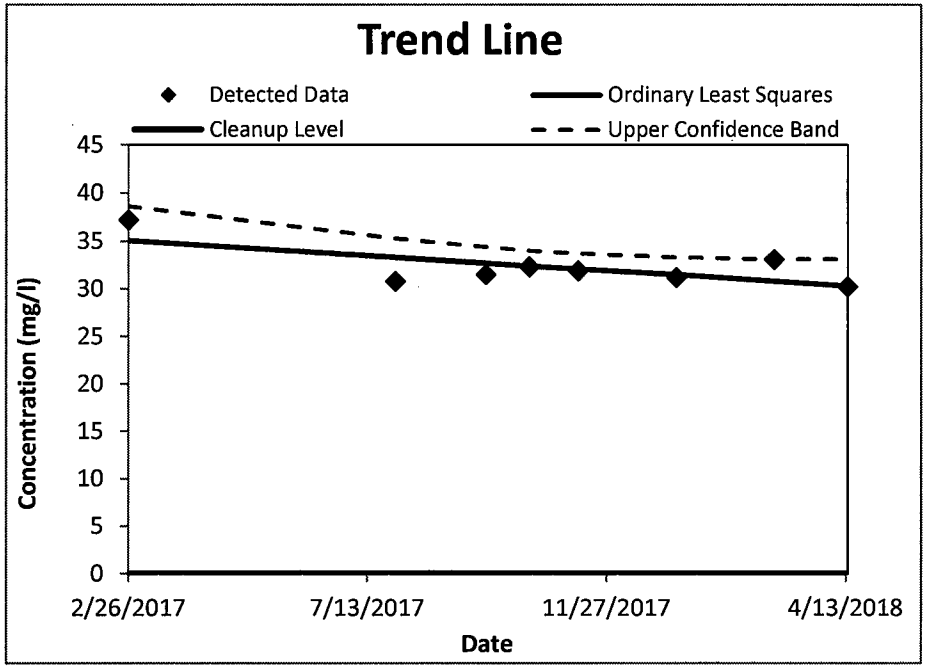
Groundwater Statistics Tool

UCL calculations and summary statistics for nonparametric data sets

Site Name	Big Pork Ranch
Operating Unit (OU)	Big Pork Ranch
Type of Evaluation	Attainment
Date of Evaluation	7/1/2018
Person performing analysis	AJH

Chemical of Concern	Sulfate
Well Name/Number	8A
Date Units	Date
Concentration Units	mg/l

Confidence Level	95%
Number of results	8
Number < cleanup level	0
Are any potential outliers present?	No
Mean of concentration	32.3
Standard deviation of concentration	2.18



95% Upper Confidence Limit (UCL)	35.7
Method for calculating UCL	Chebyshev UCL
Value of 95% Upper Confidence Band value at final sampling event	33.1
Trend calculation method	Ordinary Least Squares
Cleanup level	0
Source of cleanup level	0
Is the trend decreasing or statistically insignificant?	**Yes**

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Random Seed Used	0
Message: None.	

Draft version - Do not distrubute

GWMP #9A

Groundwater Results Statistical Analyses

Groundwater Statistics Tool

Data input worksheet

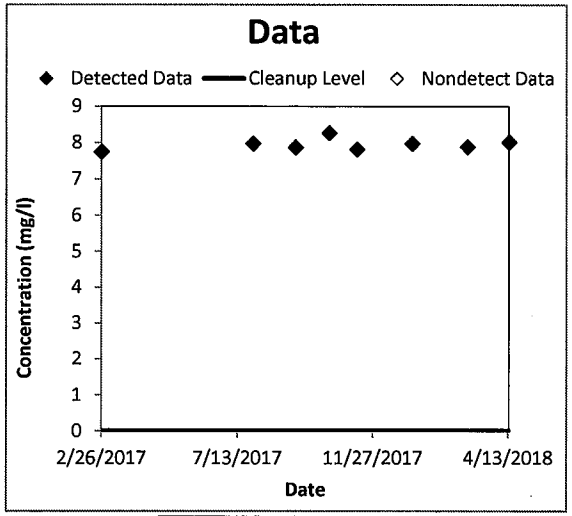
Site Name	Big Fork Ranch
Operating Unit (OU)	Big Fork Ranch
Type of Evaluation	Attainment
Date of Evaluation	9/1/2018
Person performing analysis	AJH

Chemical of Concern	pH
Well Name/Number	9A
Date Units	Date
Concentration Units	mg/l

Confidence Level Desired	95%
Cleanup Level	
Source of cleanup level (e.g. MCL or risk-based concentration)	
Risk of False Outlier Rejection	1%
Random Seed (may be left blank)	
Significant figures to use	3

Number of data points	8
Number of detected results	8
Number of nondetect results	0
Detection frequency	1

Date (Date)	pH Concentration (mg/l)	Data Qualifier	Detected? (Yes or No)
2/26/2017	7.75		Yes
7/29/2017	7.97		Yes
9/10/2017	7.87		Yes
10/14/2017	8.26		Yes
11/11/2017	7.81		Yes
1/6/2018	7.97		Yes
3/3/2018	7.88		Yes
4/14/2018	8.01		Yes



Axis Values			
Time		Concentration	
Min	Max	Min	Max
Auto	Auto	Auto	Auto

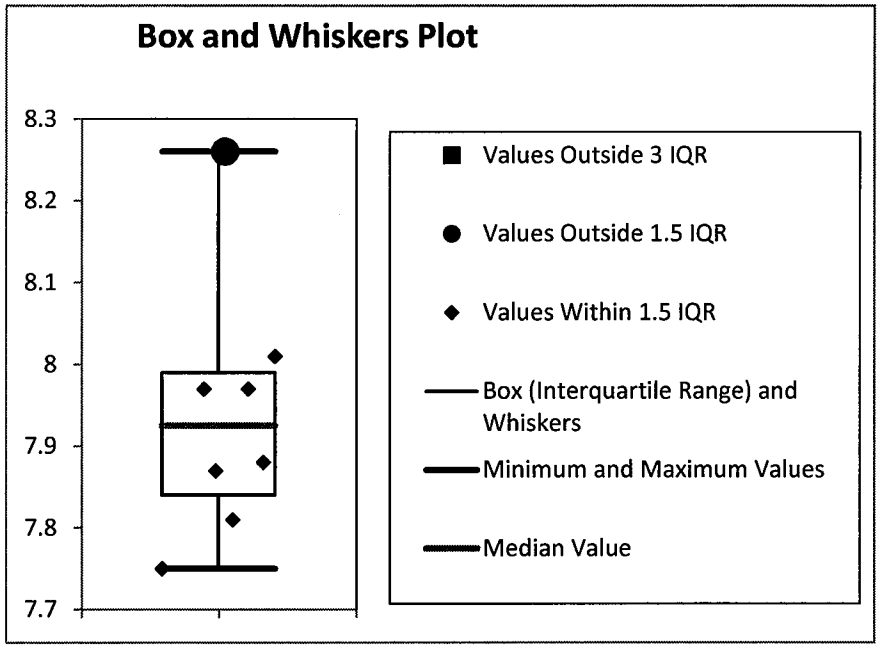
Reset Concentration Axis

Data Review		Recommendations
Are all necessary data fields entered, and in proper format?	Yes	None
Are at least 4 data points present for statistical analysis?	Yes	None
Are detection limits for nondetects ≤ maximum detected value?	Yes	None
Are all data within chart axis limits?	Yes	None

Groundwater Statistics Tool

Outlier testing worksheet

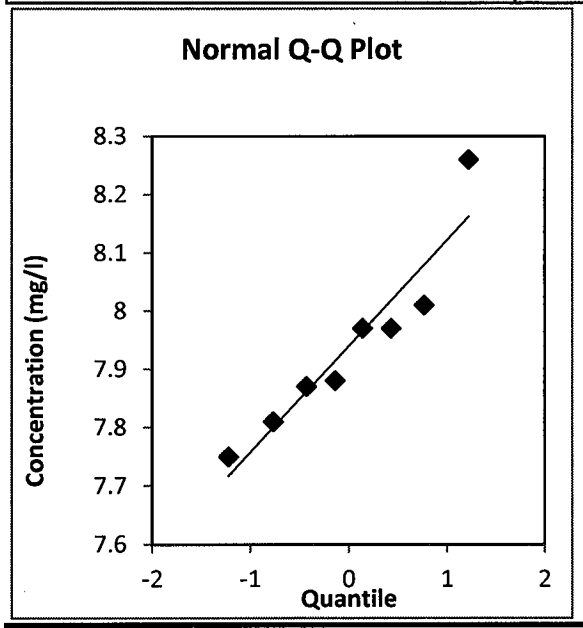
Dixon's Outlier Test Results		
Number of data points	8	
Risk of false rejection	1%	
Critical value	0.683	
Outlier type	**Low**	**High**
Test statistic	0.2308	0.5556
Potential Outlier?	No	No
Validity of Dixon'sTest	Valid	

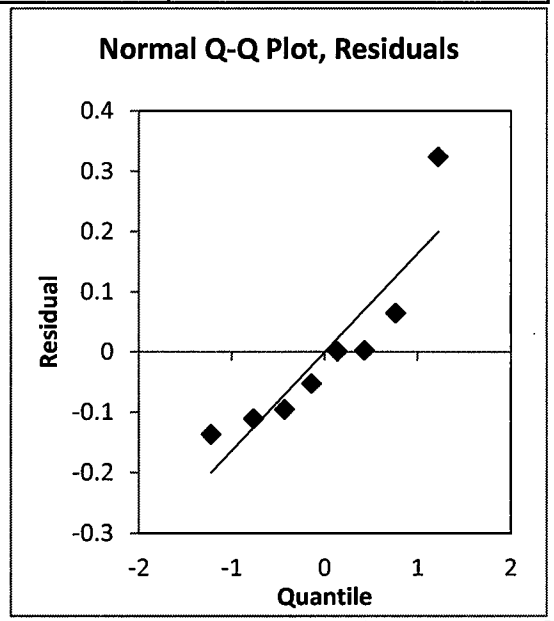


Groundwater Statistics Tool

Normality Testing Worksheet

Normality Test Results			
Parameter	**All Data**	**Minus Outliers**	**Residuals**
Number of data points	8	8	8
Shapiro-Wilk alpha value	10%	N/A	10%
Slope	0.18227899	N/A	0.163721475
Intercept	7.94	N/A	-2.77556E-15
Correlation, R	0.942343843	N/A	0.896351393
Exact Test Value	0.911840779	N/A	0.826443671
Critical Value	0.851	N/A	0.851
Conclude sample distribution:	Appears normal	N/A	Does not appear normal





Previous Step: Outliers Screen | Next Step: Trend Screen | Skip Step: UCL Screen

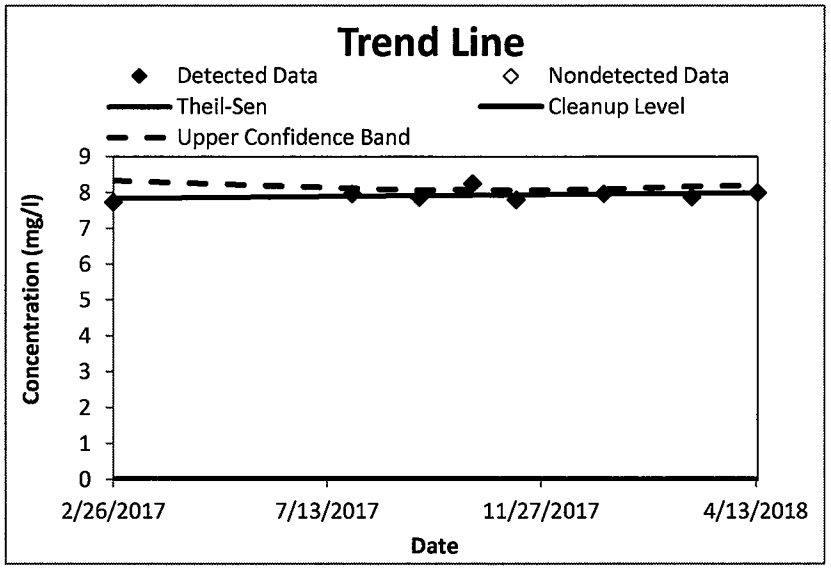
Groundwater Statistics Tool

Trend test results for datasets nonparametrically distributed residuals

i	t (Date)	C (mg/l)	C Predicted	C Residual	Upper Confidence Band
1	2/26/2017	7.75	7.84	-0.09	8.34
2	7/29/2017	7.97	7.9	0.07	8.12
3	9/10/2017	7.87	7.92	-0.05	8.07
4	10/14/2017	8.26	7.93	0.33	8.09
5	11/11/2017	7.81	7.94	-0.13	8.06
6	1/6/2018	7.97	7.96	0.01	8.1
7	3/3/2018	7.88	7.98	-0.1	8.18
8	4/14/2018	8.01	8	0.01	8.21
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Mann-Kendall	
Test Result	No trend
Test Statistic (S)	9
Normalized S	0.997
Critical Value	1.645

Theil-Sen	
Slope	0.00038
Intercept	-8.42
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing



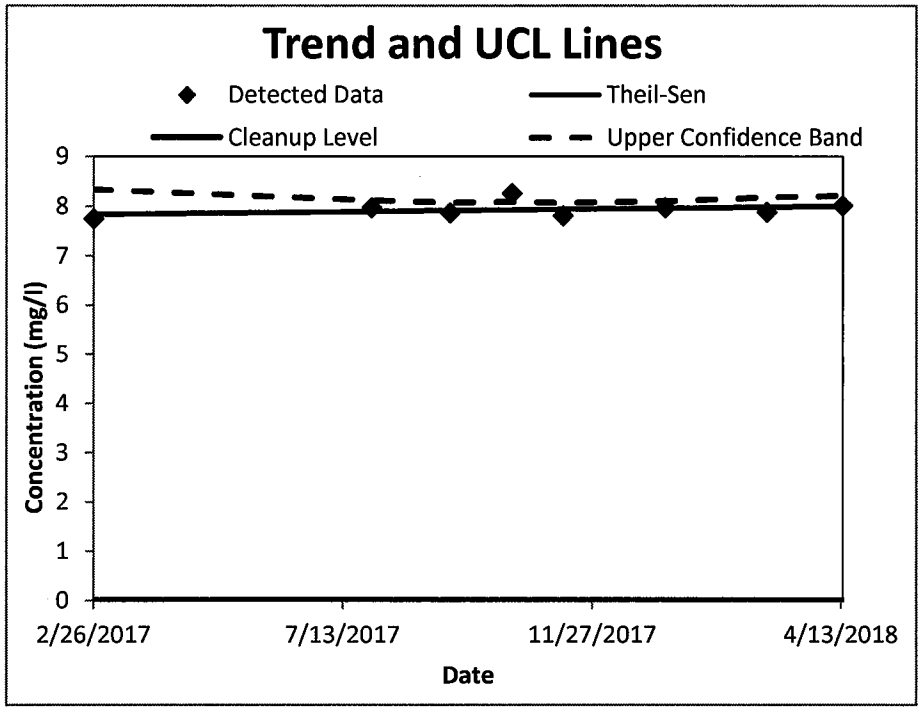
Groundwater Statistics Tool

UCL calculations and summary statistics for data sets that are normally distributed

Site Name	Big Fork Ranch
Operating Unit (OU)	Big Fork Ranch
Type of Evaluation	Attainment
Date of Evaluation	9/1/2018
Person performing analysis	AJH

Chemical of Concern	pH
Well Name/Number	9A
Date Units	Date
Concentration Units	mg/l

Confidence Level	95%
Number of results	8
Number < cleanup level	0
Are any potential outliers present?	No
Mean of concentration	7.94
Standard deviation of concentration	0.156
t-value for UCL calculation	1.895



95% Upper Confidence Limit (UCL)	8.04
Method for calculating UCL	Student's t UCL
Value of 95% Upper Confidence Band value at final sampling event	8.21
Trend calculation method	Theil-Sen/Mann-Kendall
Cleanup level	0
Source of cleanup level	0
Is the trend decreasing or statistically insignificant?	**Yes**

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Message: None.	

Groundwater Statistics Tool

Data input worksheet

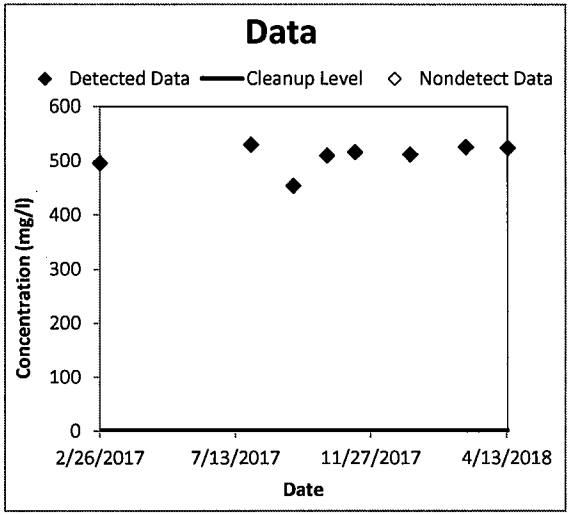
Site Name	Big Fork Ranch
Operating Unit (OU)	Big Fork Ranch
Type of Evaluation	Attainment
Date of Evaluation	7/1/2018
Person performing analysis	AJH

Chemical of Concern	TDS
Well Name/Number	9A
Date Units	Date
Concentration Units	mg/l

Confidence Level Desired	95%
Cleanup Level	
Source of cleanup level (e.g. MCL or risk-based concentration)	
Risk of False Outlier Rejection	1%
Random Seed (may be left blank)	
Significant figures to use	3

Number of data points	8
Number of detected results	8
Number of nondetect results	0
Detection frequency	1

Date (Date)	TDS Concentration (mg/l)	Data Qualifier	Detected? (Yes or No)
2/26/2017	496		Yes
7/29/2017	530		Yes
9/10/2017	454		Yes
10/14/2017	510		Yes
11/11/2017	516		Yes
1/6/2018	512		Yes
3/3/2018	526		Yes
4/14/2018	524		Yes



Axis Values			
Time		Concentration	
Min	Max	Min	Max
Auto	Auto	Auto	Auto

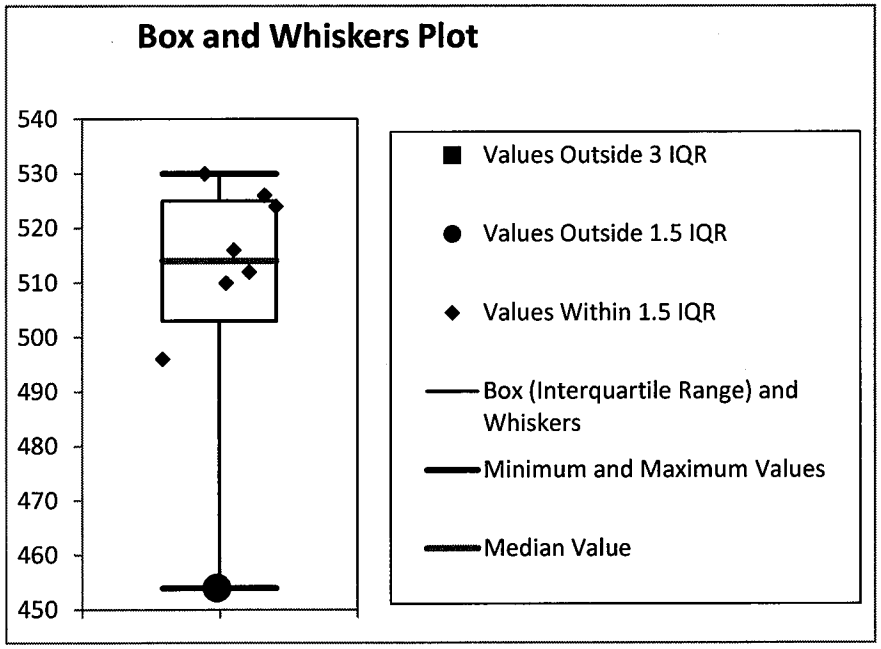
Reset Concentration Axis

Data Review		Recommendations
Are all necessary data fields entered, and in proper format?	Yes	None
Are at least 4 data points present for statistical analysis?	Yes	None
Are detection limits for nondetects ≤ maximum detected value?	Yes	None
Are all data within chart axis limits?	Yes	None

Groundwater Statistics Tool

Outlier testing worksheet

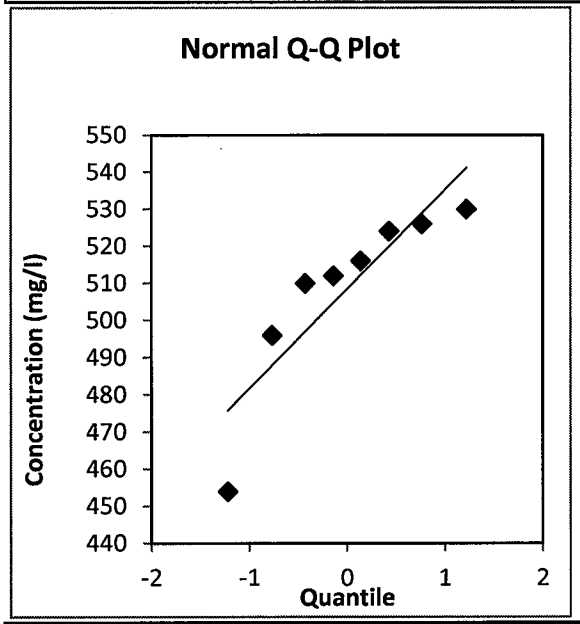
Dixon's Outlier Test Results		
Number of data points	8	
Risk of false rejection	1%	
Critical value	0.683	
Outlier type	**Low**	**High**
Test statistic	0.5833	0.1176
Potential Outlier?	No	No
Validity of Dixon'sTest	Valid	

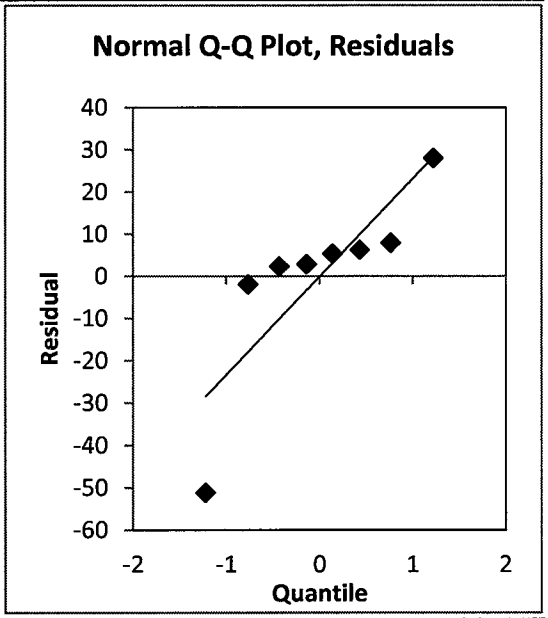


Groundwater Statistics Tool

Normality Testing Worksheet

Normality Test Results			
Parameter	**All Data**	**Minus Outliers**	**Residuals**
Number of data points	8	8	8
Shapiro-Wilk alpha value	10%	N/A	10%
Slope	26.82243732	N/A	23.2987367
Intercept	508.5	N/A	5.68434E-14
Correlation, R	0.883132572	N/A	0.834897293
Exact Test Value	0.804001865	N/A	0.757578893
Critical Value	0.851	N/A	0.851
Conclude sample distribution:	Does not appear normal	N/A	Does not appear normal





Previous Step: Outliers Screen | Next Step: Trend Screen | Skip Step: UCL Screen

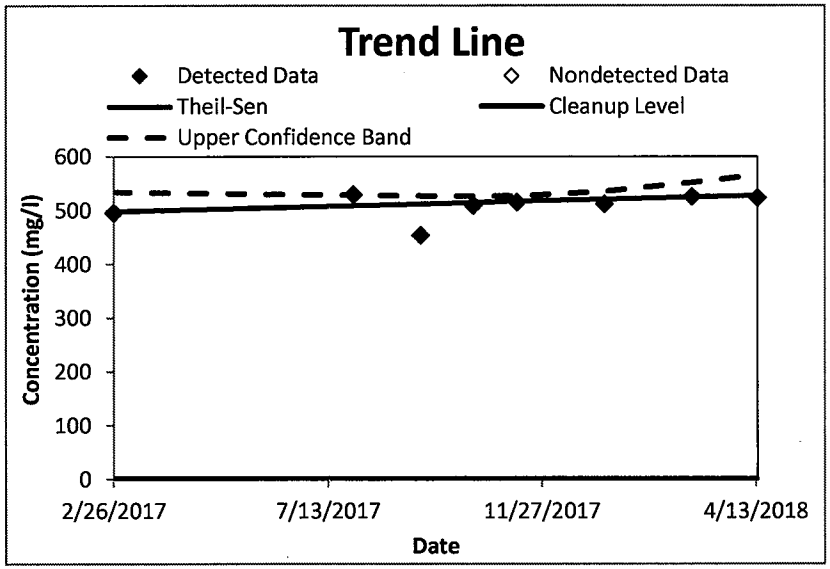
Groundwater Statistics Tool

Trend test results for datasets nonparametrically distributed residuals

	t (Date)	C (mg/l)	C Predicted	Residual	Upper Confidence Band
1	2/26/2017	496	498	-2	534
2	7/29/2017	530	509	21	528
3	9/10/2017	454	512	-58	527
4	10/14/2017	510	515	-5	527
5	11/11/2017	516	517	-1	527
6	1/6/2018	512	521	-9	536
7	3/3/2018	526	525	1	552
8	4/14/2018	524	528	-4	566
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Mann-Kendall	
Test Result	No trend
Test Statistic (S)	10
Normalized S	1.113
Critical Value	1.645

Theil-Sen	
Slope	0.0724
Intercept	-2600
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing



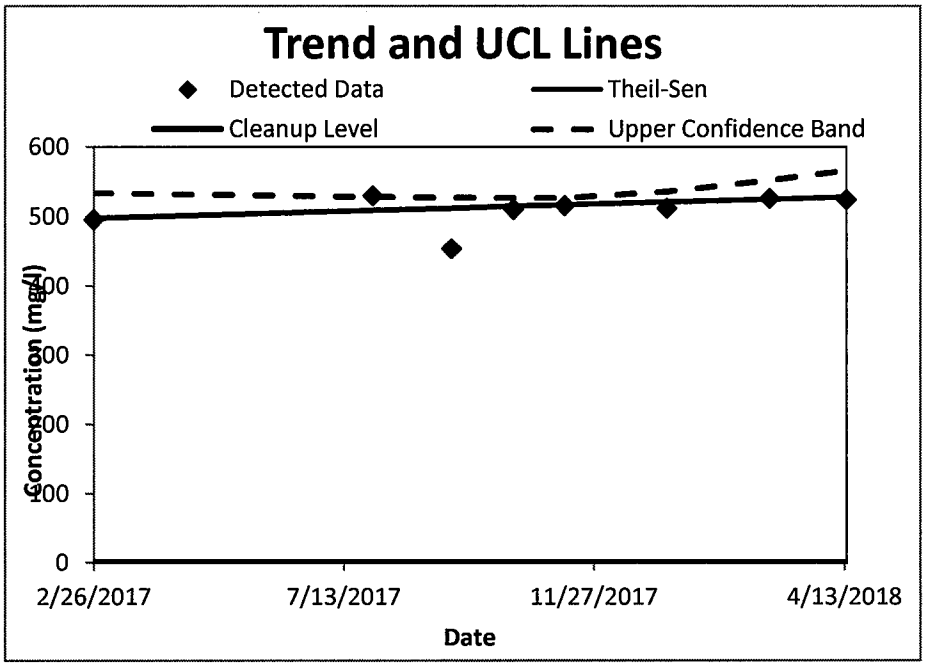
Groundwater Statistics Tool

UCL calculations and summary statistics for nonparametric data sets

Site Name	Big Fork Ranch
Operating Unit (OU)	Big Fork Ranch
Type of Evaluation	Attainment
Date of Evaluation	7/1/2018
Person performing analysis	AJH

Chemical of Concern	TDS
Well Name/Number	9A
Date Units	Date
Concentration Units	mg/l

Confidence Level	95%
Number of results	8
Number < cleanup level	0
Are any potential outliers present?	No
Mean of concentration	509
Standard deviation of concentration	24.5



95% Upper Confidence Limit (UCL)	547
Method for calculating UCL	Chebyshev UCL
Value of 95% Upper Confidence Band value at final sampling event	566
Trend calculation method	Theil-Sen/Mann-Kendall
Cleanup level	0
Source of cleanup level	0
Is the trend decreasing or statistically insignificant?	**Yes**

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Random Seed Used	60509.38281
Message: None.	

Groundwater Statistics Tool

Data input worksheet

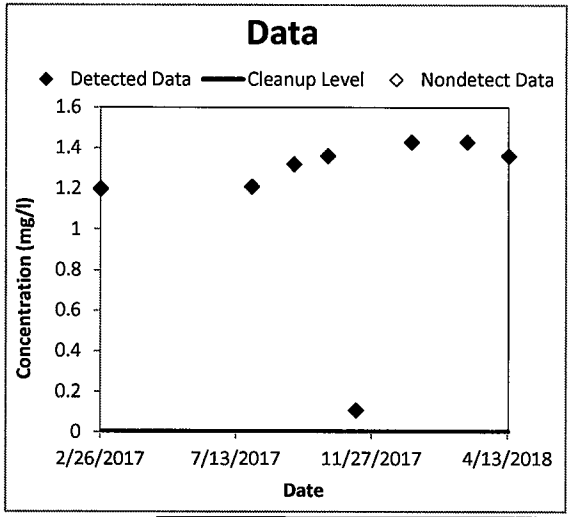
Site Name	Big Fork Ranch
Operating Unit (OU)	Big Fork Ranch
Type of Evaluation	Attainment
Date of Evaluation	7/1/2018
Person performing analysis	AJH

Chemical of Concern	Boron
Well Name/Number	9A
Date Units	Date
Concentration Units	mg/l

Confidence Level Desired	95%
Cleanup Level	
Source of cleanup level (e.g. MCL or risk-based concentration)	
Risk of False Outlier Rejection	1%
Random Seed (may be left blank)	
Significant figures to use	3

Number of data points:	8
Number of detected results:	8
Number of nondetect results:	0
Detection frequency:	1

Date (Date)	Boron Concentration (mg/l)	Data Qualifier	Detected? (Yes or No)
2/26/2017	1.2		Yes
7/29/2017	1.21		Yes
9/10/2017	1.32		Yes
10/14/2017	1.36		Yes
11/11/2017	0.109		Yes
1/6/2018	1.43		Yes
3/3/2018	1.43		Yes
4/14/2018	1.36		Yes



Axis Values			
Time		Concentration	
Min	Max	Min	Max
Auto	Auto	Auto	Auto

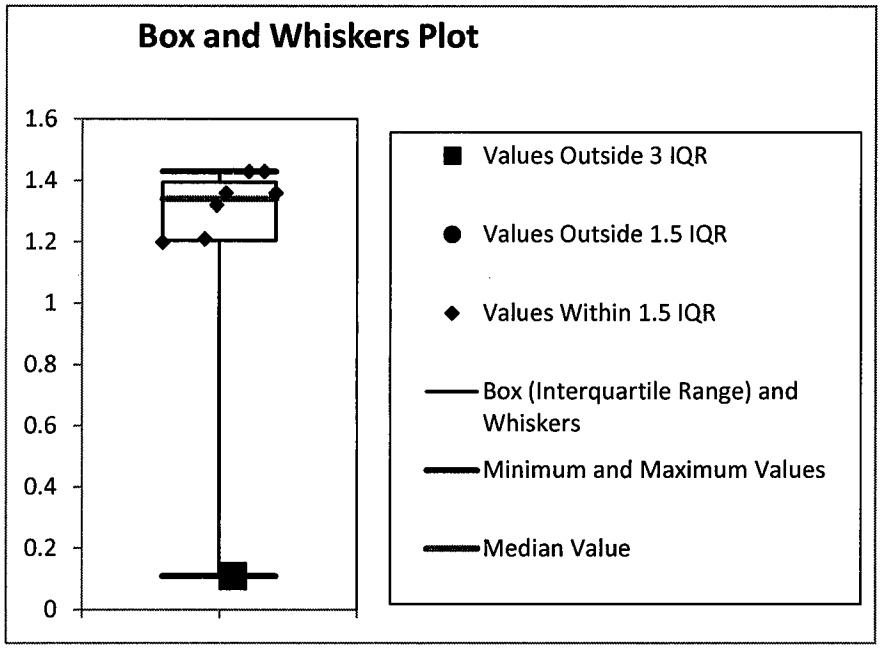
Reset Concentration Axis

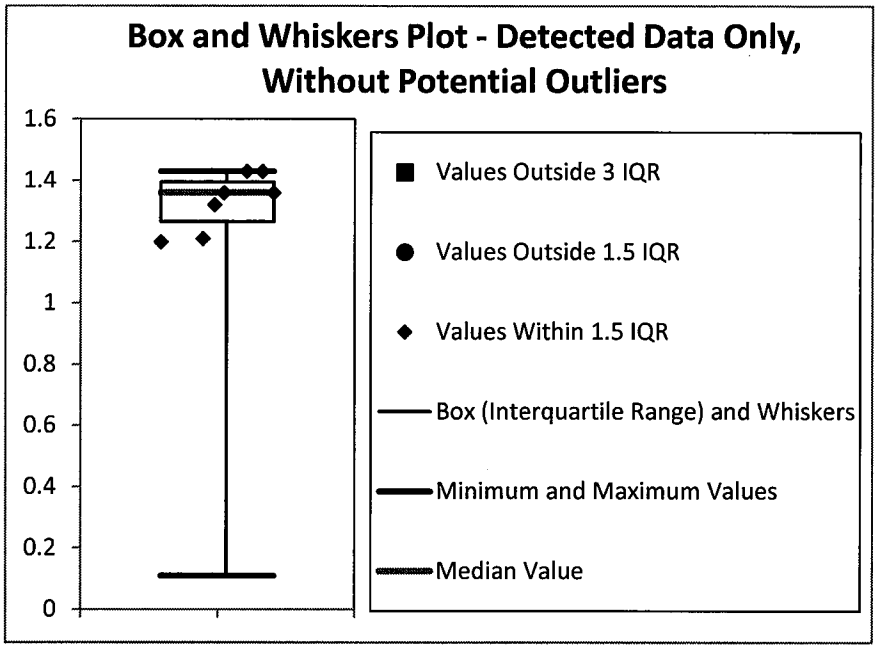
Data Review		Recommendations
Are all necessary data fields entered, and in proper format?	Yes	None
Are at least 4 data points present for statistical analysis?	Yes	None
Are detection limits for nondetects ≤ maximum detected value?	Yes	None
Are all data within chart axis limits?	Yes	None

Groundwater Statistics Tool

Outlier testing worksheet

Dixon's Outlier Test Results		
Number of data points	8	
Risk of false rejection	1%	
Critical value	0.683	
Outlier type	**Low**	**High**
Test statistic	0.8259	0.0000
Potential Outlier?	Yes	No
Validity of Dixon'sTest	Valid	

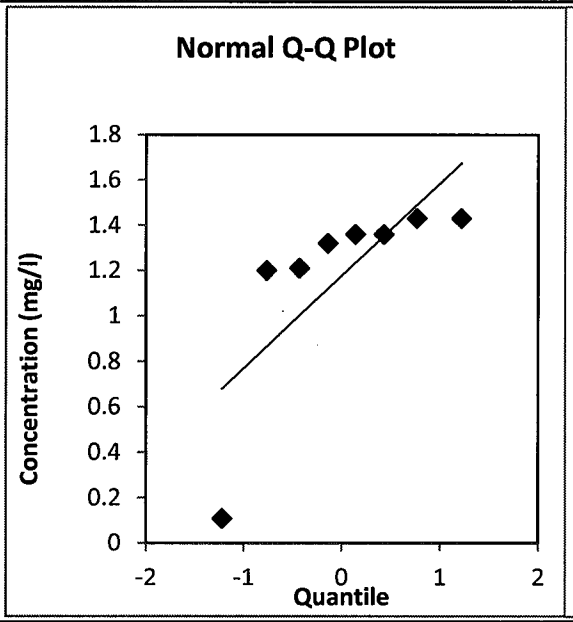


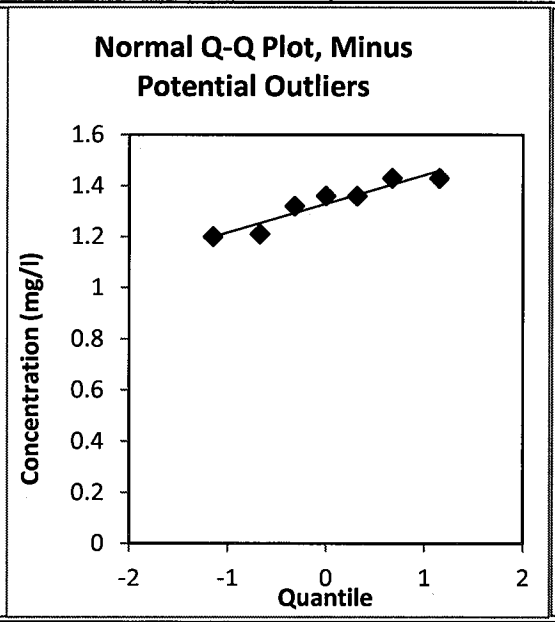


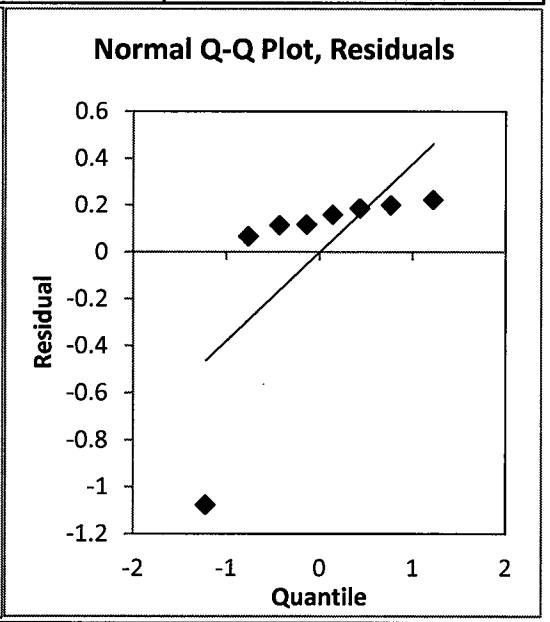
Groundwater Statistics Tool

Normality Testing Worksheet

Normality Test Results			
Parameter	**All Data**	**Minus Outliers**	**Residuals**
Number of data points	8	7	8
Shapiro-Wilk alpha value	10%	10%	10%
Slope	0.407613788	0.113235506	0.378286898
Intercept	1.177375	1.33	-1.38778E-15
Correlation, R	0.74698437	0.951906511	0.698081173
Exact Test Value	0.597439196	0.874112143	0.531243181
Critical Value	0.851	0.838	0.851
Conclude sample distribution:	Does not appear normal	Appears normal	Does not appear normal







Previous Step: Outliers Screen | Next Step: Trend Screen | Skip Step: UCL Screen

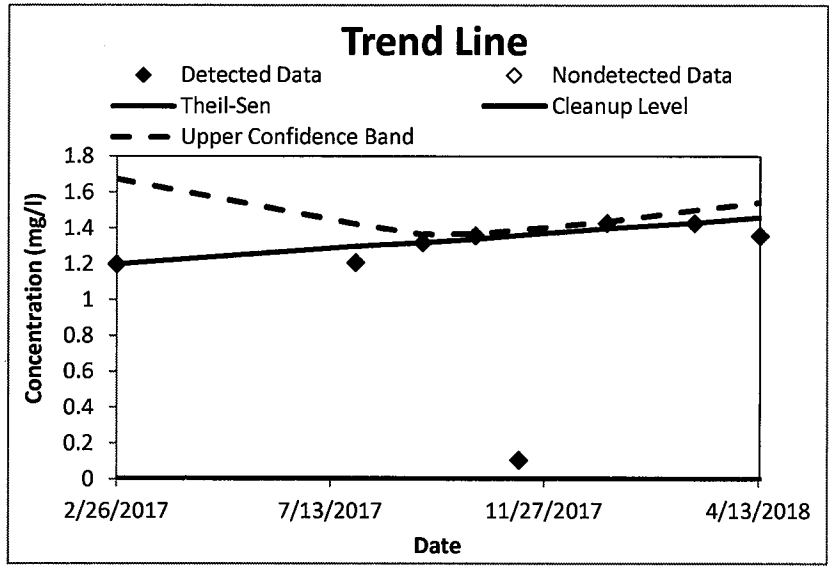
Groundwater Statistics Tool

Trend test results for datasets nonparametrically distributed residuals

i	t (Date)	C (mg/l)	C Predicted	Residual	Upper Confidence Band
1	2/26/2017	1.2	1.2	0	1.68
2	7/29/2017	1.21	1.3	-0.09	1.43
3	9/10/2017	1.32	1.32	0	1.37
4	10/14/2017	1.36	1.34	0.02	1.37
5	11/11/2017	0.109	1.36	-1.251	1.39
6	1/6/2018	1.43	1.4	0.03	1.44
7	3/3/2018	1.43	1.43	0	1.5
8	4/14/2018	1.36	1.46	-0.1	1.54
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Mann-Kendall	
Test Result	No trend
Test Statistic (S)	14
Normalized S	1.634
Critical Value	1.645

Theil-Sen	
Slope	0.000617
Intercept	-25.2
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing



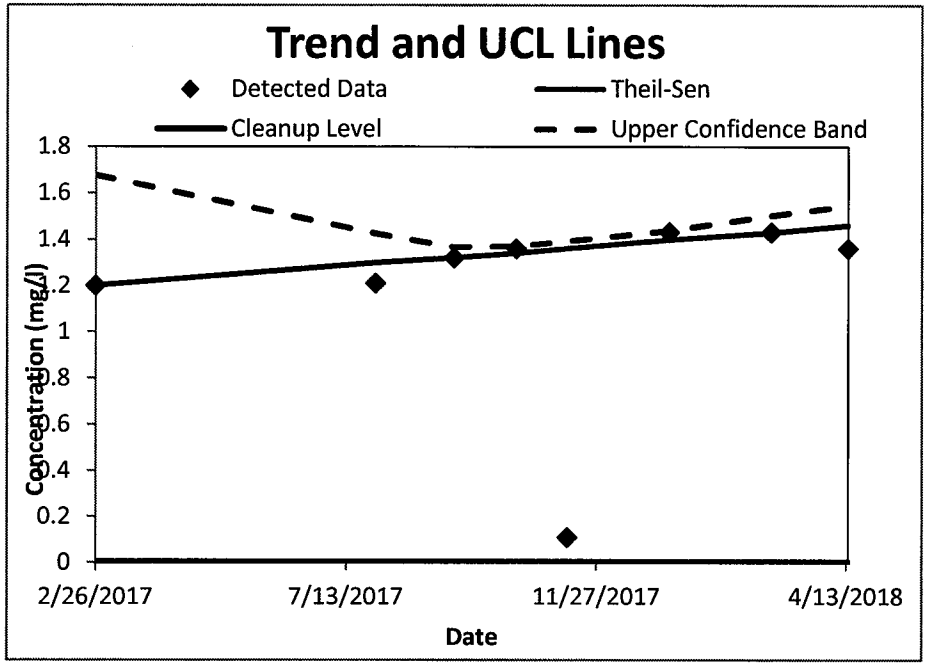
Groundwater Statistics Tool

UCL calculations and summary statistics for nonparametric data sets

Site Name	Big Fork Ranch
Operating Unit (OU)	Big Fork Ranch
Type of Evaluation	Attainment
Date of Evaluation	7/1/2018
Person performing analysis	AJH

Chemical of Concern	Boron
Well Name/Number	9A
Date Units	Date
Concentration Units	mg/l

Confidence Level	95%
Number of results	8
Number < cleanup level	0
Are any potential outliers present?	Yes
Mean of concentration	1.18
Standard deviation of concentration	0.44



95% Upper Confidence Limit (UCL)	1.86
Method for calculating UCL	Chebyshev UCL
Value of 95% Upper Confidence Band value at final sampling event	1.54
Trend calculation method	Theil-Sen/Mann-Kendall
Cleanup level	0
Source of cleanup level	0
Is the trend decreasing or statistically insignificant?	**Yes**

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Random Seed Used	40098.10547
Message: None.	

Groundwater Statistics Tool

Data input worksheet

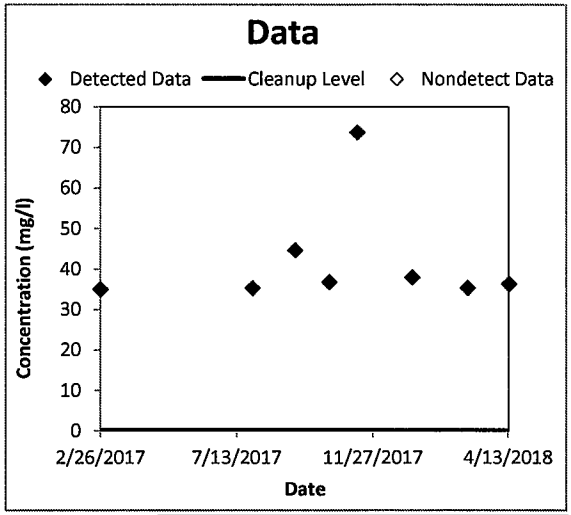
Site Name	Big Fork Ranch
Operating Unit (OU)	Big Fork Ranch
Type of Evaluation	Attainment
Date of Evaluation	7/1/2018
Person performing analysis	AJH

Chemical of Concern	Calcium
Well Name/Number	9A
Date Units	Date
Concentration Units	mg/l

Confidence Level Desired	95%
Cleanup Level	
Source of cleanup level (e.g. MCL or risk-based concentration)	
Risk of False Outlier Rejection	1%
Random Seed (may be left blank)	
Significant figures to use	3

Number of data points	8
Number of detected results	8
Number of nondetect results	0
Detection frequency	1

Date (Date)	Calcium Concentration (mg/l)	Data Qualifier	Detected? (Yes or No)
2/26/2017	35		Yes
7/29/2017	35.3		Yes
9/10/2017	44.8		Yes
10/14/2017	36.8		Yes
11/11/2017	73.7		Yes
1/6/2018	38		Yes
3/3/2018	35.4		Yes
4/14/2018	36.4		Yes



Axis Values			
Time		Concentration	
Min	Max	Min	Max
Auto	Auto	Auto	Auto

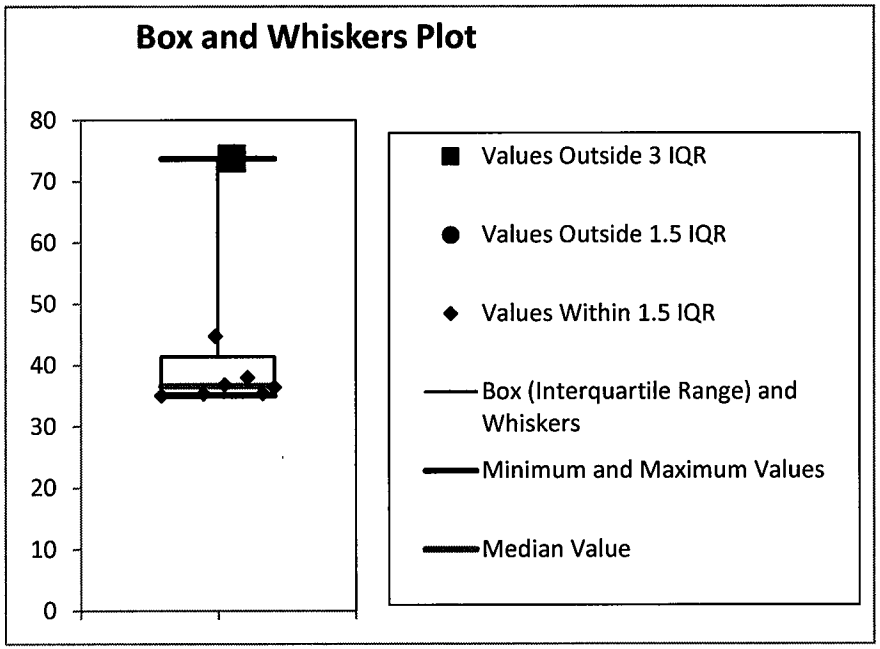
Reset Concentration Axis

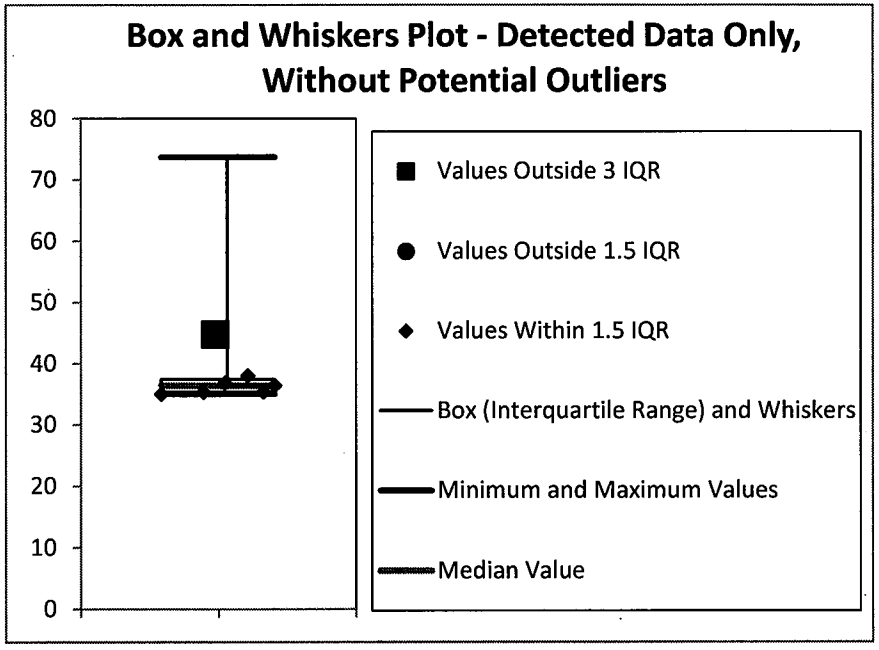
Data Review		Recommendations
Are all necessary data fields entered, and in proper format?	Yes	None
Are at least 4 data points present for statistical analysis?	Yes	None
Are detection limits for nondetects ≤ maximum detected value?	Yes	None
Are all data within chart axis limits?	Yes	None

Groundwater Statistics Tool

Outlier testing worksheet

Dixon's Outlier Test Results		
Number of data points	8	
Risk of false rejection	1%	
Critical value	0.683	
Outlier type	**Low**	**High**
Test statistic	0.0306	0.7526
Potential Outlier?	No	Yes
Validity of Dixon'sTest	Not Valid - data do not appear normal after removal of outlier.	

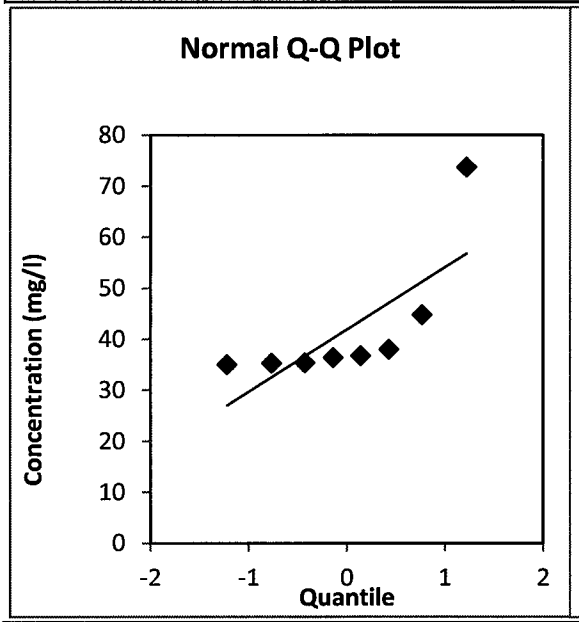


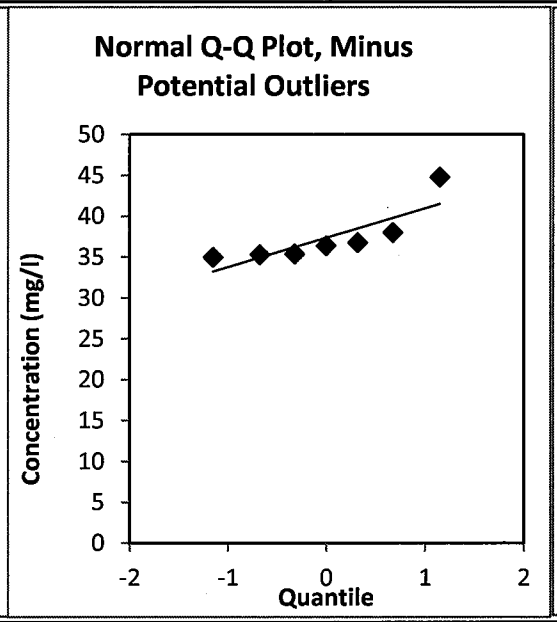


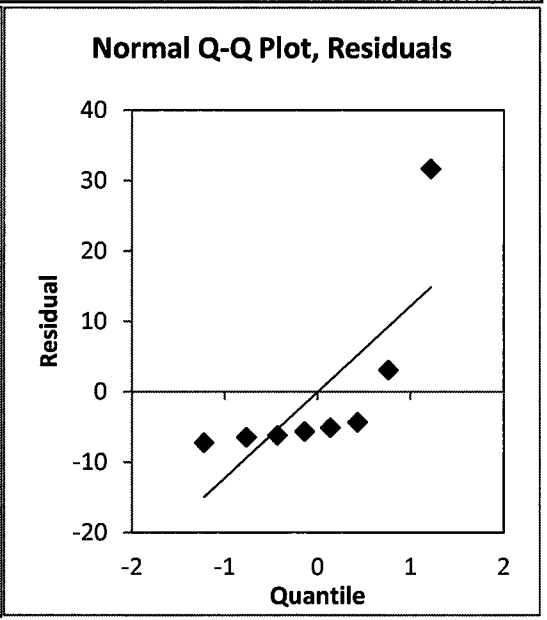
Groundwater Statistics Tool

Normality Testing Worksheet

Normality Test Results			
Parameter	**All Data**	**Minus Outliers**	**Residuals**
Number of data points	8	7	8
Shapiro-Wilk alpha value	10%	10%	10%
Slope	12.21150408	3.601672805	12.2099749
Intercept	41.925	37.38571429	1.95399E-14
Correlation, R	0.745153688	0.830845083	0.746125588
Exact Test Value	0.591043225	0.71813189	0.593636673
Critical Value	0.851	0.838	0.851
Conclude sample distribution:	Does not appear normal	Does not appear normal	Does not appear normal







Previous Step: Outliers Screen | Next Step: Trend Screen | Skip Step: UCL Screen

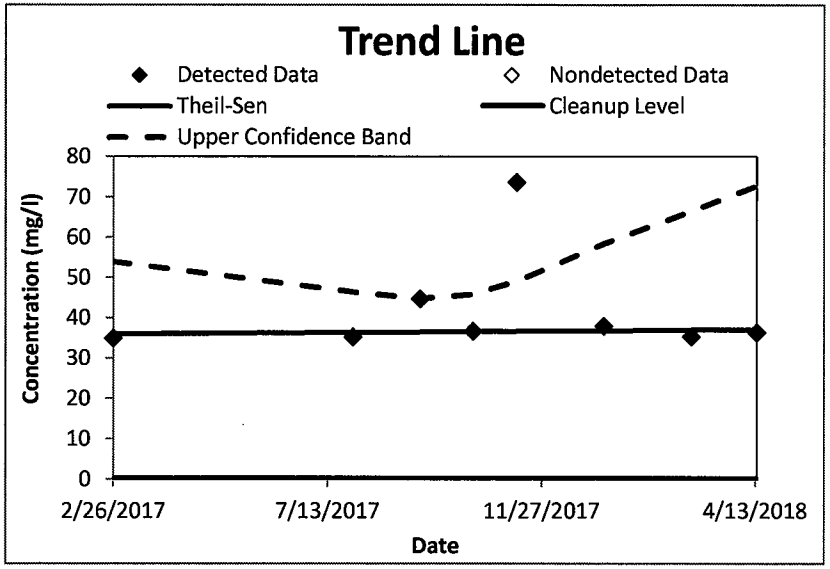
Groundwater Statistics Tool

Trend test results for datasets nonparametrically distributed residuals

1	t (Date)	C (mg/l)	C Predicted	Residual	Upper Confidence Band
1	2/26/2017	35	36	-1	54
2	7/29/2017	35.3	36.4	-1.1	46.5
3	9/10/2017	44.8	36.5	8.3	44.8
4	10/14/2017	36.8	36.6	0.2	45.9
5	11/11/2017	73.7	36.7	37	49.2
6	1/6/2018	38	36.8	1.2	58.4
7	3/3/2018	35.4	37	-1.6	66.5
8	4/14/2018	36.4	37.1	-0.7	72.8
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Mann-Kendall	
Test Result	No trend
Test Statistic (S)	6
Normalized S	0.619
Critical Value	1.645

Theil-Sen	
Slope	0.00268
Intercept	-78.7
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing



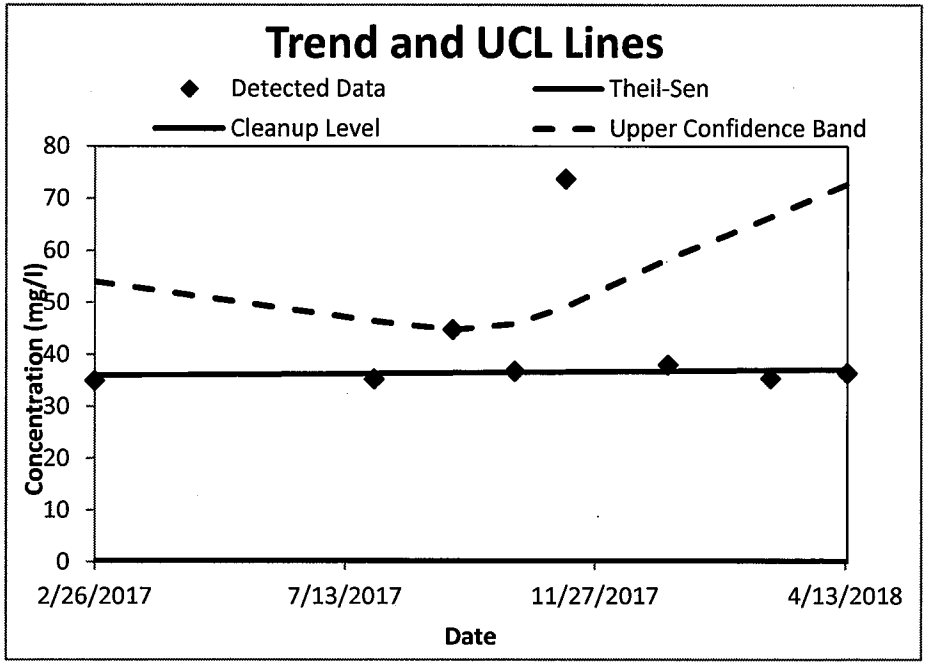
Groundwater Statistics Tool

UCL calculations and summary statistics for nonparametric data sets

Site Name	Big Fork Ranch
Operating Unit (OU)	Big Fork Ranch
Type of Evaluation	Attainment
Date of Evaluation	7/1/2018
Person performing analysis	AJH

Chemical of Concern	Calcium
Well Name/Number	9A
Date Units	Date
Concentration Units	mg/l

Confidence Level	95%
Number of results	8
Number < cleanup level	0
Are any potential outliers present?	Yes
Mean of concentration	41.9
Standard deviation of concentration	13.2



95% Upper Confidence Limit (UCL)	62.2
Method for calculating UCL	Chebyshev UCL
Value of 95% Upper Confidence Band value at final sampling event	72.8
Trend calculation method	Theil-Sen/Mann-Kendall
Cleanup level	0
Source of cleanup level	0
Is the trend decreasing or statistically insignificant?	**Yes**

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Random Seed Used	61007.70703
Message: None.	

Groundwater Statistics Tool

Data input worksheet

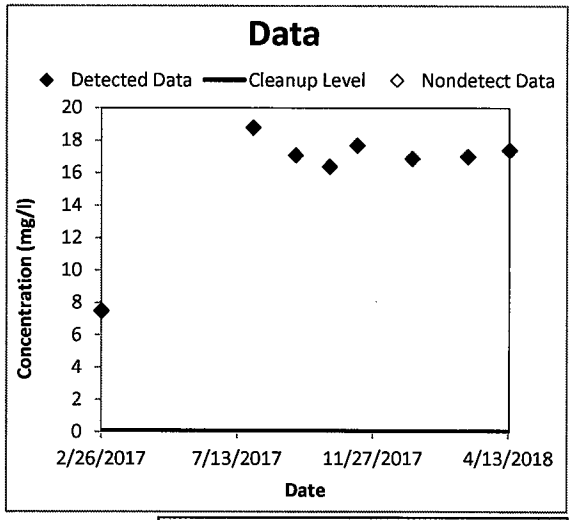
Site Name	Big Fork Ranch
Operating Unit (OU)	Big Fork Ranch
Type of Evaluation	Attainment
Date of Evaluation	7/1/2018
Person performing analysis	AJH

Chemical of Concern	Chloride
Well Name/Number	9A
Date Units	Date
Concentration Units	mg/l

Confidence Level Desired	95%
Cleanup Level	
Source of cleanup level (e.g. MCL or risk-based concentration)	
Risk of False Outlier Rejection	1%
Random Seed (may be left blank)	
Significant figures to use	3

Number of data points	8
Number of detected results	8
Number of nondetect results	0
Detection frequency	1

Date (Date)	Chloride Concentration (mg/l)	Data Qualifier	Detected? (Yes or No)
2/26/2017	7.5		Yes
7/29/2017	18.8		Yes
9/10/2017	17.1		Yes
10/14/2017	16.4		Yes
11/11/2017	17.7		Yes
1/6/2018	16.9		Yes
3/3/2018	17		Yes
4/14/2018	17.4		Yes



Axis Values			
Time		Concentration	
Min	Max	Min	Max
Auto	Auto	Auto	Auto

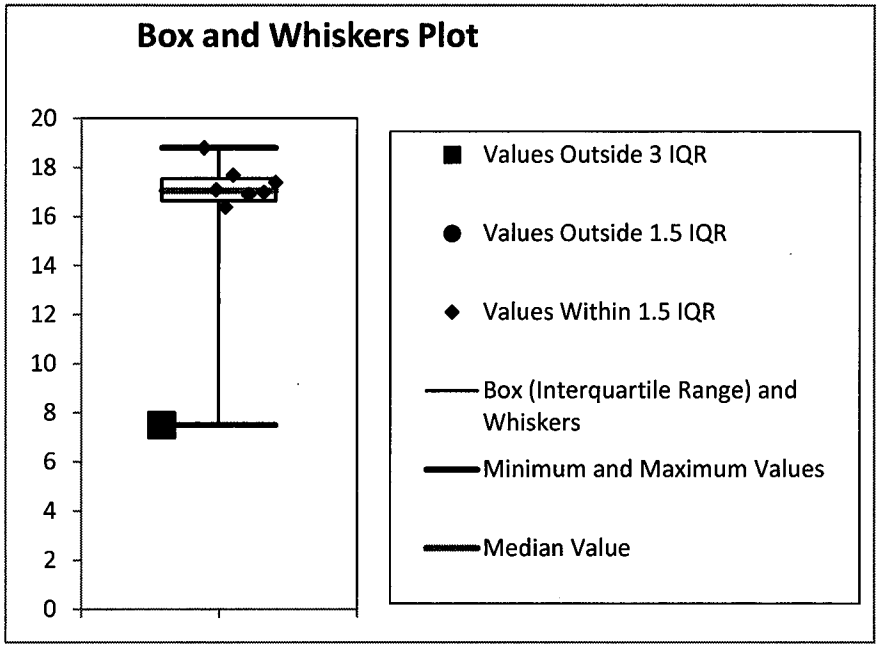
Reset Concentration Axis

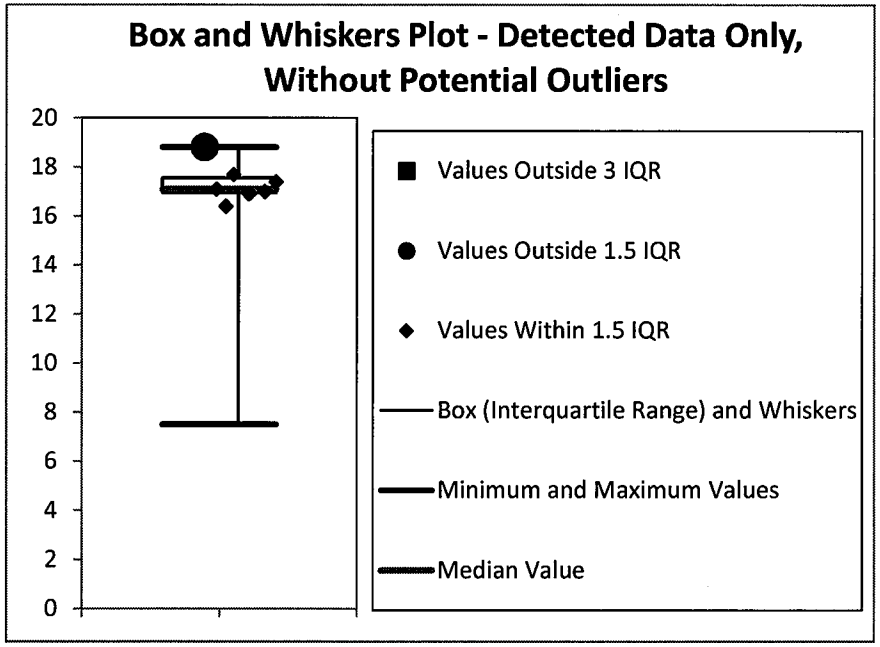
Data Review		Recommendations
Are all necessary data fields entered, and in proper format?	Yes	None
Are at least 4 data points present for statistical analysis?	Yes	None
Are detection limits for nondetects ≤ maximum detected value?	Yes	None
Are all data within chart axis limits?	Yes	None

Groundwater Statistics Tool

Outlier testing worksheet

Dixon's Outlier Test Results		
Number of data points	8	
Risk of false rejection	1%	
Critical value	0.683	
Outlier type	**Low**	**High**
Test statistic	0.8725	0.4583
Potential Outlier?	Yes	No
Validity of Dixon'sTest	Valid	

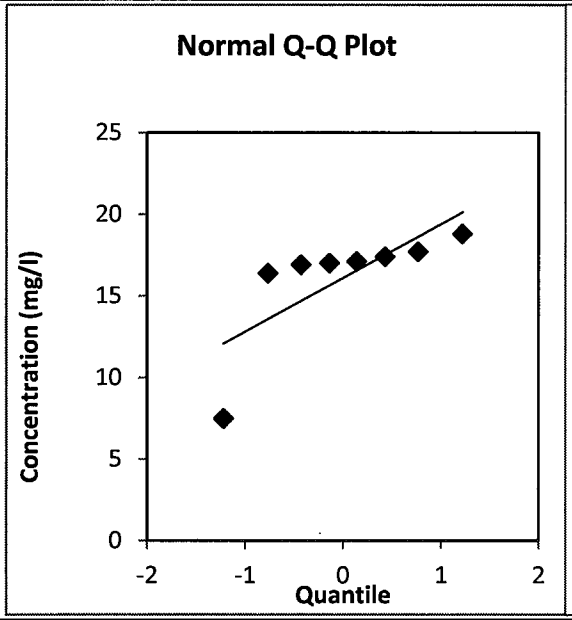


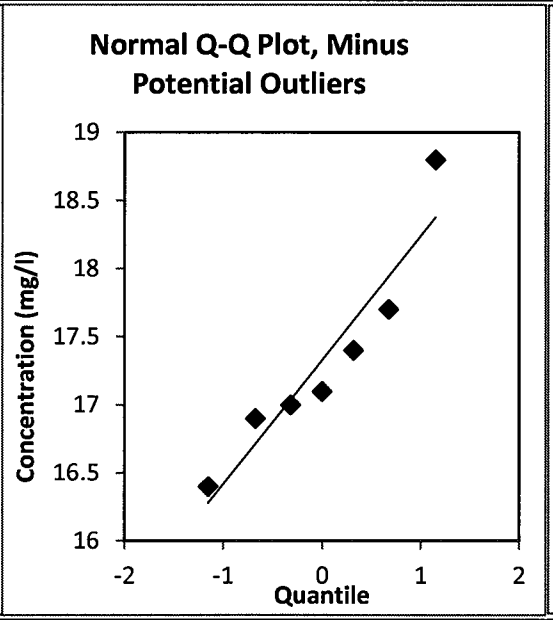


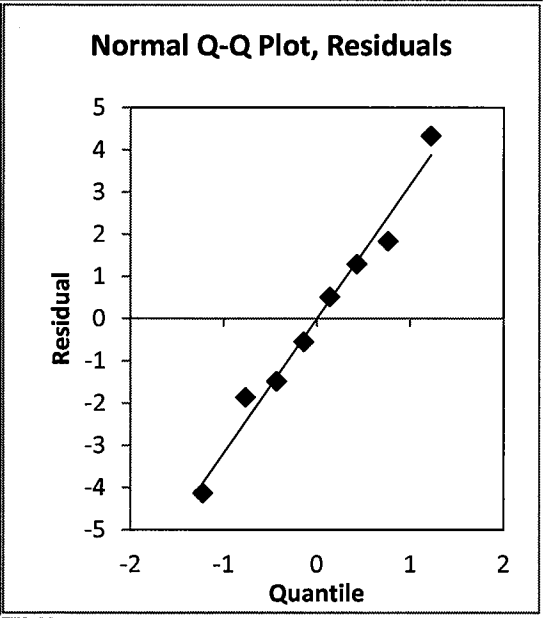
Groundwater Statistics Tool

Normality Testing Worksheet

Normality Test Results			
Parameter	**All Data**	**Minus Outliers**	**Residuals**
Number of data points	8	7	8
Shapiro-Wilk alpha value	10%	10%	10%
Slope	3.293439665	0.911782807	3.181432105
Intercept	16.1	17.32857143	-2.30926E-14
Correlation, R	0.749500614	0.943062237	0.989525808
Exact Test Value	0.612418211	0.916264406	0.991909367
Critical Value	0.851	0.838	0.851
Conclude sample distribution:	Does not appear normal	Appears normal	Appears normal







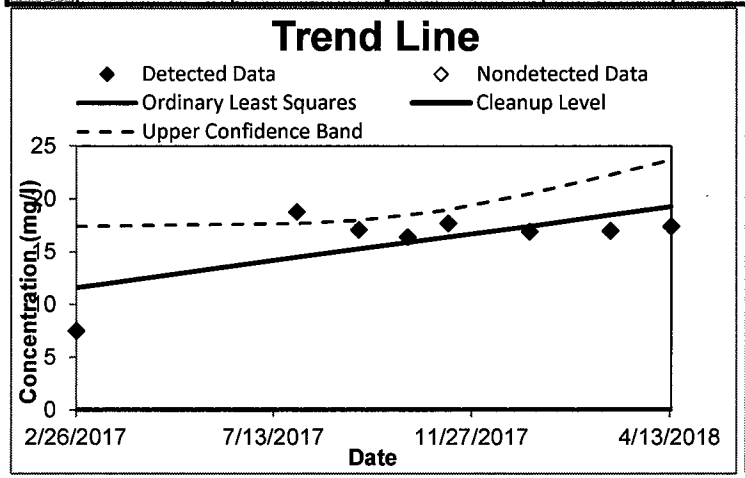
Previous Step: Outliers Screen | Next Step: Trend Screen | Skip Step: UCL Screen

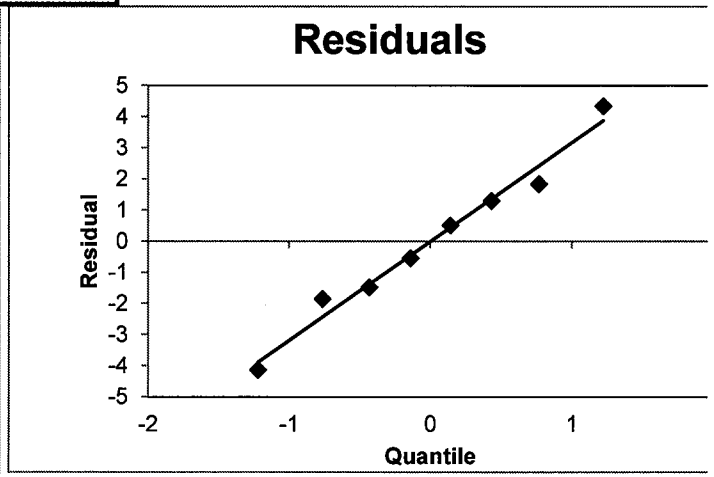
Groundwater Statistics Tool

Trend test results for datasets with normally distributed residuals (with our without transformation)

i	x (Date)	C (mg/l)	C_i Predicted	Fit residual	Upper Confidence Band
1	2/26/2017	7.5	11.6	-4.1	17.4
2	7/29/2017	18.8	14.5	4.3	17.7
3	9/10/2017	17.1	15.3	1.8	18
4	10/14/2017	16.4	15.9	0.5	18.5
5	11/11/2017	17.7	16.4	1.3	19
6	1/6/2018	16.9	17.4	-0.5	20.5
7	3/3/2018	17	18.5	-1.5	22.3
8	4/14/2018	17.4	19.3	-1.9	23.7
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Ordinary Least Squares	
Slope	0.018504556
Intercept	-780.2181298
Correlation, R^2	0.4647
Test Result	Increasing
Test Statistic	2.282
Critical Value	1.943
When is the concentration predicted to exceed the cleanup level?	MCL is already exceeded





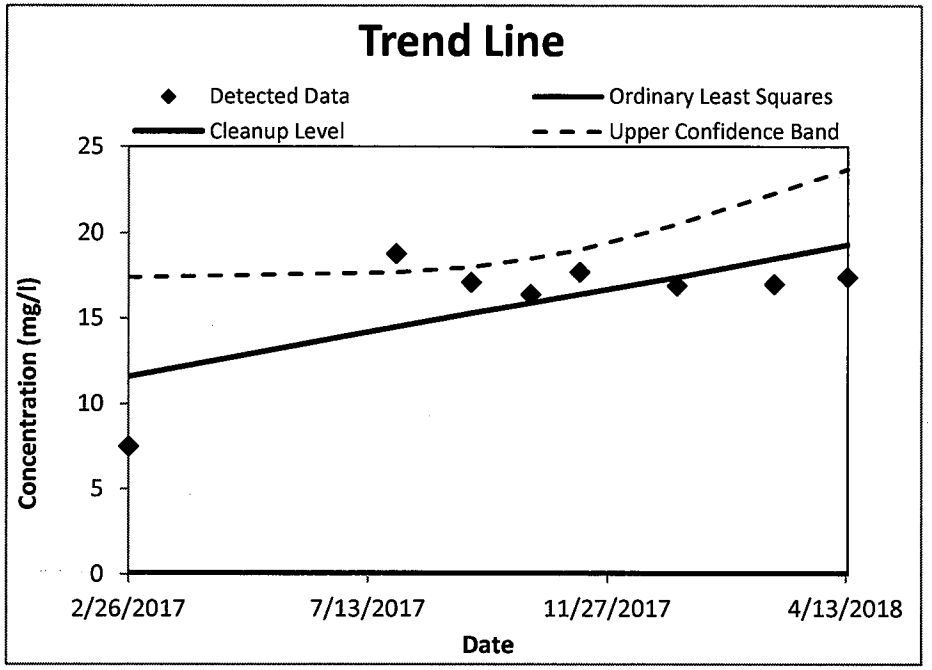
Groundwater Statistics Tool

UCL calculations and summary statistics for nonparametric data sets

Site Name	Big Fork Ranch
Operating Unit (OU)	Big Fork Ranch
Type of Evaluation	Attainment
Date of Evaluation	7/1/2018
Person performing analysis	AJH

Chemical of Concern	Chloride
Well Name/Number	9A
Date Units	Date
Concentration Units	mg/l

Confidence Level	95%
Number of results	8
Number < cleanup level	0
Are any potential outliers present?	Yes
Mean of concentration	16.1
Standard deviation of concentration	3.55



95% Upper Confidence Limit (UCL)	21.6
Method for calculating UCL	Chebyshev UCL
Value of 95% Upper Confidence Band value at final sampling event	23.7
Trend calculation method	Ordinary Least Squares
Cleanup level	0
Source of cleanup level	0
Is the trend decreasing or statistically insignificant?	**No**

When is the concentration predicted to exceed the MCL?	MCL is already exceeded
Random Seed Used	0
Message: None.	

Groundwater Statistics Tool

Data input worksheet

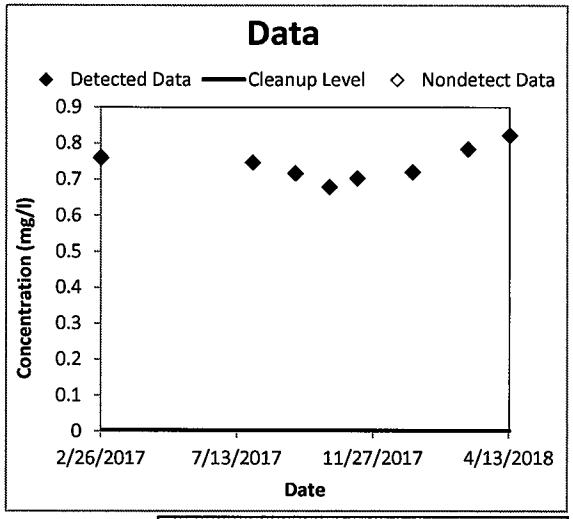
Site Name	Big Fork Ranch
Operating Unit (OU)	Big Fork Ranch
Type of Evaluation	Attainment
Date of Evaluation	7/1/2018
Person performing analysis	AJH

Chemical of Concern	Fluoride
Well Name/Number	9A
Date Units	Date
Concentration Units	mg/l

Confidence Level Desired	95%
Cleanup Level	
Source of cleanup level (e.g. MCL or risk-based concentration)	
Risk of False Outlier Rejection	1%
Random Seed (may be left blank)	
Significant figures to use	3

Number of data points:	8
Number of detected results:	8
Number of nondetect results:	0
Detection frequency:	1

Date (Date)	Fluoride Concentration (mg/l)	Data Qualifier	Detected? (Yes or No)
2/26/2017	0.76		Yes
7/29/2017	0.747		Yes
9/10/2017	0.717		Yes
10/14/2017	0.679		Yes
11/11/2017	0.703		Yes
1/6/2018	0.72		Yes
3/3/2018	0.784		Yes
4/14/2018	0.822		Yes



Axis Values			
Time		Concentration	
Min	Max	Min	Max
Auto	Auto	Auto	Auto

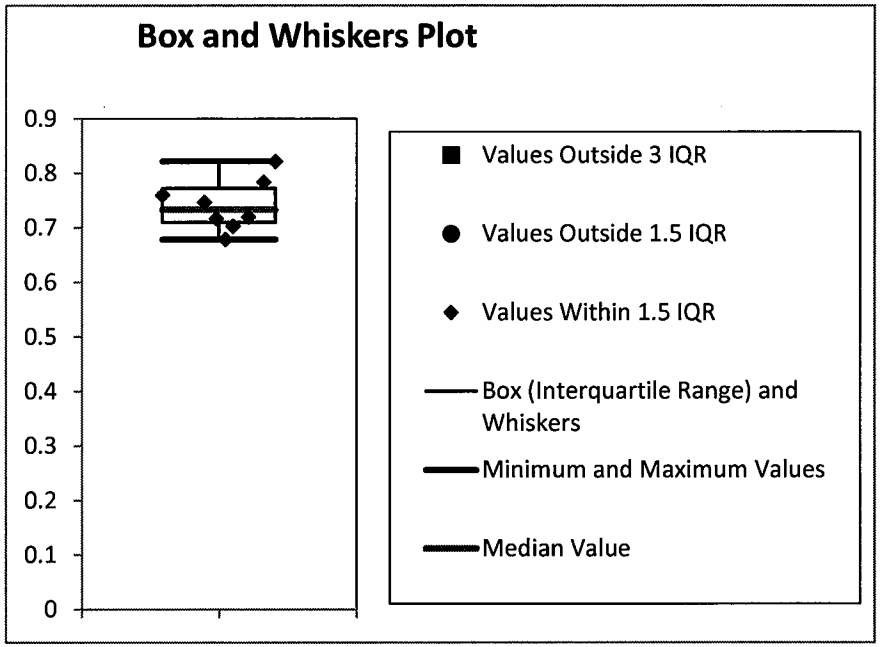
Reset Concentration Axis

Data Review		Recommendations
Are all necessary data fields entered, and in proper format?	Yes	None
Are at least 4 data points present for statistical analysis?	Yes	None
Are detection limits for nondetects ≤ maximum detected value?	Yes	None
Are all data within chart axis limits?	Yes	None

Groundwater Statistics Tool

Outlier testing worksheet

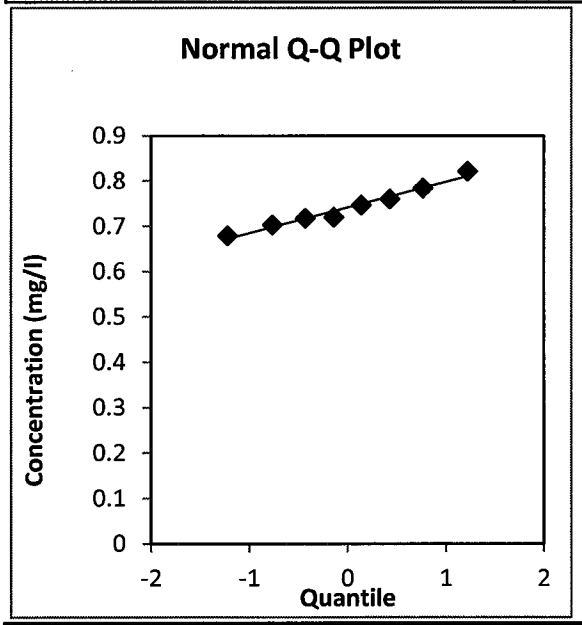
Dixon's Outlier Test Results		
Number of data points	8	
Risk of false rejection	1%	
Critical value	0.683	
Outlier type	**Low**	**High**
Test statistic	0.2286	0.3193
Potential Outlier?	No	No
Validity of Dixon'sTest	Valid	

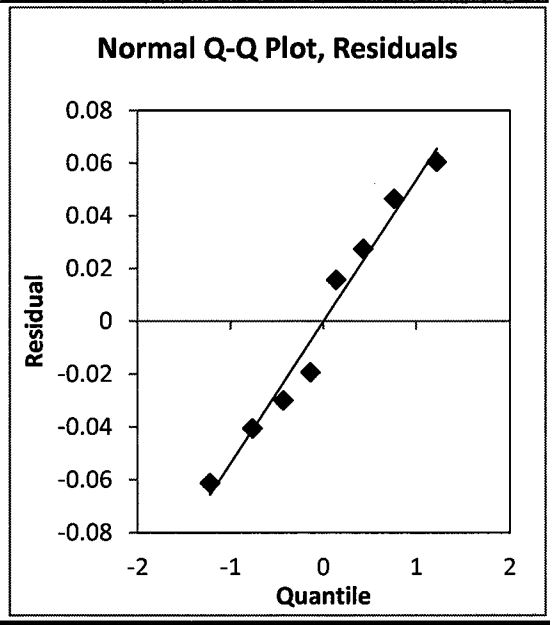


Groundwater Statistics Tool

Normality Testing Worksheet

Normality Test Results			
Parameter	**All Data**	**Minus Outliers**	**Residuals**
Number of data points	8	8	8
Shapiro-Wilk alpha value	10%	N/A	10%
Slope	0.056756686	N/A	0.053712886
Intercept	0.7415	N/A	-4.996E-16
Correlation, R	0.985932302	N/A	0.987151998
Exact Test Value	0.97187162	N/A	0.95012693
Critical Value	0.851	N/A	0.851
Conclude sample distribution:	Appears normal	N/A	Appears normal





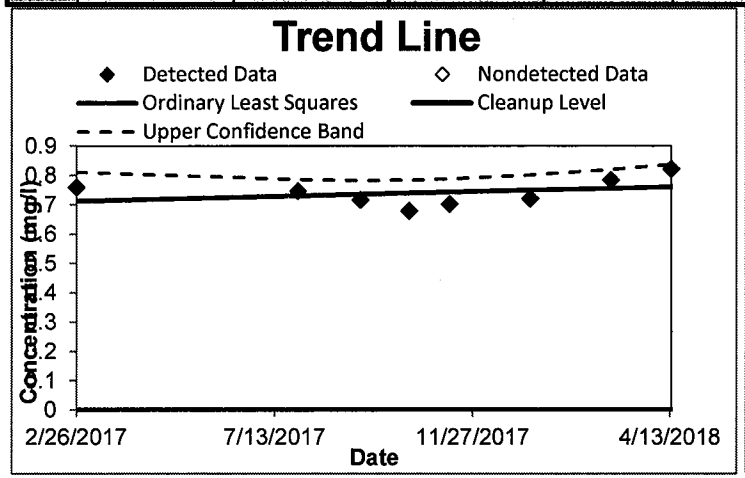
Previous Step: Outliers Screen | Next Step: Trend Screen | Skip Step: UCL Screen

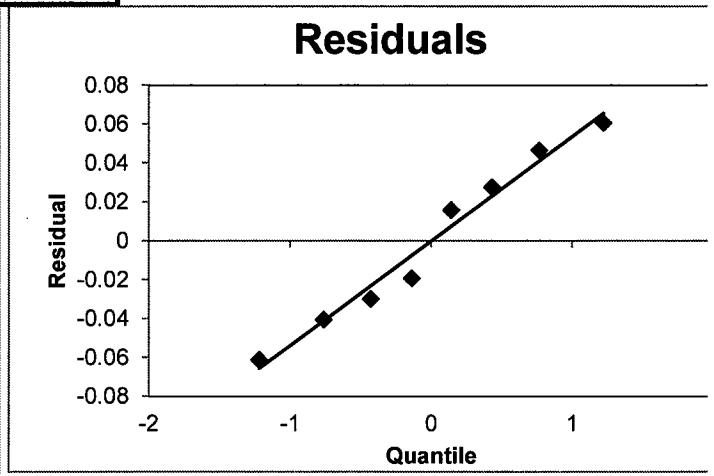
Groundwater Statistics Tool

Trend test results for datasets with normally distributed residuals (with our without transformation)

	t (Date)	C (mg/l)	C Predicted	Fit residual	Upper Confidence Band
1	2/26/2017	0.76	0.713	0.047	0.811
2	7/29/2017	0.747	0.731	0.016	0.786
3	9/10/2017	0.717	0.736	-0.019	0.783
4	10/14/2017	0.679	0.74	-0.061	0.784
5	11/11/2017	0.703	0.743	-0.04	0.788
6	1/6/2018	0.72	0.75	-0.03	0.801
7	3/3/2018	0.784	0.756	0.028	0.82
8	4/14/2018	0.822	0.761	0.061	0.837
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Ordinary Least Squares	
Slope	0.000116111
Intercept	-4.255164829
Correlation, R^2	0.1066
Test Result	No trend
Test Statistic	0.846
Critical Value	1.943
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing





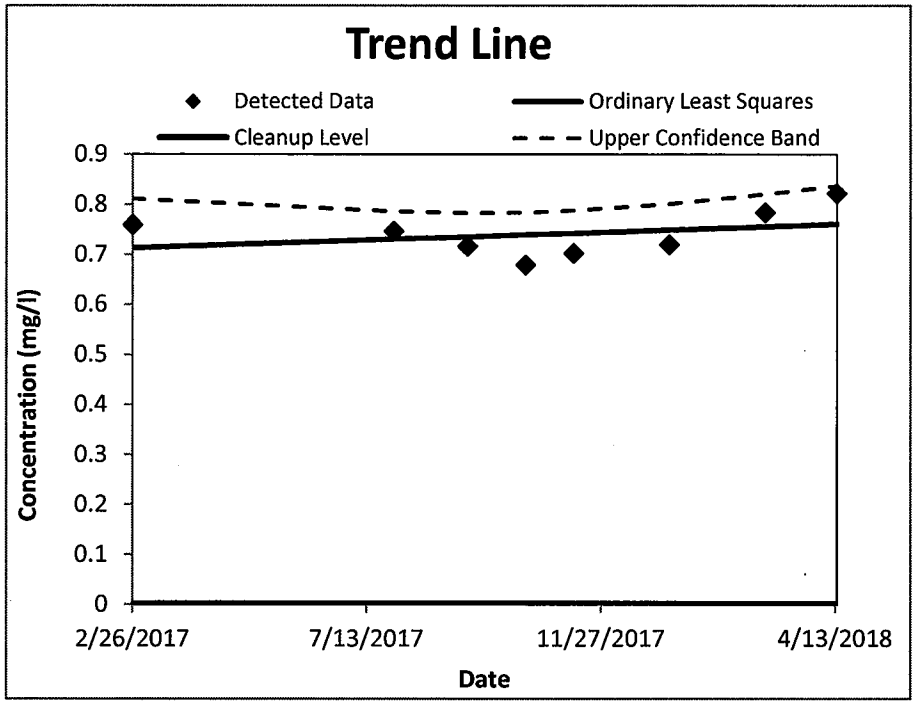
Groundwater Statistics Tool

UCL calculations and summary statistics for data sets that are normally distributed

Site Name	Big Fork Ranch
Operating Unit (OU)	Big Fork Ranch
Type of Evaluation	Attainment
Date of Evaluation	7/1/2018
Person performing analysis	AJH

Chemical of Concern	Fluoride
Well Name/Number	9A
Date Units	Date
Concentration Units	mg/l

Confidence Level	95%
Number of results	8
Number < cleanup level	0
Are any potential outliers present?	No
Mean of concentration	0.742
Standard deviation of concentration	0.0465
t-value for UCL calculation	1.895



95% Upper Confidence Limit (UCL)	0.773
Method for calculating UCL	Student's t UCL
Value of 95% Upper Confidence Band value at final sampling event	0.837
Trend calculation method	Ordinary Least Squares
Cleanup level	0
Source of cleanup level	0
Is the trend decreasing or statistically insignificant?	**Yes**

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Message: None.	

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Groundwater Statistics Tool

Data input worksheet

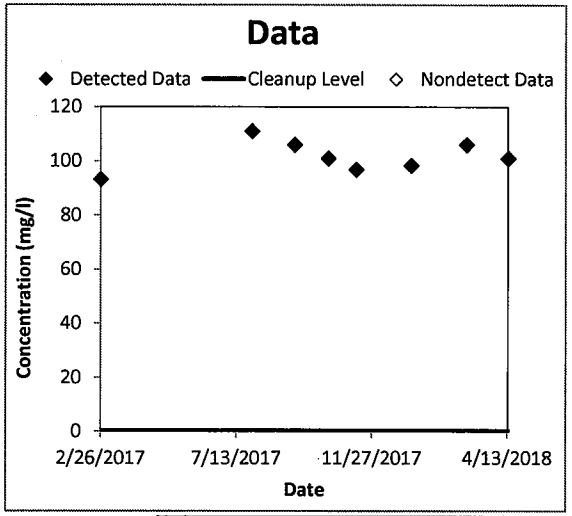
Site Name	Big Fork Ranch
Operating Unit (OU)	Big Fork Ranch
Type of Evaluation	Attainment
Date of Evaluation	7/8/2018
Person performing analysis	AJH

Chemical of Concern	Sulfate
Well Name/Number	9A
Date Units	Date
Concentration Units	mg/l

Confidence Level Desired	95%
Cleanup Level	
Source of cleanup level (e.g. MCL or risk-based concentration)	
Risk of False Outlier Rejection	1%
Random Seed (may be left blank)	
Significant figures to use	3

Number of data points:	8
Number of detected results:	8
Number of nondetect results:	0
Detection frequency:	1

Date (Date)	Sulfate Concentration (mg/l)	Data Qualifier	Detected? (Yes or No)
2/26/2017	93.18		Yes
7/29/2017	111		Yes
9/10/2017	106		Yes
10/14/2017	101		Yes
11/11/2017	96.8		Yes
1/6/2018	98.3		Yes
3/3/2018	106		Yes
4/14/2018	101		Yes



Axis Values			
Time		Concentration	
Min	Max	Min	Max
Auto	Auto	Auto	Auto

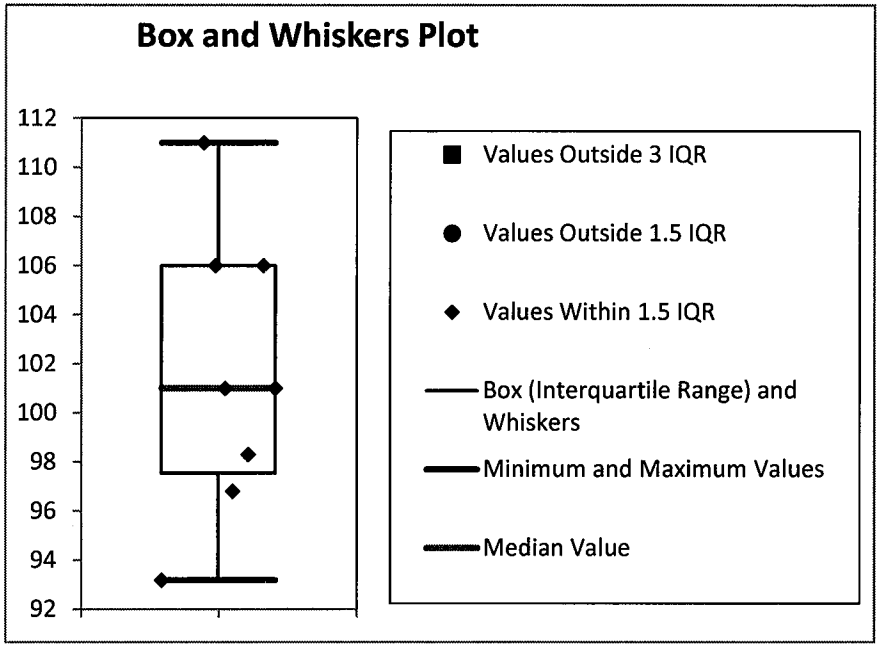
Reset Concentration Axis

Data Review		Recommendations
Are all necessary data fields entered, and in proper format?	Yes	None
Are at least 4 data points present for statistical analysis?	Yes	None
Are detection limits for nondetects ≤ maximum detected value?	Yes	None
Are all data within chart axis limits?	Yes	None

Groundwater Statistics Tool

Outlier testing worksheet

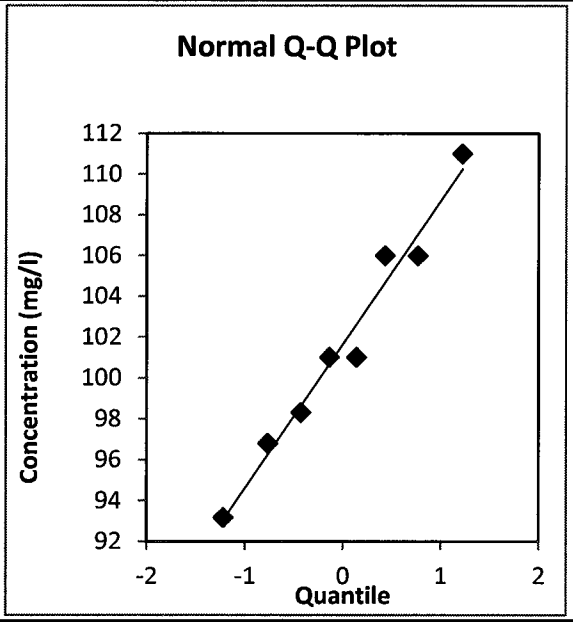
Dixon's Outlier Test Results		
Number of data points	8	
Risk of false rejection	1%	
Critical value	0.683	
Outlier type	**Low**	**High**
Test statistic	0.2824	0.3521
Potential Outlier?	No	No
Validity of Dixon'sTest	Valid	

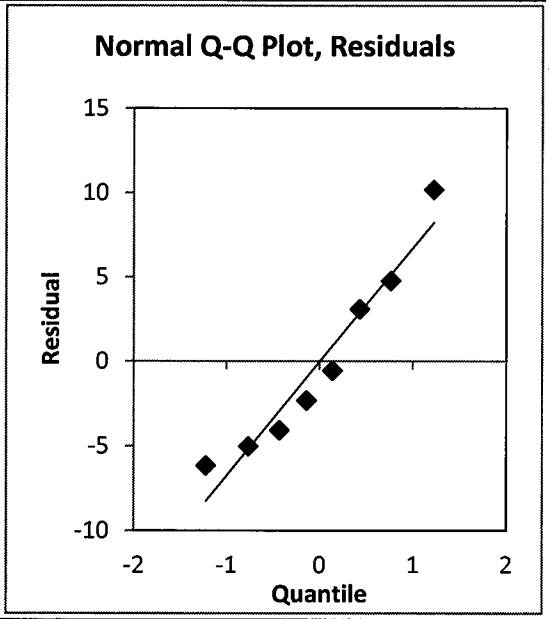


Groundwater Statistics Tool

Normality Testing Worksheet

Normality Test Results			
Parameter	**All Data**	**Minus Outliers**	**Residuals**
Number of data points	8	8	8
Shapiro-Wilk alpha value	10%	N/A	10%
Slope	7.040946368	N/A	6.748807785
Intercept	101.66	N/A	-3.19744E-14
Correlation, R	0.985804326	N/A	0.96834173
Exact Test Value	0.9721985	N/A	0.928200842
Critical Value	0.851	N/A	0.851
Conclude sample distribution:	Appears normal	N/A	Appears normal





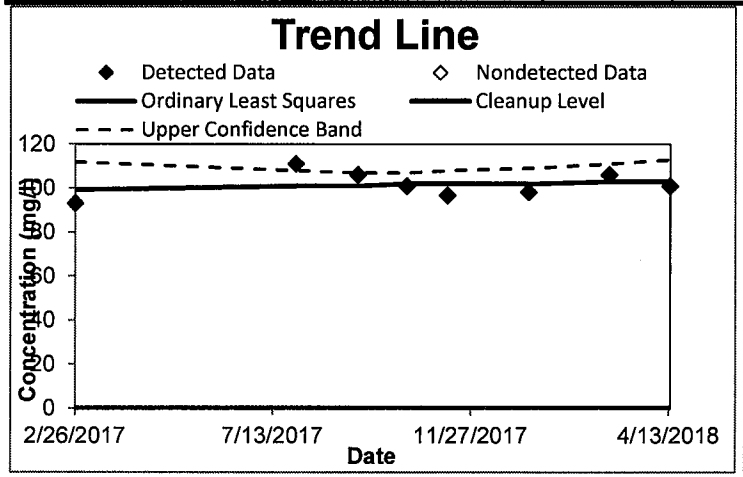
Previous Step: Outliers Screen | Next Step: Trend Screen | Skip Step: UCL Screen

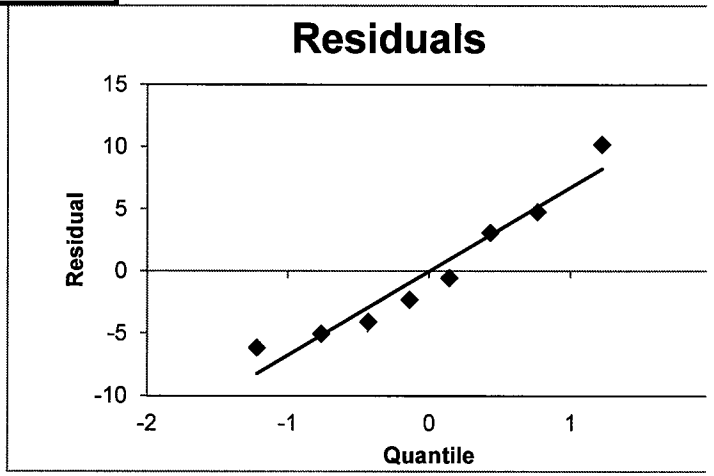
Groundwater Statistics Tool

Trend test results for datasets with normally distributed residuals (with our without transformation)

i	t (Date)	C (mg/l)	C Predicted	Fit residual	Upper Confidence Band
1	2/26/2017	93.18	99.3	-6.12	112
2	7/29/2017	111	101	10	108
3	9/10/2017	106	101	5	107
4	10/14/2017	101	102	-1	107
5	11/11/2017	96.8	102	-5.2	108
6	1/6/2018	98.3	102	-3.7	109
7	3/3/2018	106	103	3	111
8	4/14/2018	101	103	-2	113
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Ordinary Least Squares	
Slope	0.009649623
Intercept	-313.598274
Correlation, R^2	0.0478
Test Result	No trend
Test Statistic	0.549
Critical Value	1.943
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing





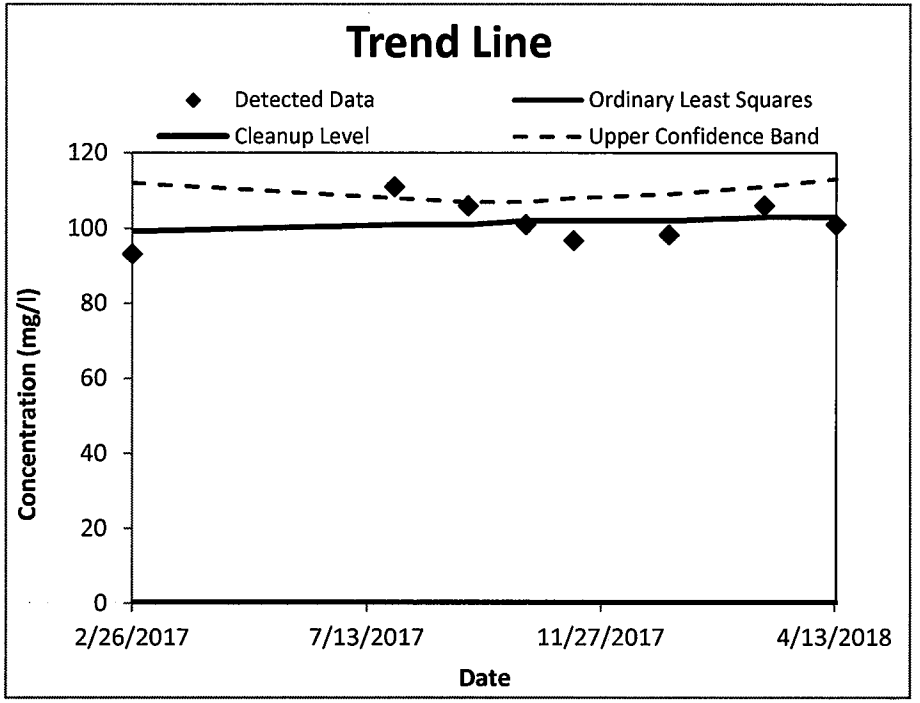
Groundwater Statistics Tool

UCL calculations and summary statistics for data sets that are normally distributed

Site Name	Big Fork Ranch
Operating Unit (OU)	Big Fork Ranch
Type of Evaluation	Attainment
Date of Evaluation	7/8/2018
Person performing analysis	AJH

Chemical of Concern	Sulfate
Well Name/Number	9A
Date Units	Date
Concentration Units	mg/l

Confidence Level	95%
Number of results	8
Number < cleanup level	0
Are any potential outliers present?	No
Mean of concentration	102
Standard deviation of concentration	5.76
t-value for UCL calculation	1.895



95% Upper Confidence Limit (UCL)	106
Method for calculating UCL	Student's t UCL
Value of 95% Upper Confidence Band value at final sampling event	113
Trend calculation method	Ordinary Least Squares
Cleanup level	0
Source of cleanup level	0
Is the trend decreasing or statistically insignificant?	**Yes**

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Message: None.	

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GWMP #10A

Groundwater Results Statistical Analyses

Groundwater Statistics Tool

Data input worksheet

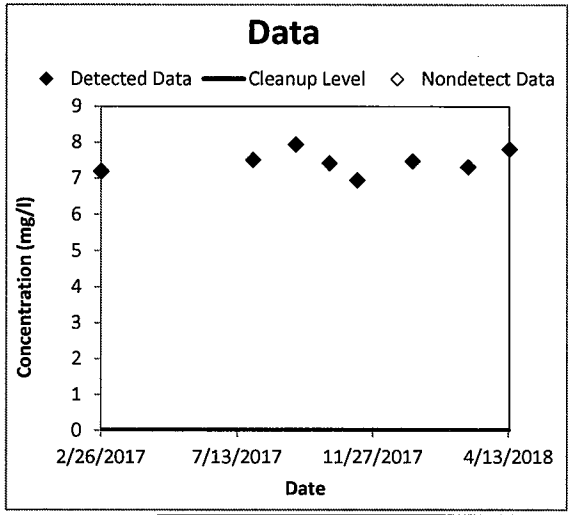
Site Name	Big Fork Ranch
Operating Unit (OU)	Big Fork Ranch
Type of Evaluation	Attainment
Date of Evaluation	7/8/2018
Person performing analysis	AJH

Chemical of Concern	pH
Well Name/Number	10A
Date Units	Date
Concentration Units	su

Confidence Level Desired	95%
Cleanup Level	
Source of cleanup level (e.g. MCL or risk-based concentration)	
Risk of False Outlier Rejection	1%
Random Seed (may be left blank)	
Significant figures to use	3

Number of data points:	8
Number of detected results:	8
Number of nondetect results:	0
Detection frequency:	1

Date (Date)	pH Concentration (su)	Data Qualifier	Detected? (Yes or No)
2/26/2017	7.19		Yes
7/29/2017	7.51		Yes
9/10/2017	7.94		Yes
10/14/2017	7.42		Yes
11/11/2017	6.95		Yes
1/6/2018	7.48		Yes
3/3/2018	7.31		Yes
4/14/2018	7.81		Yes



Axis Values			
Time		Concentration	
Min	Max	Min	Max
Auto	Auto	Auto	Auto

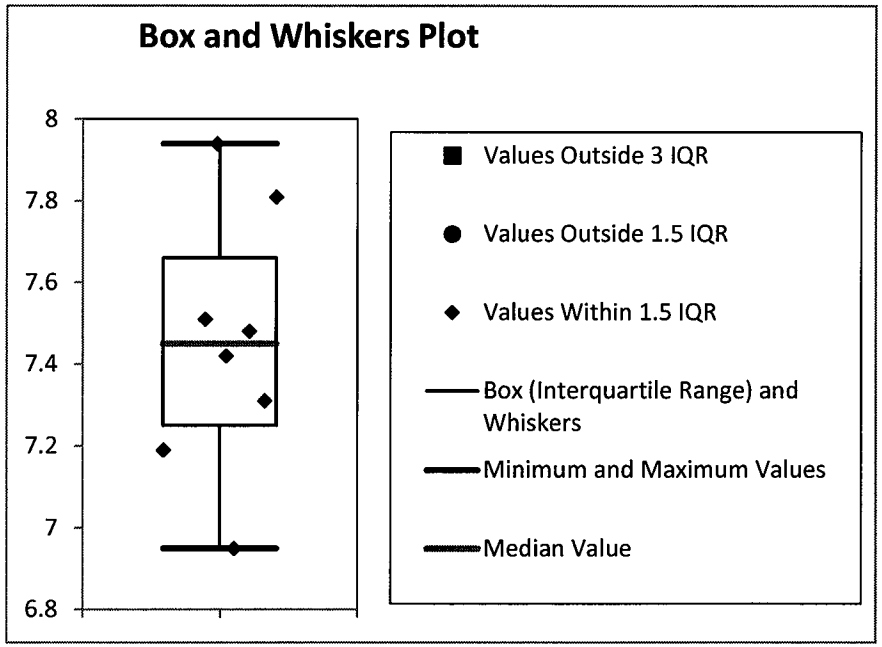
Reset Concentration Axis

Data Review		Recommendations
Are all necessary data fields entered, and in proper format?	Yes	None
Are at least 4 data points present for statistical analysis?	Yes	None
Are detection limits for nondetects ≤ maximum detected value?	Yes	None
Are all data within chart axis limits?	Yes	None

Groundwater Statistics Tool

Outlier testing worksheet

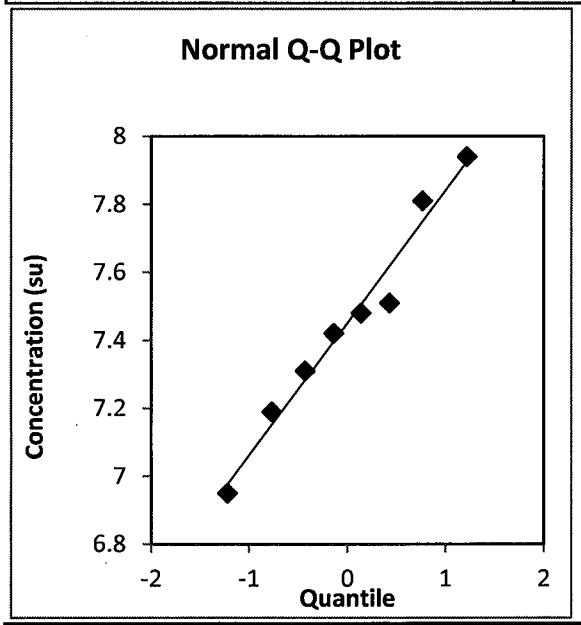
Dixon's Outlier Test Results		
Number of data points	8	
Risk of false rejection	1%	
Critical value	0.683	
Outlier type	**Low**	**High**
Test statistic	0.2791	0.1733
Potential Outlier?	No	No
Validity of Dixon'sTest	Valid	

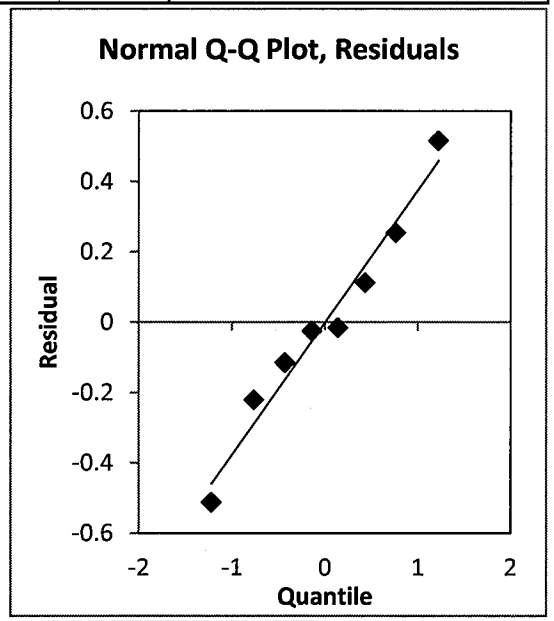


Groundwater Statistics Tool

Normality Testing Worksheet

Normality Test Results			
Parameter	**All Data**	**Minus Outliers**	**Residuals**
Number of data points	8	8	8
Shapiro-Wilk alpha value	10%	N/A	10%
Slope	0.389747086	N/A	0.376400535
Intercept	7.45125	N/A	-2.10942E-15
Correlation, R	0.986092177	N/A	0.983480775
Exact Test Value	0.97543796	N/A	0.987552906
Critical Value	0.851	N/A	0.851
Conclude sample distribution:	Appears normal	N/A	Appears normal





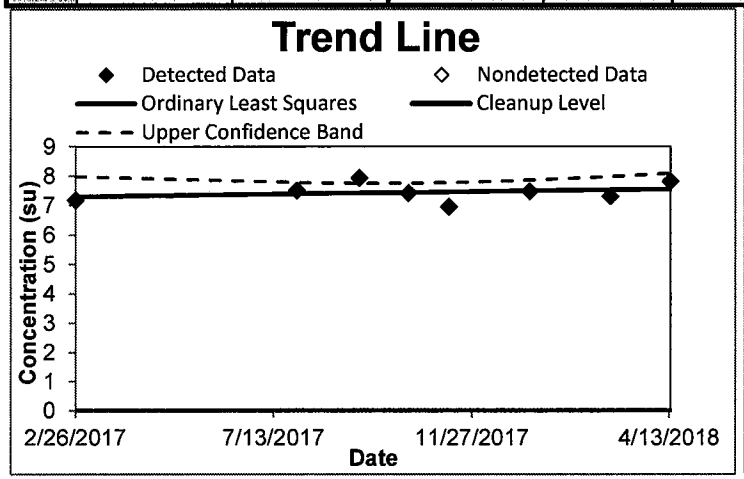
Previous Step: Outliers Screen | Next Step: Trend Screen | Skip Step: UCL Screen

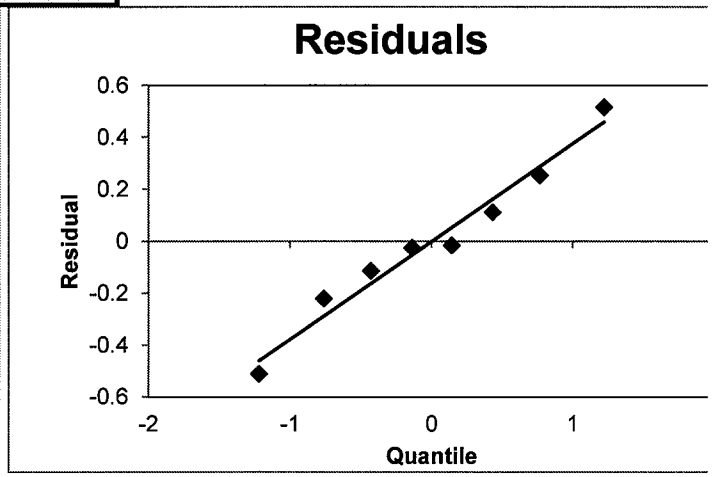
Groundwater Statistics Tool

Trend test results for datasets with normally distributed residuals (with our without transformation)

i	t (Date)	C (su)	C Predicted	Fit residual	Upper Confidence Band
1	2/26/2017	7.19	7.3	-0.11	7.99
2	7/29/2017	7.51	7.4	0.11	7.78
3	9/10/2017	7.94	7.42	0.52	7.75
4	10/14/2017	7.42	7.44	-0.02	7.76
5	11/11/2017	6.95	7.46	-0.51	7.77
6	1/6/2018	7.48	7.5	-0.02	7.86
7	3/3/2018	7.31	7.53	-0.22	7.98
8	4/14/2018	7.81	7.56	0.25	8.09
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Ordinary Least Squares	
Slope	0.000609735
Intercept	-18.78785923
Correlation, R^2	0.0624
Test Result	No trend
Test Statistic	0.632
Critical Value	1.943
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing





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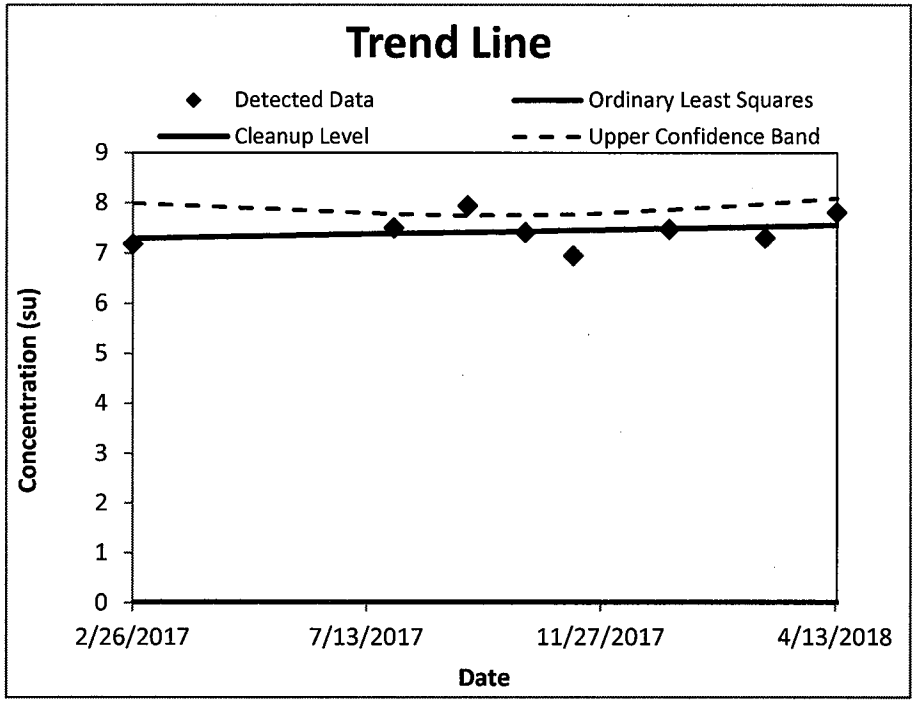
Groundwater Statistics Tool

UCL calculations and summary statistics for data sets that are normally distributed

Site Name	Big Fork Ranch
Operating Unit (OU)	Big Fork Ranch
Type of Evaluation	Attainment
Date of Evaluation	7/8/2018
Person performing analysis	AJH

Chemical of Concern	pH
Well Name/Number	10A
Date Units	Date
Concentration Units	su

Confidence Level	95%
Number of results	8
Number < cleanup level	0
Are any potential outliers present?	No
Mean of concentration	7.45
Standard deviation of concentration	0.319
t-value for UCL calculation	1.895



95% Upper Confidence Limit (UCL)	7.66
Method for calculating UCL	Student's t UCL
Value of 95% Upper Confidence Band value at final sampling event	8.09
Trend calculation method	Ordinary Least Squares
Cleanup level	0
Source of cleanup level	0
Is the trend decreasing or statistically insignificant?	Yes

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Message: None.	

Groundwater Statistics Tool

Data input worksheet

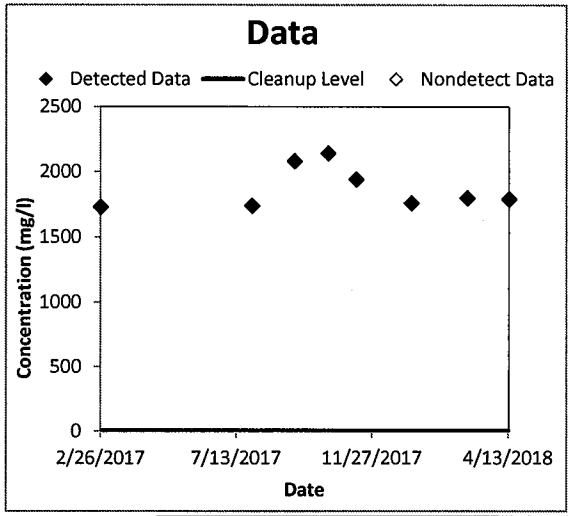
Site Name	Big Fork Ranch
Operating Unit (OU)	Big Fork Ranch
Type of Evaluation	Attainment
Date of Evaluation	7/8/2018
Person performing analysis	AJH

Chemical of Concern	TDS
Well Name/Number	10A
Date Units	Date
Concentration Units	mg/l

Confidence Level Desired	95%
Cleanup Level	
Source of cleanup level (e.g. MCL or risk-based concentration)	
Risk of False Outlier Rejection	1%
Random Seed (may be left blank)	
Significant figures to use	3

Number of data points:	8
Number of detected results:	8
Number of nondetect results:	0
Detection frequency:	1

Date (Date)	TDS Concentration (mg/l)	Data Qualifier	Detected? (Yes or No)
2/26/2017	1730		Yes
7/29/2017	1740		Yes
9/10/2017	2080		Yes
10/14/2017	2140		Yes
11/11/2017	1940		Yes
1/6/2018	1760		Yes
3/3/2018	1800		Yes
4/14/2018	1790		Yes



Axis Values			
Time		Concentration	
Min	Max	Min	Max
Auto	Auto	Auto	Auto

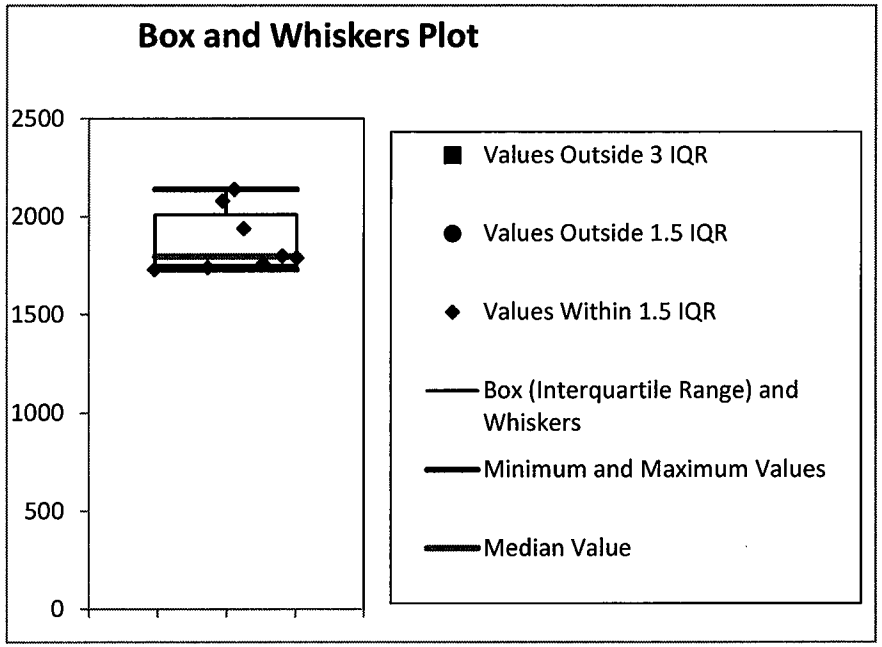
Reset Concentration Axis

Data Review		Recommendations
Are all necessary data fields entered, and in proper format?	Yes	None
Are at least 4 data points present for statistical analysis?	Yes	None
Are detection limits for nondetects ≤ maximum detected value?	Yes	None
Are all data within chart axis limits?	Yes	None

Groundwater Statistics Tool

Outlier testing worksheet

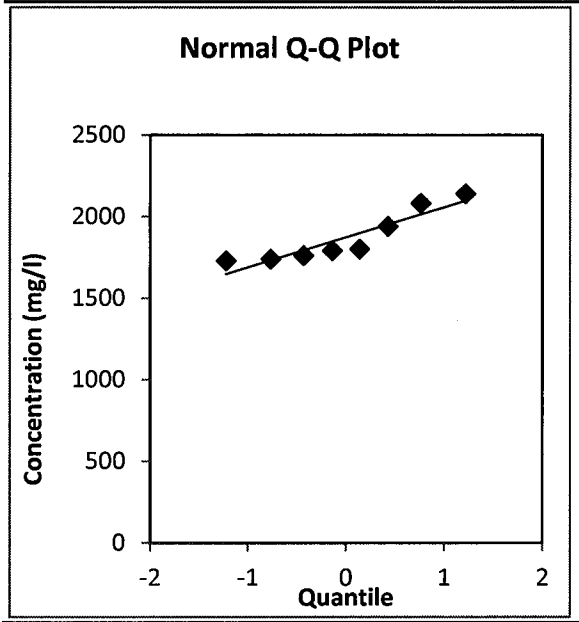
Dixon's Outlier Test Results		
Number of data points	8	
Risk of false rejection	1%	
Critical value	0.683	
Outlier type	**Low**	**High**
Test statistic	0.0286	0.1500
Potential Outlier?	No	No
Validity of Dixon'sTest	Valid	

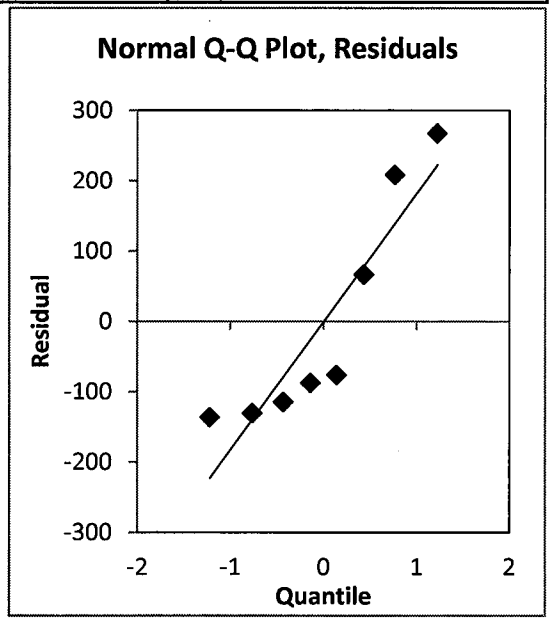


Groundwater Statistics Tool

Normality Testing Worksheet

Normality Test Results			
Parameter	**All Data**	**Minus Outliers**	**Residuals**
Number of data points	8	8	8
Shapiro-Wilk alpha value	10%	N/A	10%
Slope	184.0942192	N/A	182.4292578
Intercept	1872.5	N/A	-5.68434E-14
Correlation, R	0.922072861	N/A	0.913948765
Exact Test Value	0.826779067	N/A	0.811177301
Critical Value	0.851	N/A	0.851
Conclude sample distribution:	Does not appear normal	N/A	Does not appear normal





Previous Step: Outliers Screen | Next Step: Trend Screen | Skip Step: UCL Screen

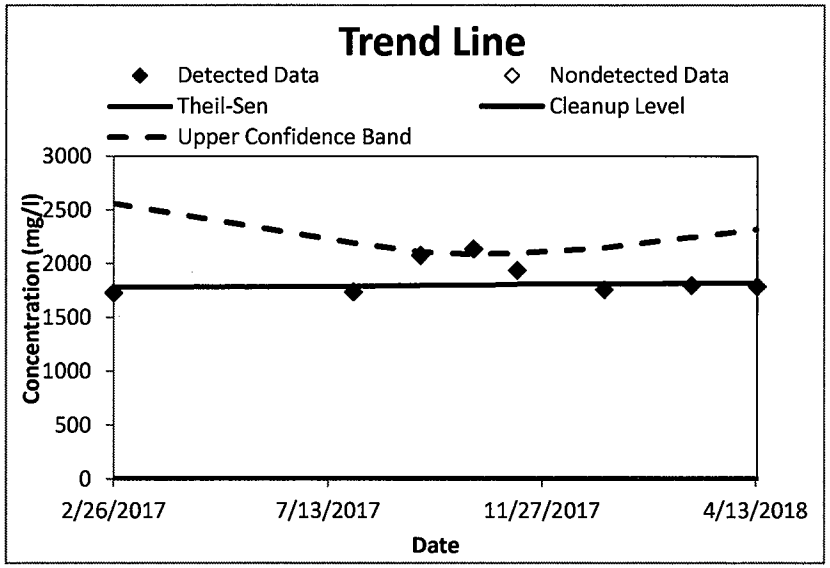
Groundwater Statistics Tool

Trend test results for datasets nonparametrically distributed residuals

i	t (Date)	C (mg/l)	C Predicted	Residual	Upper Confidence Band
1	2/26/2017	1730	1780	-50	2560
2	7/29/2017	1740	1790	-50	2200
3	9/10/2017	2080	1800	280	2110
4	10/14/2017	2140	1800	340	2090
5	11/11/2017	1940	1810	130	2100
6	1/6/2018	1760	1810	-50	2150
7	3/3/2018	1800	1820	-20	2250
8	4/14/2018	1790	1820	-30	2320
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Mann-Kendall	
Test Result	No trend
Test Statistic (S)	4
Normalized S	0.371
Critical Value	1.645

Theil-Sen	
Slope	0.11
Intercept	-2930
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing



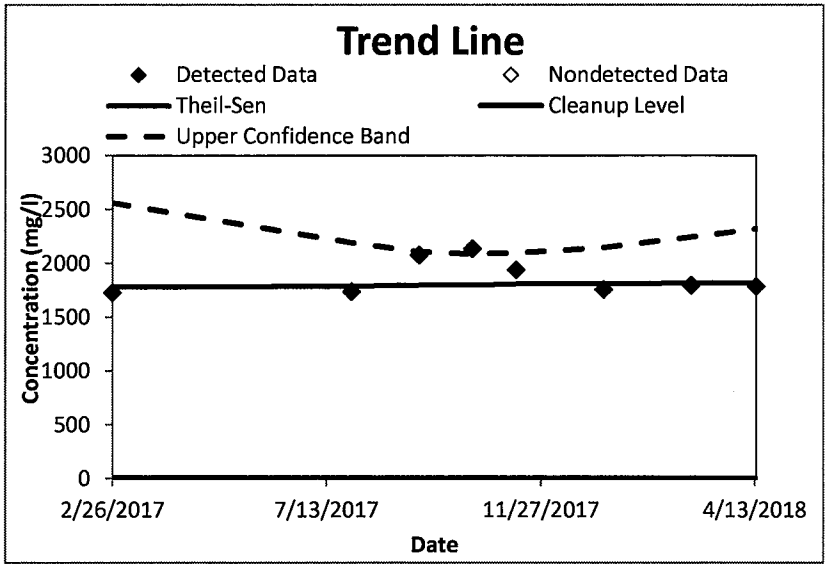
Groundwater Statistics Tool

Trend test results for datasets nonparametrically distributed residuals

i	t (Date)	C (mg/l)	C Predicted	Residual	Upper Confidence Band
1	2/26/2017	1730	1780	-50	2560
2	7/29/2017	1740	1790	-50	2200
3	9/10/2017	2080	1800	280	2110
4	10/14/2017	2140	1800	340	2090
5	11/11/2017	1940	1810	130	2100
6	1/6/2018	1760	1810	-50	2150
7	3/3/2018	1800	1820	-20	2250
8	4/14/2018	1790	1820	-30	2320
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Mann-Kendall	
Test Result	No trend
Test Statistic (S)	4
Normalized S	0.371
Critical Value	1.645

Theil-Sen	
Slope	0.11
Intercept	-2930
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing



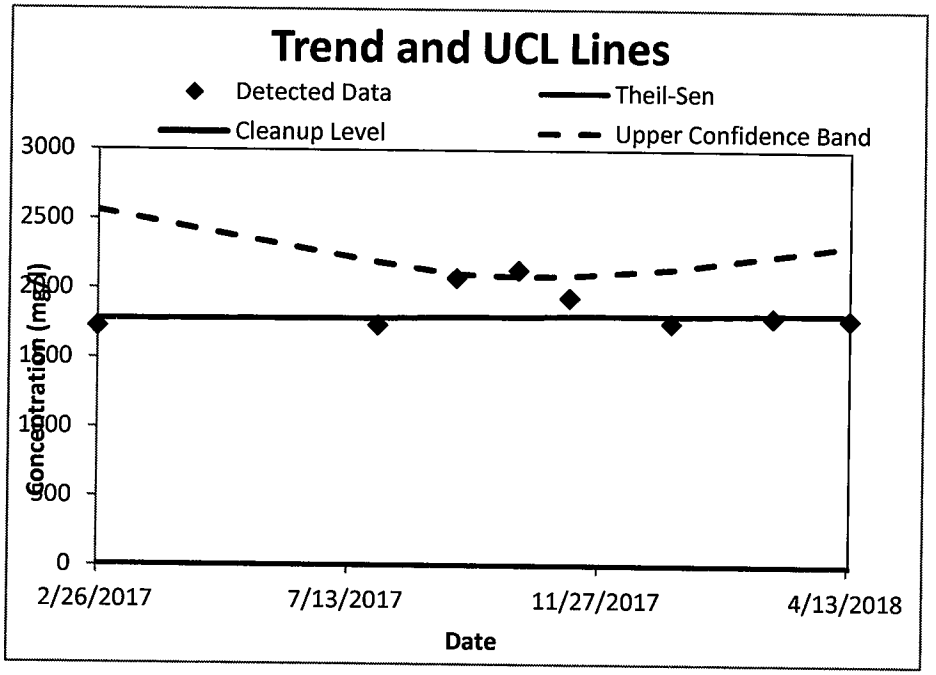
Groundwater Statistics Tool

UCL calculations and summary statistics for nonparametric data sets

Site Name	Big Fork Ranch
Operating Unit (OU)	Big Fork Ranch
Type of Evaluation	Attainment
Date of Evaluation	7/8/2018
Person performing analysis	AJH

Chemical of Concern	TDS
Well Name/Number	10A
Date Units	Date
Concentration Units	mg/l

Confidence Level	95%
Number of results	8
Number < cleanup level	0
Are any potential outliers present?	No
Mean of concentration	1870
Standard deviation of concentration	161



95% Upper Confidence Limit (UCL)	2120
Method for calculating UCL	Chebyshev UCL
Value of 95% Upper Confidence Band value at final sampling event	2320
Trend calculation method	Theil-Sen/Mann-Kendall
Cleanup level	0
Source of cleanup level	0
Is the trend decreasing or statistically insignificant?	**Yes**

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Random Seed Used	37663.75
Message: None.	

Groundwater Statistics Tool

Data input worksheet

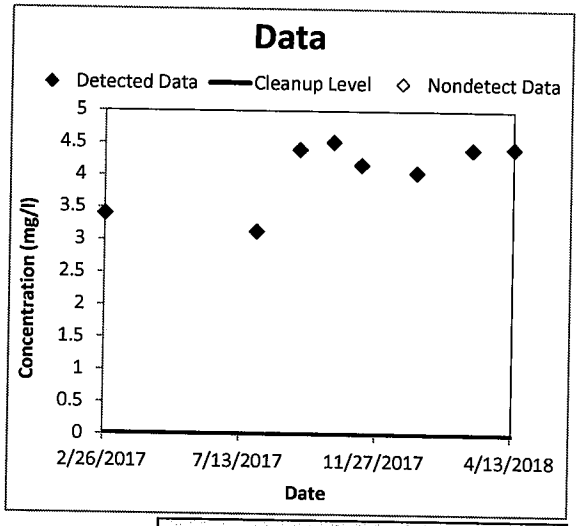
Site Name	Big Fork Ranch
Operating Unit (OU)	Big Fork Ranch
Type of Evaluation	Attainment
Date of Evaluation	7/8/2018
Person performing analysis	AJH

Chemical of Concern	Boron
Well Name/Number	10A
Date Units	Date
Concentration Units	mg/l

Confidence Level Desired	95%
Cleanup Level	
Source of cleanup level (e.g. MCL or risk-based concentration)	
Risk of False Outlier Rejection	1%
Random Seed (may be left blank)	
Significant figures to use	3

Number of data points	8
Number of detected results	8
Number of nondetect results	0
Detection frequency	1

Date (Date)	Boron Concentration (mg/l)	Data Qualifier	Detected? (Yes or No)
2/26/2017	3.4		Yes
7/29/2017	3.13		Yes
9/10/2017	4.4		Yes
10/14/2017	4.52		Yes
11/11/2017	4.17		Yes
1/6/2018	4.05		Yes
3/3/2018	4.41		Yes
4/14/2018	4.43		Yes



Axis Values			
Time		Concentration	
Min	Max	Min	Max
Auto	Auto	Auto	Auto

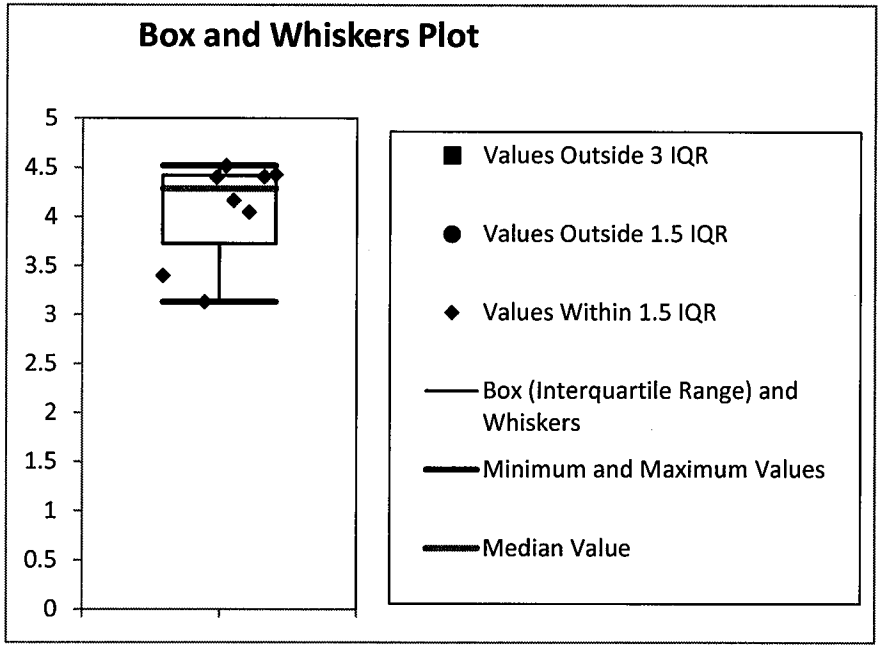
Reset Concentration Axis

Data Review		Recommendations
Are all necessary data fields entered, and in proper format?	Yes	None
Are at least 4 data points present for statistical analysis?	Yes	None
Are detection limits for nondetects ≤ maximum detected value?	Yes	None
Are all data within chart axis limits?	Yes	None

Groundwater Statistics Tool

Outlier testing worksheet

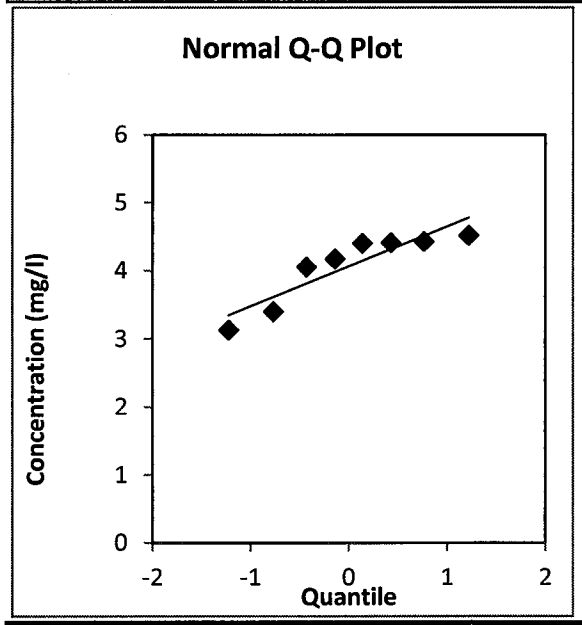
Dixon's Outlier Test Results		
Number of data points	8	
Risk of false rejection	1%	
Critical value	0.683	
Outlier type	**Low**	**High**
Test statistic	0.2077	0.0804
Potential Outlier?	No	No
Validity of Dixon'sTest	Valid	

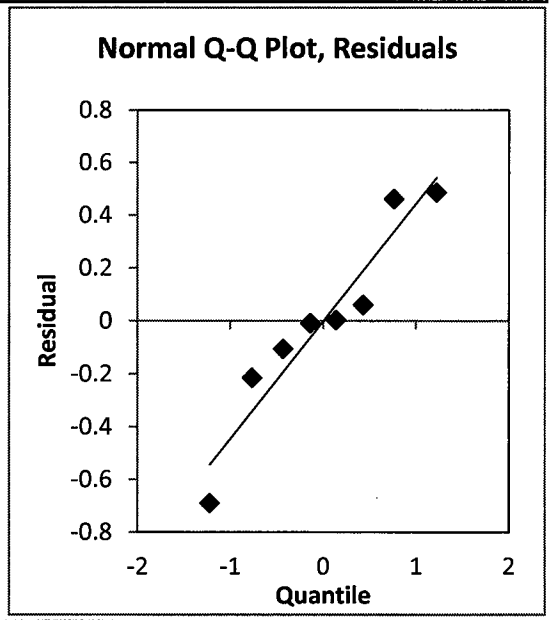


Groundwater Statistics Tool

Normality Testing Worksheet

Normality Test Results			
Parameter	**All Data**	**Minus Outliers**	**Residuals**
Number of data points	8	8	8
Shapiro-Wilk alpha value	10%	N/A	10%
Slope	0.585917507	N/A	0.444551132
Intercept	4.06375	N/A	4.60743E-15
Correlation, R	0.907851574	N/A	0.955393372
Exact Test Value	0.813231847	N/A	0.925601751
Critical Value	0.851	N/A	0.851
Conclude sample distribution:	Does not appear normal	N/A	Appears normal





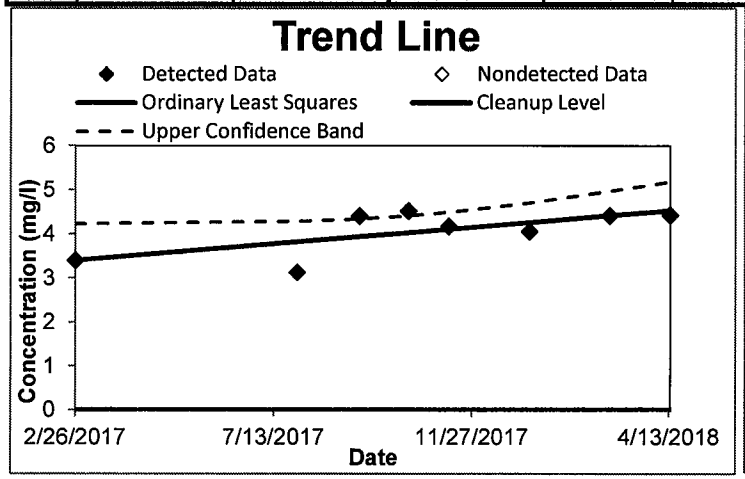
Previous Step: Outliers Screen | Next Step: Trend Screen | Skip Step: UCL Screen

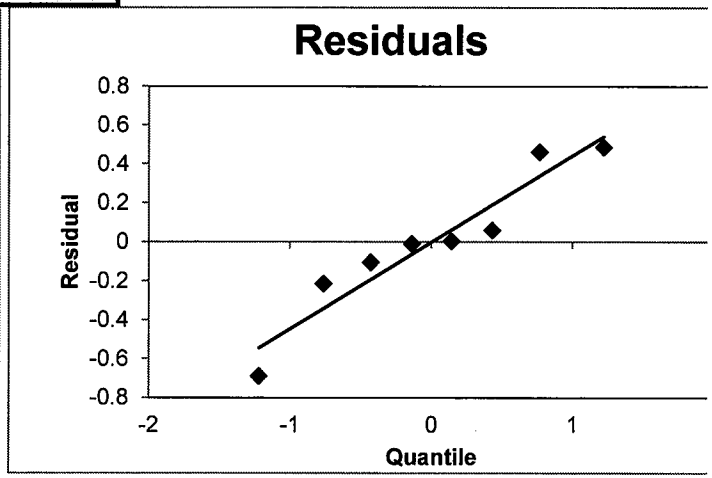
Groundwater Statistics Tool

Trend test results for datasets with normally distributed residuals (with our without transformation)

	t (Date)	C (mg/l)	C Predicted	Fit residual	Upper Confidence Band
1	2/26/2017	3.4	3.4	0	4.23
2	7/29/2017	3.13	3.82	-0.69	4.29
3	9/10/2017	4.4	3.94	0.46	4.34
4	10/14/2017	4.52	4.03	0.49	4.41
5	11/11/2017	4.17	4.11	0.06	4.49
6	1/6/2018	4.05	4.26	-0.21	4.7
7	3/3/2018	4.41	4.42	-0.01	4.97
8	4/14/2018	4.43	4.53	-0.1	5.18
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Ordinary Least Squares	
Slope	0.002762929
Intercept	-114.8350982
Correlation, R^2	0.4802
Test Result	Increasing
Test Statistic	2.354
Critical Value	1.943
When is the concentration predicted to exceed the cleanup level?	MCL is already exceeded





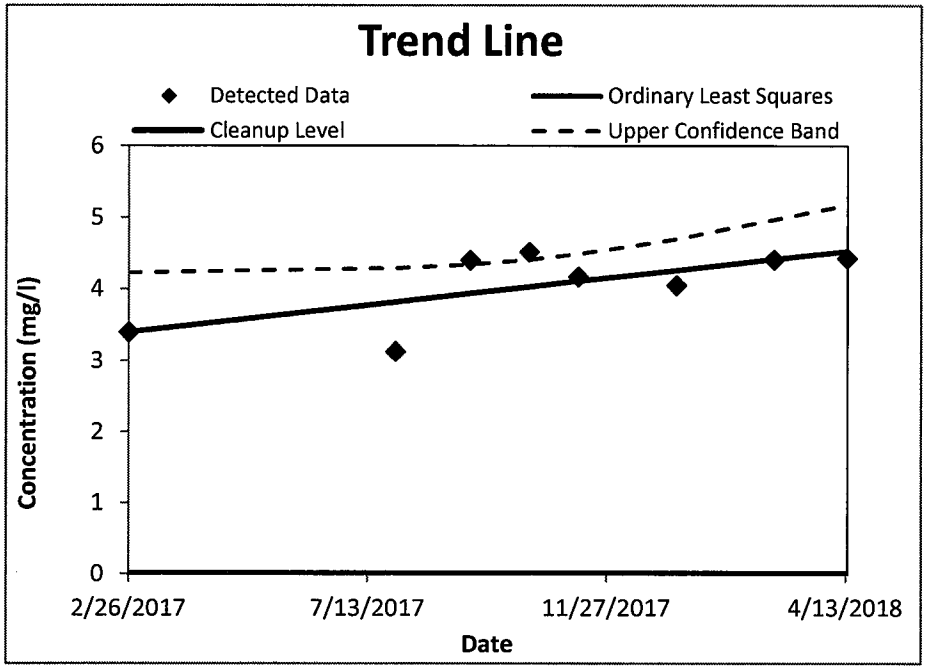
Groundwater Statistics Tool

UCL calculations and summary statistics for nonparametric data sets

Site Name	Big Fork Ranch
Operating Unit (OU)	Big Fork Ranch
Type of Evaluation	Attainment
Date of Evaluation	7/8/2018
Person performing analysis	AJH

Chemical of Concern	Boron
Well Name/Number	10A
Date Units	Date
Concentration Units	mg/l

Confidence Level	95%
Number of results	8
Number < cleanup level	0
Are any potential outliers present?	No
Mean of concentration	4.06
Standard deviation of concentration	0.521



95% Upper Confidence Limit (UCL)	4.86
Method for calculating UCL	Chebyshev UCL
Value of 95% Upper Confidence Band value at final sampling event	5.18
Trend calculation method	Ordinary Least Squares
Cleanup level	0
Source of cleanup level	0
Is the trend decreasing or statistically insignificant?	**No**

When is the concentration predicted to exceed the MCL?	MCL is already exceeded
Random Seed Used	0
Message: None.	

Groundwater Statistics Tool

Data input worksheet

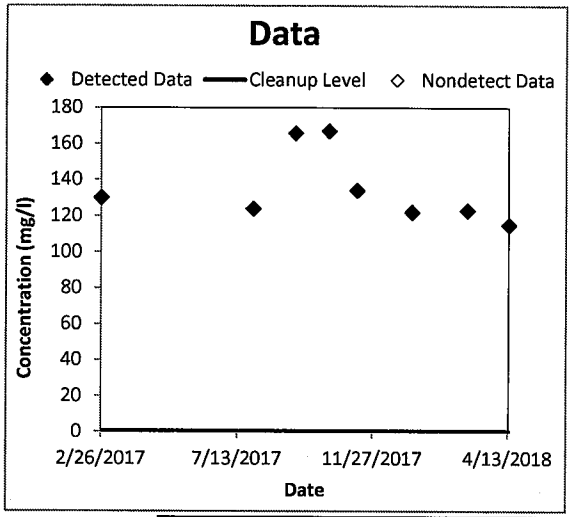
Site Name	Big Fork Ranch
Operating Unit (OU)	Big Fork Ranch
Type of Evaluation	Attainment
Date of Evaluation	7/8/2018
Person performing analysis	AJH

Chemical of Concern	Calcium
Well Name/Number	10A
Date Units	Date
Concentration Units	mg/l

Confidence Level Desired	95%
Cleanup Level	
Source of cleanup level (e.g. MCL or risk-based concentration)	
Risk of False Outlier Rejection	1%
Random Seed (may be left blank)	
Significant figures to use	3

Number of data points:	8
Number of detected results:	8
Number of nondetect results:	0
Detection frequency:	1

Date (Date)	Calcium Concentration (mg/l)	Data Qualifier	Detected? (Yes or No)
2/26/2017	130		Yes
7/29/2017	124		Yes
9/10/2017	166		Yes
10/14/2017	167		Yes
11/11/2017	134		Yes
1/6/2018	122		Yes
3/3/2018	123		Yes
4/14/2018	115		Yes



Axis Values			
Time		Concentration	
Min	Max	Min	Max
Auto	Auto	Auto	Auto

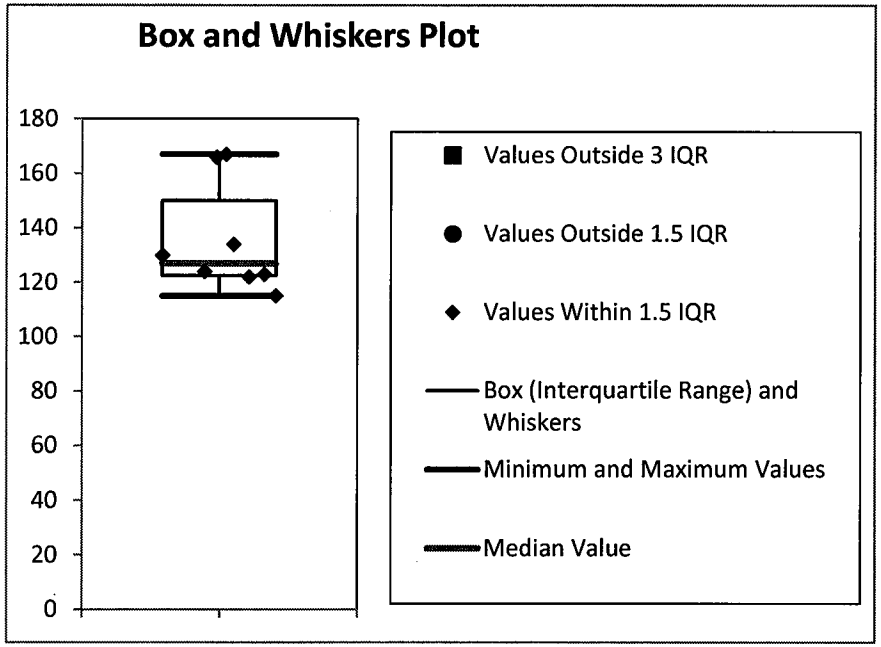
Reset Concentration Axis

Data Review		Recommendations
Are all necessary data fields entered, and in proper format?	Yes	None
Are at least 4 data points present for statistical analysis?	Yes	None
Are detection limits for nondetects ≤ maximum detected value?	Yes	None
Are all data within chart axis limits?	Yes	None

Groundwater Statistics Tool

Outlier testing worksheet

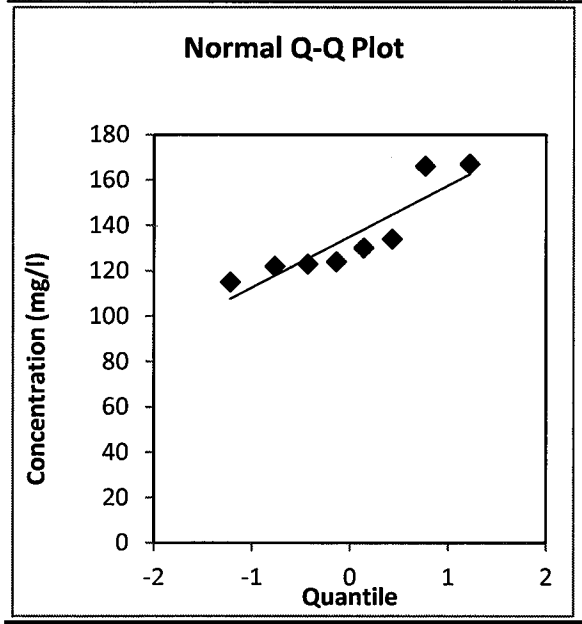
Dixon's Outlier Test Results		
Number of data points	8	
Risk of false rejection	1%	
Critical value	0.683	
Outlier type	**Low**	**High**
Test statistic	0.1373	0.0222
Potential Outlier?	No	No
Validity of Dixon'sTest	Valid	

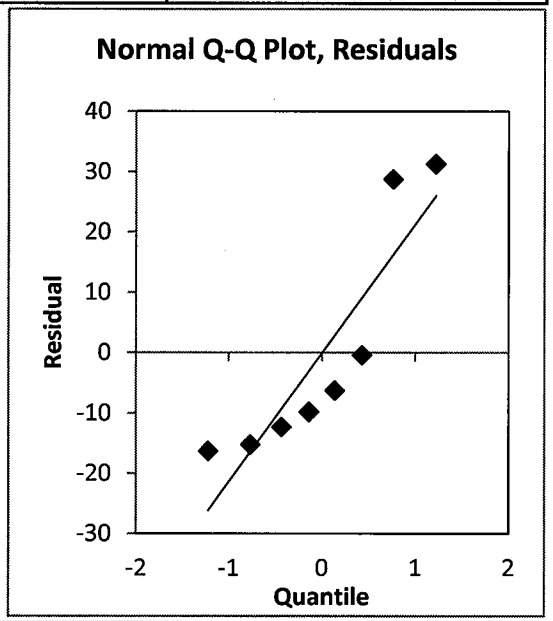


Groundwater Statistics Tool

Normality Testing Worksheet

Normality Test Results			
Parameter	**All Data**	**Minus Outliers**	**Residuals**
Number of data points	8	8	8
Shapiro-Wilk alpha value	10%	N/A	10%
Slope	22.52331213	N/A	21.35474226
Intercept	135.125	N/A	8.52651E-14
Correlation, R	0.901701847	N/A	0.895846247
Exact Test Value	0.797972419	N/A	0.781651578
Critical Value	0.851	N/A	0.851
Conclude sample distribution:	Does not appear normal	N/A	Does not appear normal





Previous Step: Outliers Screen | Next Step: Trend Screen | Skip Step: UCL Screen

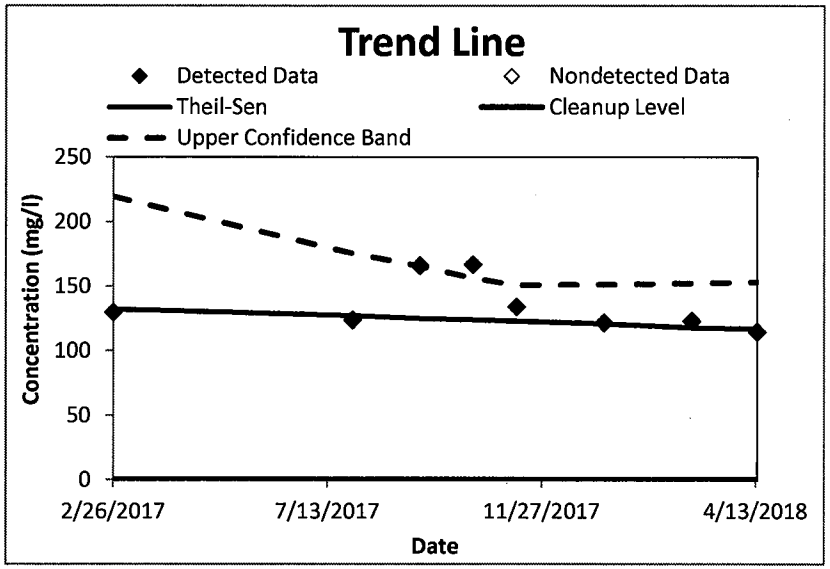
Groundwater Statistics Tool

Trend test results for datasets nonparametrically distributed residuals

i	t (Date)	C (mg/l)	C Predicted	Residual	Upper Confidence Band
1	2/26/2017	130	132	-2	220
2	7/29/2017	124	127	-3	176
3	9/10/2017	166	125	41	166
4	10/14/2017	167	124	43	156
5	11/11/2017	134	123	11	151
6	1/6/2018	122	121	1	151
7	3/3/2018	123	118	5	152
8	4/14/2018	115	117	-2	153
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Mann-Kendall	
Test Result	No trend
Test Statistic (S)	-12
Normalized S	-1.361
Critical Value	1.645

Theil-Sen	
Slope	-0.0378
Intercept	1750
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing



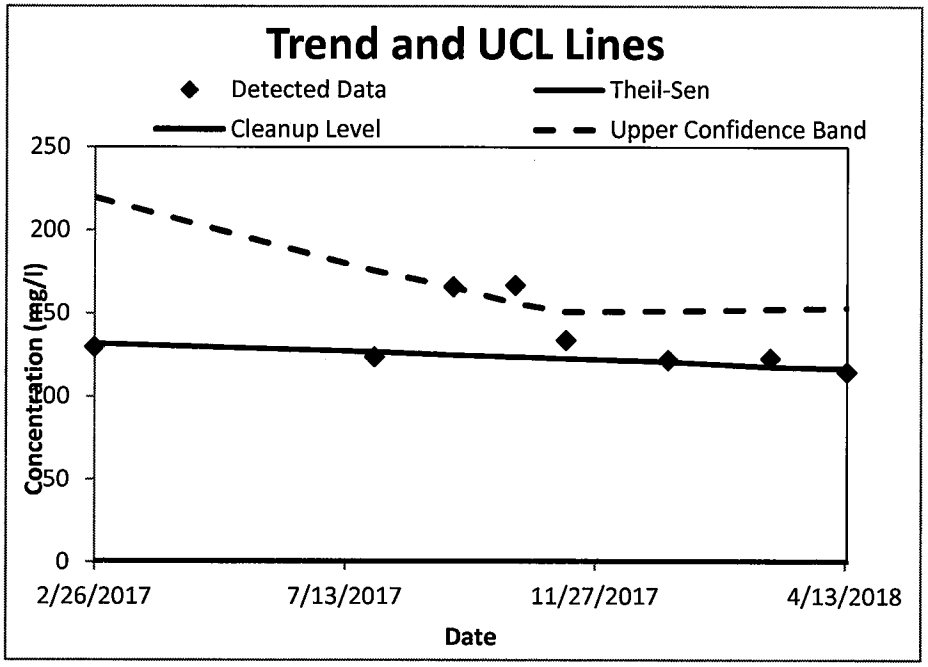
Groundwater Statistics Tool

UCL calculations and summary statistics for nonparametric data sets

Site Name	Big Pork Ranch
Operating Unit (OU)	Big Pork Ranch
Type of Evaluation	Attainment
Date of Evaluation	7/8/2018
Person performing analysis	AJH

Chemical of Concern	Calcium
Well Name/Number	10A
Date Units	Date
Concentration Units	mg/l

Confidence Level	95%
Number of results	8
Number < cleanup level	0
Are any potential outliers present?	No
Mean of concentration	135
Standard deviation of concentration	20.2



95% Upper Confidence Limit (UCL)	166
Method for calculating UCL	Chebyshev UCL
Value of 95% Upper Confidence Band value at final sampling event	153
Trend calculation method	Theil-Sen/Mann-Kendall
Cleanup level	0
Source of cleanup level	0
Is the trend decreasing or statistically insignificant?	**Yes**

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Random Seed Used	38285.17969
Message: None.	

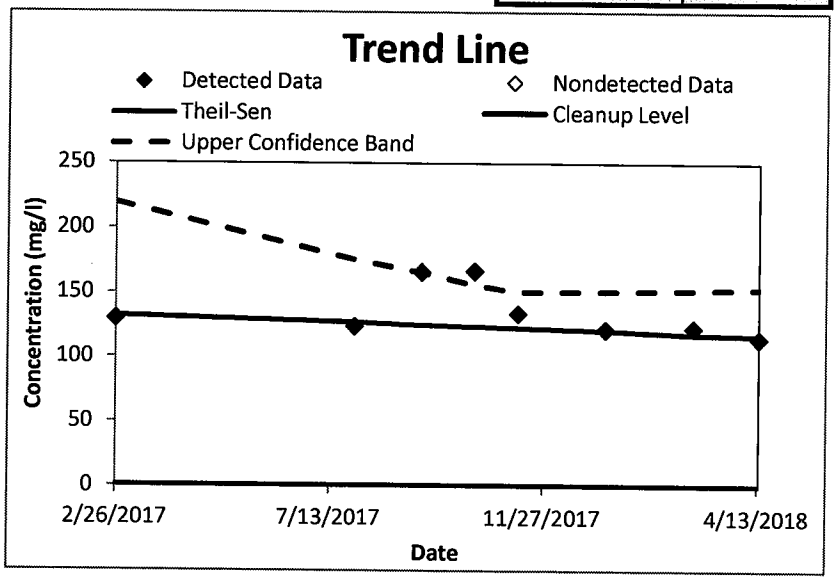
Groundwater Statistics Tool

Trend test results for datasets nonparametrically distributed residuals

	t (Date)	C (mg/l)	C Predicted	Residual	Upper Confidence Band
1	2/26/2017	130	132	-2	220
2	7/29/2017	124	127	-3	176
3	9/10/2017	166	125	41	166
4	10/14/2017	167	124	43	156
5	11/11/2017	134	123	11	151
6	1/6/2018	122	121	1	151
7	3/3/2018	123	118	5	152
8	4/14/2018	115	117	-2	153
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Mann-Kendall	
Test Result	No trend
Test Statistic (S)	-12
Normalized S	-1.361
Critical Value	1.645

Theil-Sen	
Slope	-0.0378
Intercept	1750
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing



Groundwater Statistics Tool

Data input worksheet

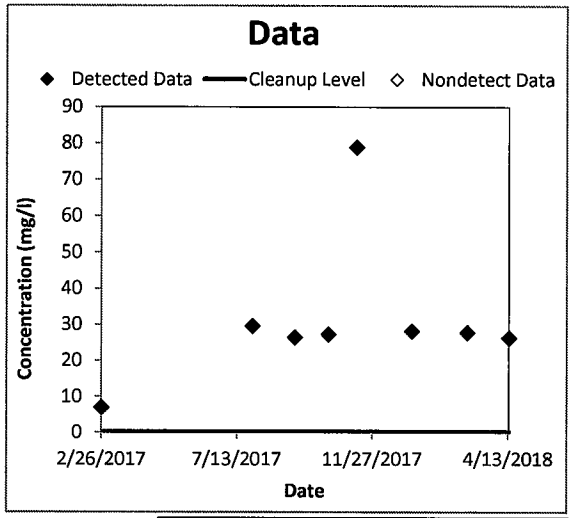
Site Name	Big Fork Ranch
Operating Unit (OU)	Big Fork Ranch
Type of Evaluation	Attainment
Date of Evaluation	7/8/2018
Person performing analysis	AJH

Chemical of Concern	Chloride
Well Name/Number	10A
Date Units	Date
Concentration Units	mg/l

Confidence Level Desired	95%
Cleanup Level	
Source of cleanup level (e.g. MCL or risk-based concentration)	
Risk of False Outlier Rejection	1%
Random Seed (may be left blank)	
Significant figures to use	3

Number of data points:	8
Number of detected results:	8
Number of nondetect results:	0
Detection frequency:	1

Date (Date)	Chloride Concentration (mg/l)	Data Qualifier	Detected? (Yes or No)
2/26/2017	7		Yes
7/29/2017	29.6		Yes
9/10/2017	26.5		Yes
10/14/2017	27.3		Yes
11/11/2017	78.9		Yes
1/6/2018	28.2		Yes
3/3/2018	27.8		Yes
4/14/2018	26.3		Yes



Axis Values			
Time		Concentration	
Min	Max	Min	Max
Auto	Auto	Auto	Auto

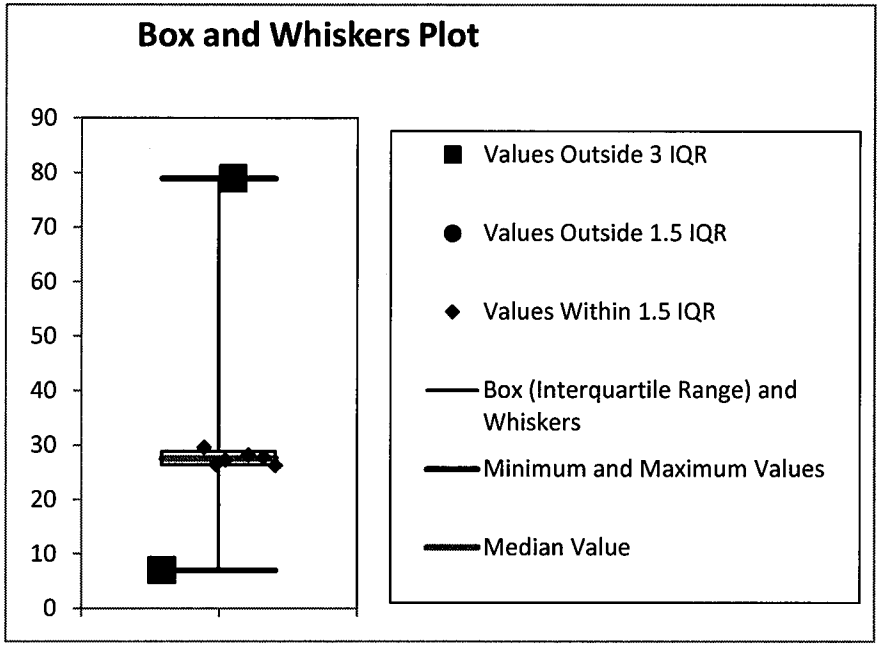
Reset Concentration Axis

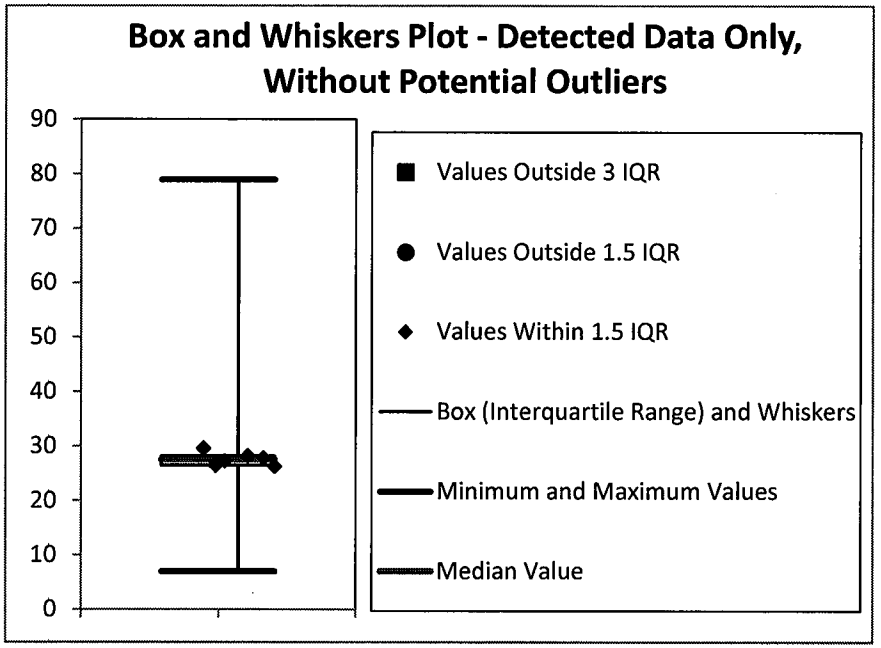
Data Review		Recommendations
Are all necessary data fields entered, and in proper format?	Yes	None
Are at least 4 data points present for statistical analysis?	Yes	None
Are detection limits for nondetects ≤ maximum detected value?	Yes	None
Are all data within chart axis limits?	Yes	None

Groundwater Statistics Tool

Outlier testing worksheet

Dixon's Outlier Test Results		
Number of data points	8	
Risk of false rejection	1%	
Critical value	0.683	
Outlier type	**Low**	**High**
Test statistic	0.8540	0.9373
Potential Outlier?	Yes	Yes
Validity of Dixon'sTest	Valid	

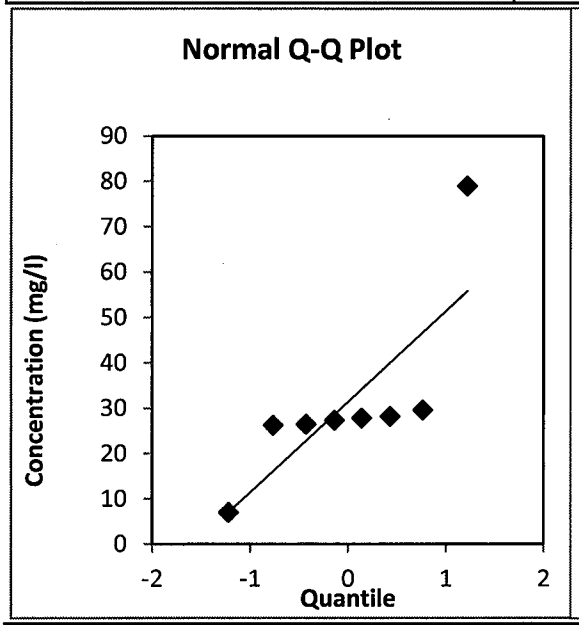


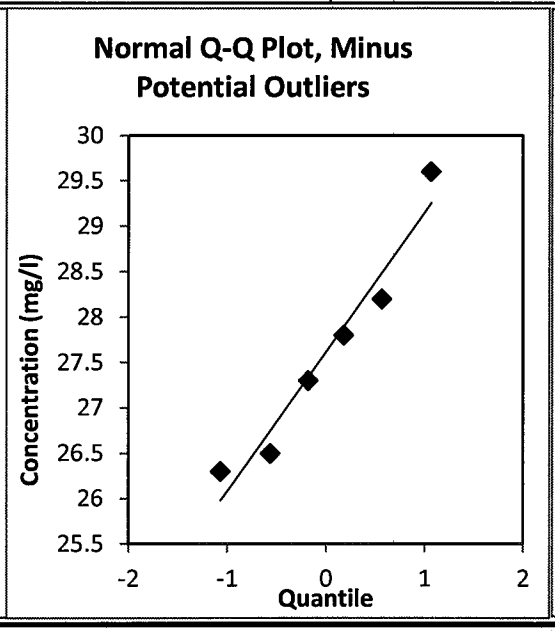


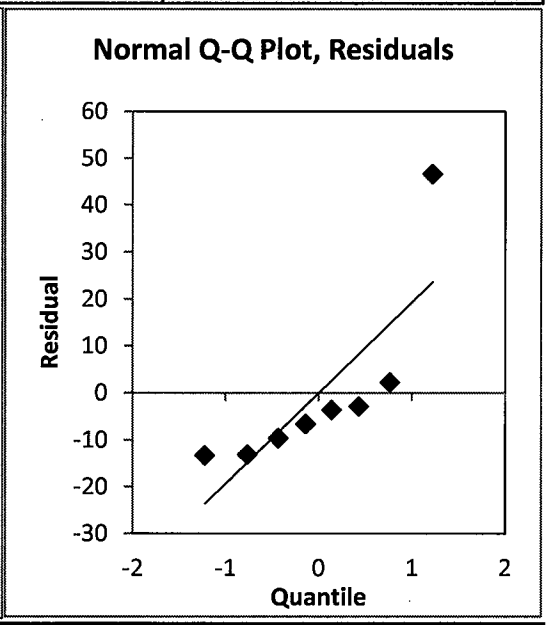
Groundwater Statistics Tool

Normality Testing Worksheet

Normality Test Results			
Parameter	**All Data**	**Minus Outliers**	**Residuals**
Number of data points	8	6	8
Shapiro-Wilk alpha value	10%	10%	10%
Slope	19.97765708	1.532790559	19.34430195
Intercept	31.45	27.61666667	-7.37188E-14
Correlation, R	0.78609408	0.974245827	0.796738456
Exact Test Value	0.684048219	0.945470201	0.670901205
Critical Value	0.851	0.826	0.851
Conclude sample distribution:	Does not appear normal	Appears normal	Does not appear normal







Previous Step: Outliers Screen | Next Step: Trend Screen | Skip Step: UCL Screen

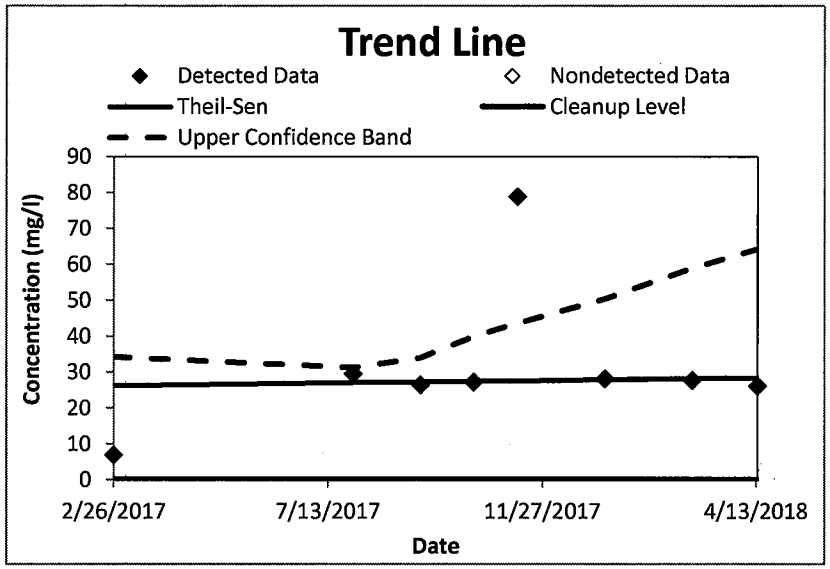
Groundwater Statistics Tool

Trend test results for datasets nonparametrically distributed residuals

	t(Date)	C (mg/l)	C Predicted	Residual	Upper Confidence Band
1	2/26/2017	7	26.2	-19.2	34.3
2	7/29/2017	29.6	27.1	2.5	31.3
3	9/10/2017	26.5	27.3	-0.8	34.1
4	10/14/2017	27.3	27.5	-0.2	40.1
5	11/11/2017	78.9	27.6	51.3	43.7
6	1/6/2018	28.2	27.9	0.3	50.5
7	3/3/2018	27.8	28.3	-0.5	59.1
8	4/14/2018	26.3	28.5	-2.2	64.3
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Mann-Kendall	
Test Result	No trend
Test Statistic (S)	2
Normalized S	0.124
Critical Value	1.645

Theil-Sen	
Slope	0.00552
Intercept	-210
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing



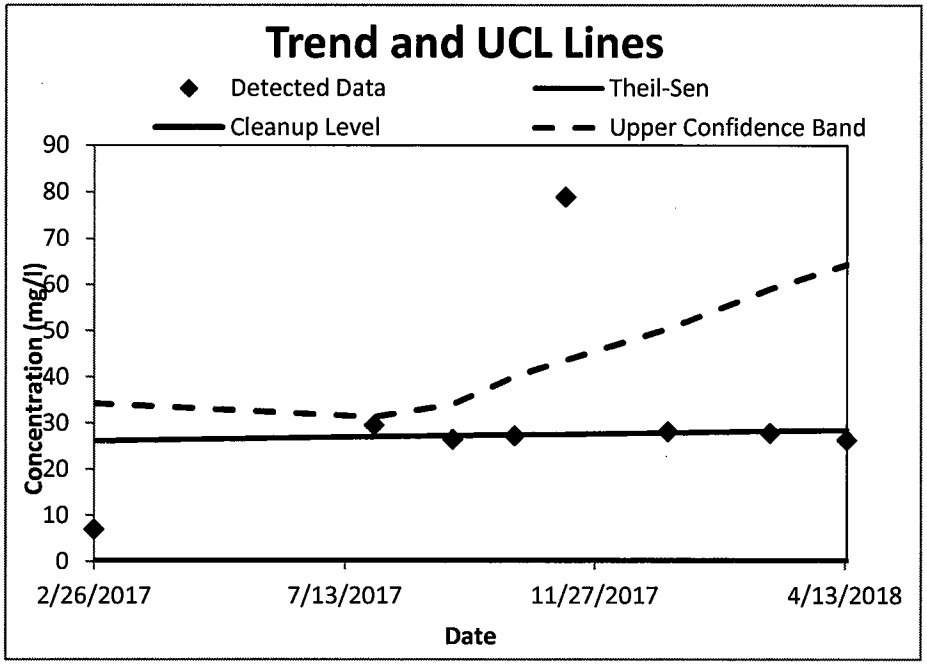
Groundwater Statistics Tool

UCL calculations and summary statistics for nonparametric data sets

Site Name	Big Fork Ranch
Operating Unit (OU)	Big Fork Ranch
Type of Evaluation	Attainment
Date of Evaluation	7/8/2018
Person performing analysis	AJH

Chemical of Concern	Chloride
Well Name/Number	10A
Date Units	Date
Concentration Units	mg/l

Confidence Level	95%
Number of results	8
Number < cleanup level	0
Are any potential outliers present?	Yes
Mean of concentration	31.5
Standard deviation of concentration	20.5



95% Upper Confidence Limit (UCL)	63.1
Method for calculating UCL	Chebyshev UCL
Value of 95% Upper Confidence Band value at final sampling event	64.3
Trend calculation method	Theil-Sen/Mann-Kendall
Cleanup level	0
Source of cleanup level	0
Is the trend decreasing or statistically insignificant?	**Yes**

When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Random Seed Used	38600.85156
Message: None.	

Groundwater Statistics Tool

Data input worksheet

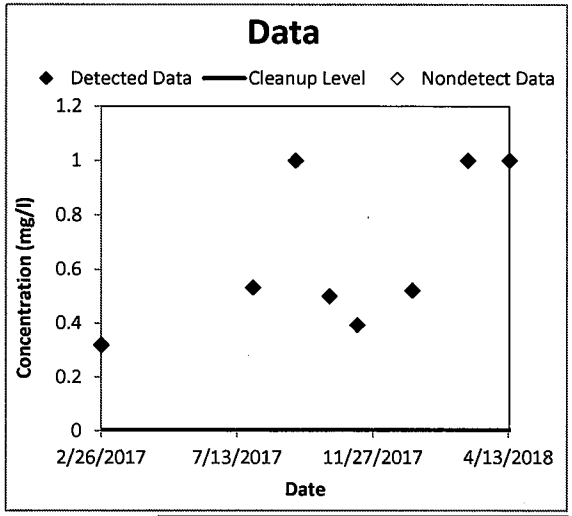
Site Name	Big Fork Ranch
Operating Unit (OU)	Big Fork Ranch
Type of Evaluation	Attainment
Date of Evaluation	7/8/2018
Person performing analysis	AJH

Chemical of Concern	Fluoride
Well Name/Number	10A
Date Units	Date
Concentration Units	mg/l

Confidence Level Desired	95%
Cleanup Level	
Source of cleanup level (e.g. MCL or risk-based concentration)	
Risk of False Outlier Rejection	1%
Random Seed (may be left blank)	
Significant figures to use	3

Number of data points	8
Number of detected results	8
Number of nondetect results	0
Detection frequency	1

Date (Date)	Fluoride Concentration (mg/l)	Data Qualifier	Detected? (Yes or No)
2/26/2017	0.32		Yes
7/29/2017	0.533		Yes
9/10/2017	1		Yes
10/14/2017	0.5		Yes
11/11/2017	0.394		Yes
1/6/2018	0.522		Yes
3/3/2018	1		Yes
4/14/2018	1		Yes



Axis Values			
Time		Concentration	
Min	Max	Min	Max
Auto	Auto	Auto	Auto

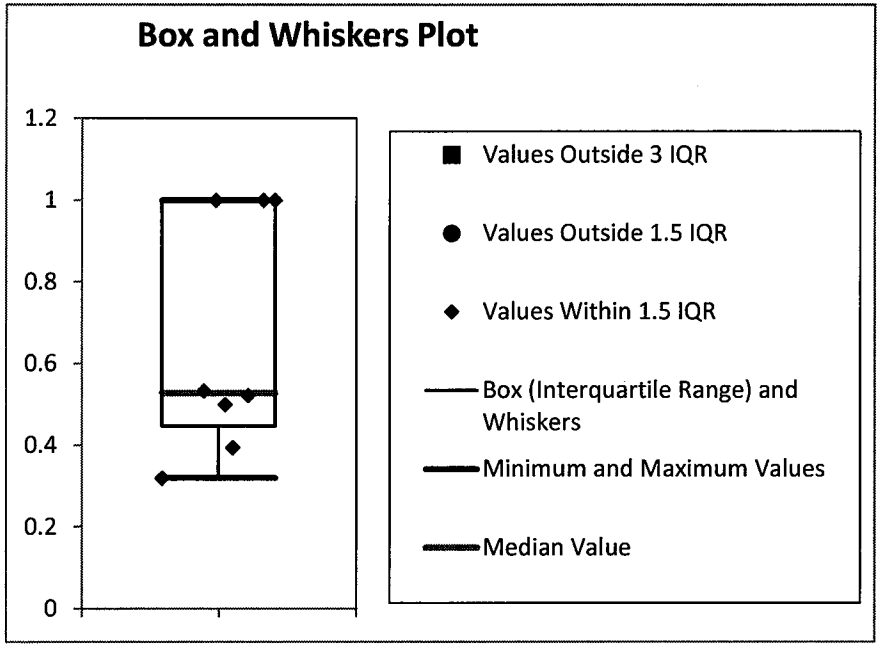
Reset Concentration Axis

Data Review		Recommendations
Are all necessary data fields entered, and in proper format?	Yes	None
Are at least 4 data points present for statistical analysis?	Yes	None
Are detection limits for nondetects ≤ maximum detected value?	Yes	None
Are all data within chart axis limits?	Yes	None

Groundwater Statistics Tool

Outlier testing worksheet

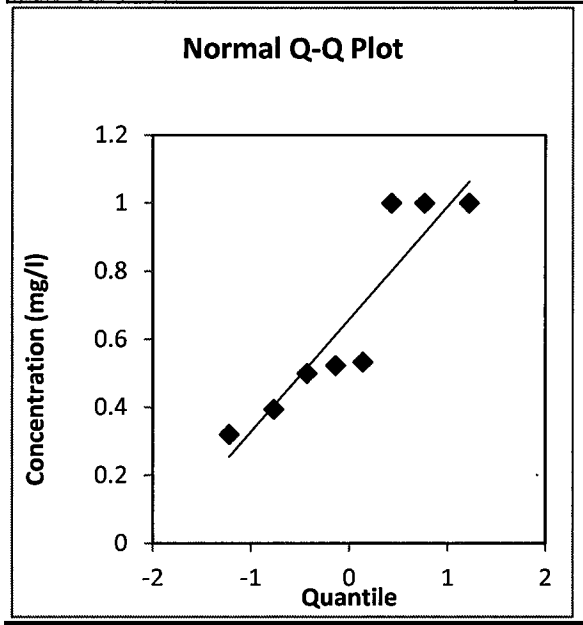
Dixon's Outlier Test Results		
Number of data points	8	
Risk of false rejection	1%	
Critical value	0.683	
Outlier type	**Low**	**High**
Test statistic	0.1088	0.0000
Potential Outlier?	No	No
Validity of Dixon'sTest	Valid	

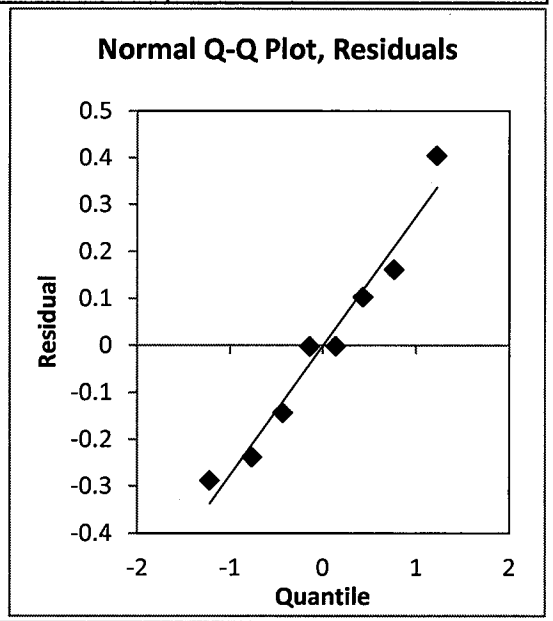


Groundwater Statistics Tool

Normality Testing Worksheet

Normality Test Results			
Parameter	**All Data**	**Minus Outliers**	**Residuals**
Number of data points	8	8	8
Shapiro-Wilk alpha value	10%	N/A	10%
Slope	0.331247793	N/A	0.275699635
Intercept	0.658625	N/A	2.22045E-16
Correlation, R	0.917811627	N/A	0.980486465
Exact Test Value	0.804053205	N/A	0.960776139
Critical Value	0.851	N/A	0.851
Conclude sample distribution:	Does not appear normal	N/A	Appears normal





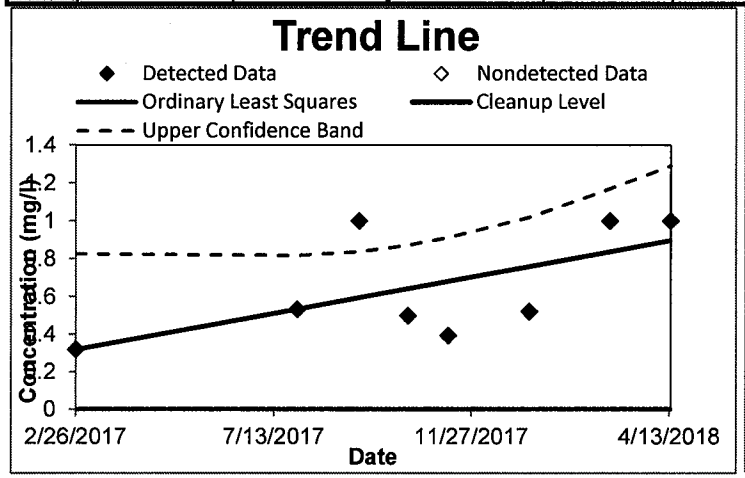
Previous Step: Outliers Screen | Next Step: Trend Screen | Skip Step: UCL Screen

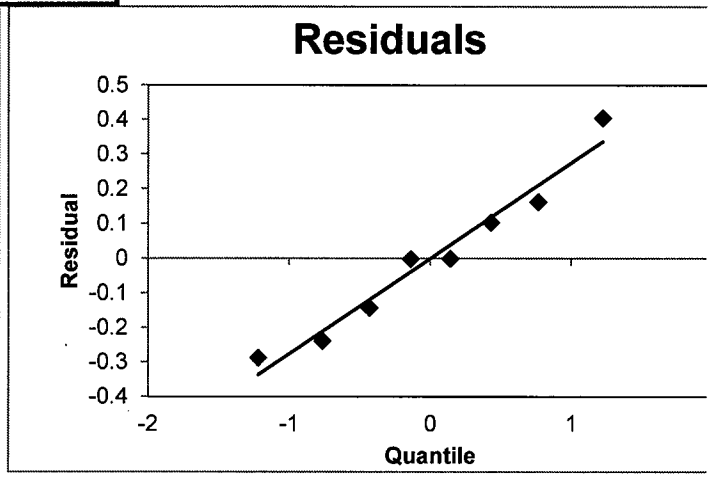
Groundwater Statistics Tool

Trend test results for datasets with normally distributed residuals (with our without transformation)

	T (Date)	C (mg/l)	C Predicted	Fit residual	Upper Confidence Band
1	2/26/2017	0.32	0.321	-0.001	0.826
2	7/29/2017	0.533	0.535	-0.002	0.817
3	9/10/2017	1	0.595	0.405	0.838
4	10/14/2017	0.5	0.642	-0.142	0.871
5	11/11/2017	0.394	0.682	-0.288	0.912
6	1/6/2018	0.522	0.76	-0.238	1.02
7	3/3/2018	1	0.838	0.162	1.17
8	4/14/2018	1	0.897	0.103	1.29
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Ordinary Least Squares	
Slope	0.001397755
Intercept	-59.49185946
Correlation, R^2	0.3930
Test Result	Increasing
Test Statistic	1.971
Critical Value	1.943
When is the concentration predicted to exceed the cleanup level?	MCL is already exceeded





Draft version - Do not distrubute

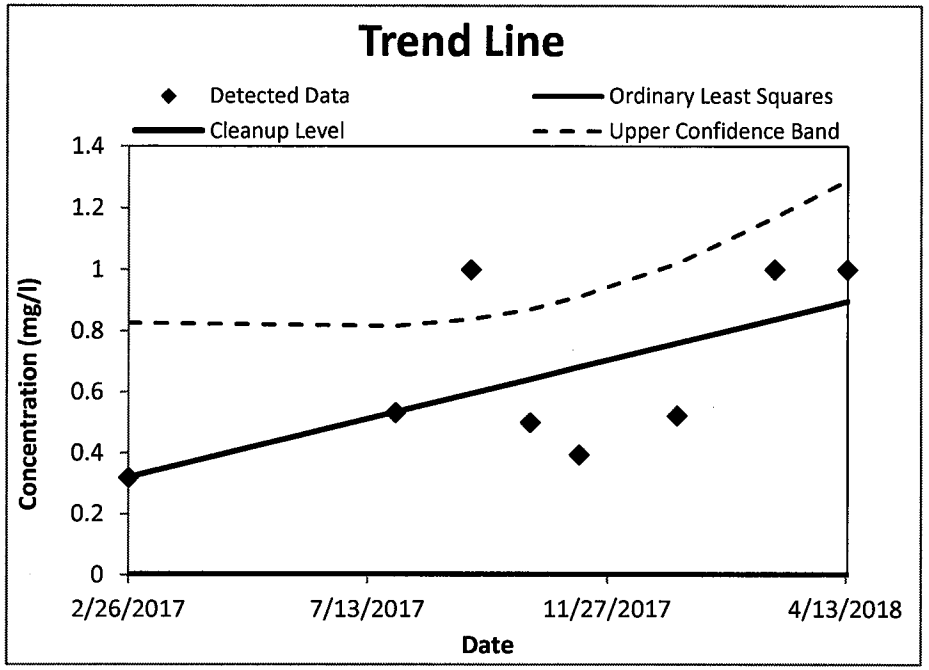
Groundwater Statistics Tool

UCL calculations and summary statistics for nonparametric data sets

Site Name	Big Fork Ranch
Operating Unit (OU)	Big Fork Ranch
Type of Evaluation	Attainment
Date of Evaluation	7/8/2018
Person performing analysis	AJH

Chemical of Concern	Fluoride
Well Name/Number	10A
Date Units	Date
Concentration Units	mg/l

Confidence Level	95%
Number of results	8
Number < cleanup level	0
Are any potential outliers present?	No
Mean of concentration	0.659
Standard deviation of concentration	0.291



95% Upper Confidence Limit (UCL)	1.11
Method for calculating UCL	Chebyshev UCL
Value of 95% Upper Confidence Band value at final sampling event	1.29
Trend calculation method	Ordinary Least Squares
Cleanup level	0
Source of cleanup level	0
Is the trend decreasing or statistically insignificant?	**No**

When is the concentration predicted to exceed the MCL?	MCL is already exceeded
Random Seed Used	0
Message: None.	

Groundwater Statistics Tool

Data input worksheet

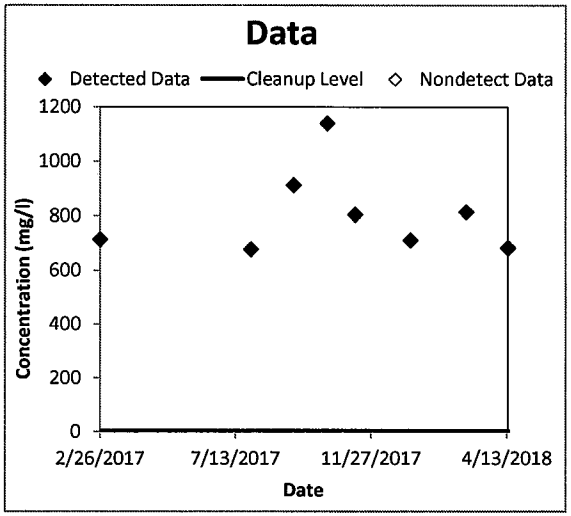
Site Name	Big Fork Ranch
Operating Unit (OU)	Big Fork Ranch
Type of Evaluation	Attainment
Date of Evaluation	7/8/2018
Person performing analysis	AJH

Chemical of Concern	Sulfate
Well Name/Number	7/8/2018
Date Units	Date
Concentration Units	mg/l

Confidence Level Desired	95%
Cleanup Level	
Source of cleanup level (e.g. MCL or risk-based concentration)	
Risk of False Outlier Rejection	1%
Random Seed (may be left blank)	
Significant figures to use	3

Number of data points	8
Number of detected results	8
Number of nondetect results	0
Detection frequency	1

Date (Date)	Sulfate Concentration (mg/l)	Data Qualifier	Detected? (Yes or No)
2/26/2017	713.03		Yes
7/29/2017	677		Yes
9/10/2017	914		Yes
10/14/2017	1140		Yes
11/11/2017	804		Yes
1/6/2018	711		Yes
3/3/2018	814		Yes
4/14/2018	682		Yes



Axis Values			
Time		Concentration	
Min	Max	Min	Max
Auto	Auto	Auto	Auto

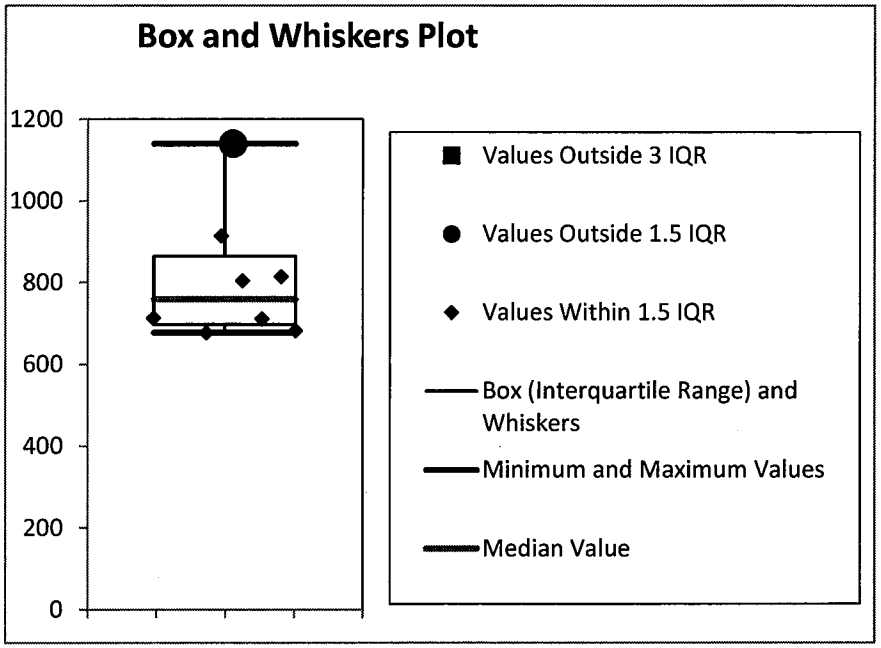
Reset Concentration Axis

Data Review		Recommendations
Are all necessary data fields entered, and in proper format?	Yes	None
Are at least 4 data points present for statistical analysis?	Yes	None
Are detection limits for nondetects ≤ maximum detected value?	Yes	None
Are all data within chart axis limits?	Yes	None

Groundwater Statistics Tool

Outlier testing worksheet

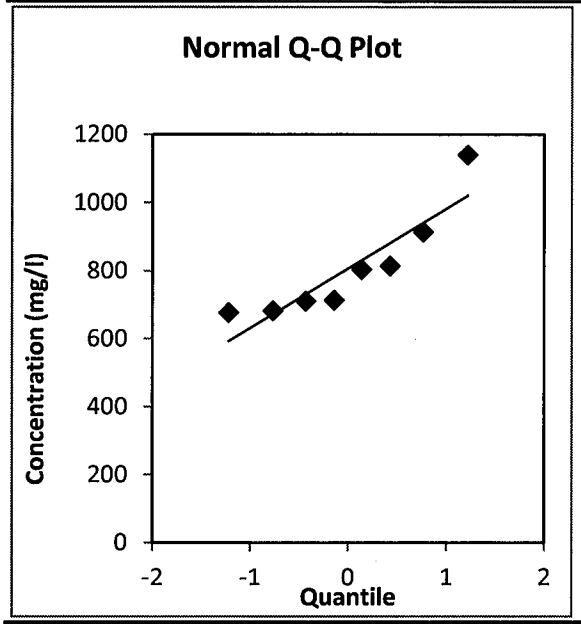
Dixon's Outlier Test Results		
Number of data points	8	
Risk of false rejection	1%	
Critical value	0.683	
Outlier type	**Low**	**High**
Test statistic	0.0211	0.4934
Potential Outlier?	No	No
Validity of Dixon'sTest	Valid	

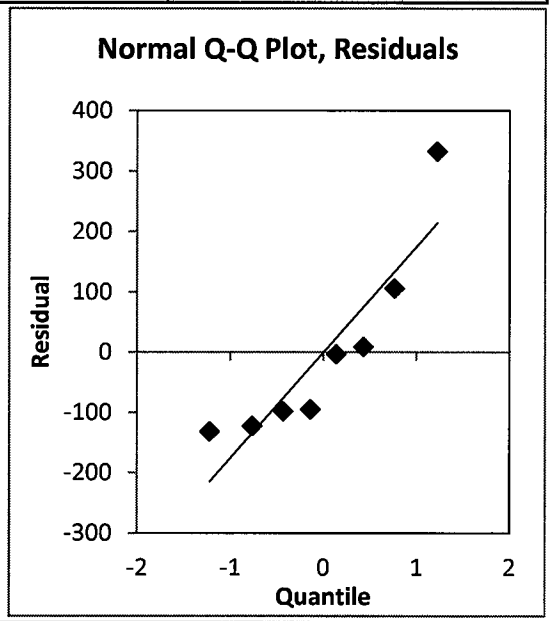


Groundwater Statistics Tool

Normality Testing Worksheet

Normality Test Results			
Parameter	**All Data**	**Minus Outliers**	**Residuals**
Number of data points	8	8	8
Shapiro-Wilk alpha value	10%	N/A	10%
Slope	175.3766646	N/A	175.5305762
Intercept	806.87875	N/A	-9.9476E-14
Correlation, R	0.900434595	N/A	0.901305357
Exact Test Value	0.820267004	N/A	0.822144497
Critical Value	0.851	N/A	0.851
Conclude sample distribution:	Does not appear normal	N/A	Does not appear normal





Previous Step: Outliers Screen | Next Step: Trend Screen | Skip Step: UCL Screen

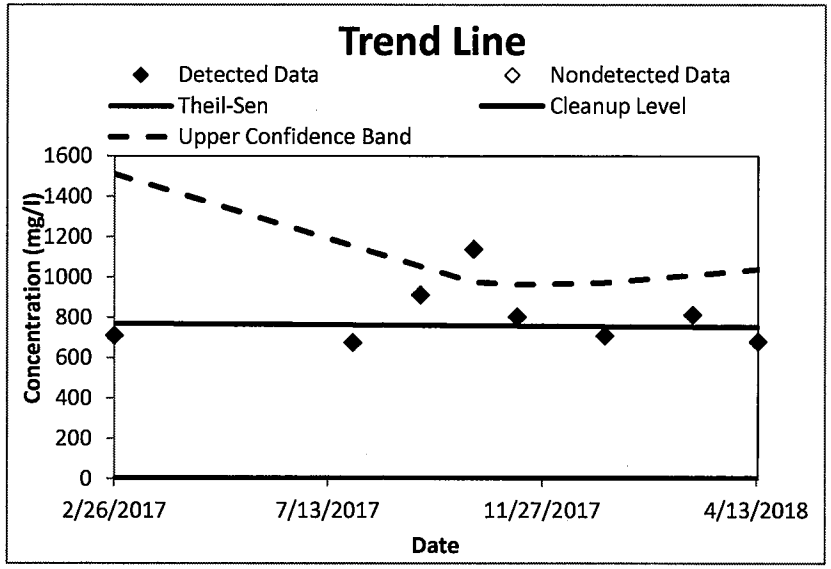
Groundwater Statistics Tool

Trend test results for datasets nonparametrically distributed residuals

i	t (Date)	C (mg/l)	C Predicted	Residual	Upper Confidence Band
1	2/26/2017	713.03	770	-56.97	1510
2	7/29/2017	677	764	-87	1160
3	9/10/2017	914	762	152	1060
4	10/14/2017	1140	760	380	977
5	11/11/2017	804	759	45	964
6	1/6/2018	711	757	-46	974
7	3/3/2018	814	755	59	1010
8	4/14/2018	682	753	-71	1040
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Mann-Kendall	
Test Result	No trend
Test Statistic (S)	-2
Normalized S	-0.124
Critical Value	1.645

Theil-Sen	
Slope	-0.0409
Intercept	2520
When is the concentration predicted to exceed the cleanup level?	Not applicable - slope is not statistically increasing



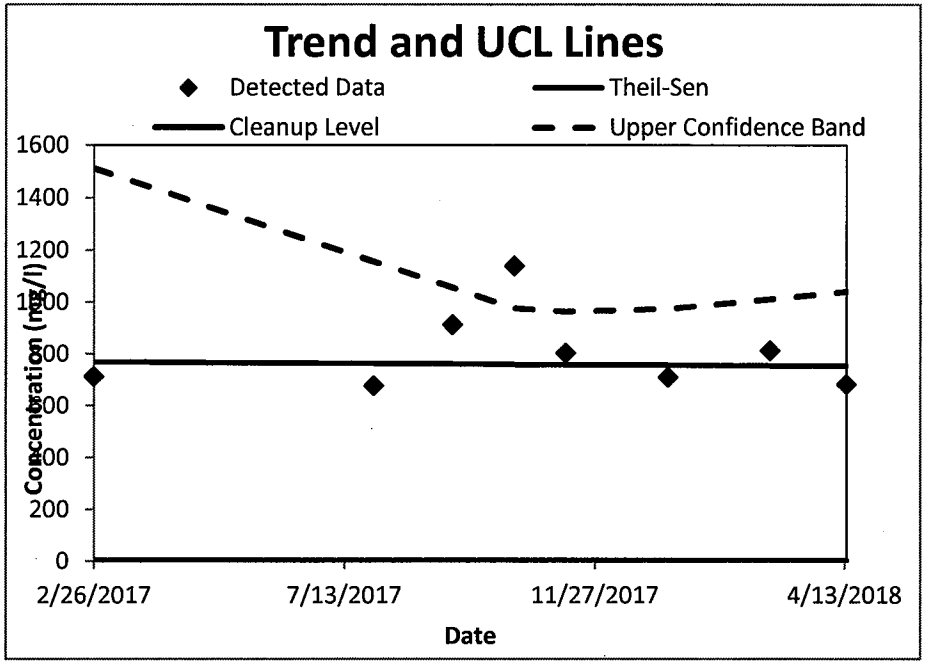
Groundwater Statistics Tool

UCL calculations and summary statistics for nonparametric data sets

Site Name	Big Fork Ranch
Operating Unit (OU)	Big Fork Ranch
Type of Evaluation	Attainment
Date of Evaluation	7/8/2018
Person performing analysis	AJH

Chemical of Concern	Sulfate
Well Name/Number	43289
Date Units	Date
Concentration Units	mg/l

Confidence Level	95%
Number of results	8
Number < cleanup level	0
Are any potential outliers present?	No
Mean of concentration	807
Standard deviation of concentration	157



95% Upper Confidence Limit (UCL)	1049
Method for calculating UCL	Chebyshev UCL
Value of 95% Upper Confidence Band value at final sampling event	1040
Trend calculation method	Theil-Sen/Mann-Kendall
Cleanup level	0
Source of cleanup level	0
Is the trend decreasing or statistically insignificant?	**Yes**

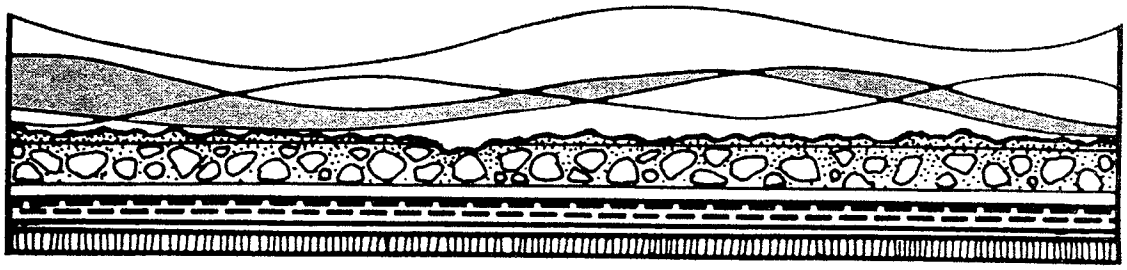
When is the concentration predicted to exceed the MCL?	Not applicable - slope is not statistically increasing
Random Seed Used	39045.20313
Message: None.	

ATTACHMENT 3

Laboratory Reports of Groundwater Analyses

Laboratory Reports For Sample Date 2-26-2017

DATA TESTING INC



March 22, 2017

FOR: Emera, P.C.
P.O. Box 2228
Edmond, Oklahoma 73083

Type of Analysis: Evans & Associates, LE-1884 Big Fork Ranch GWMP # 6A

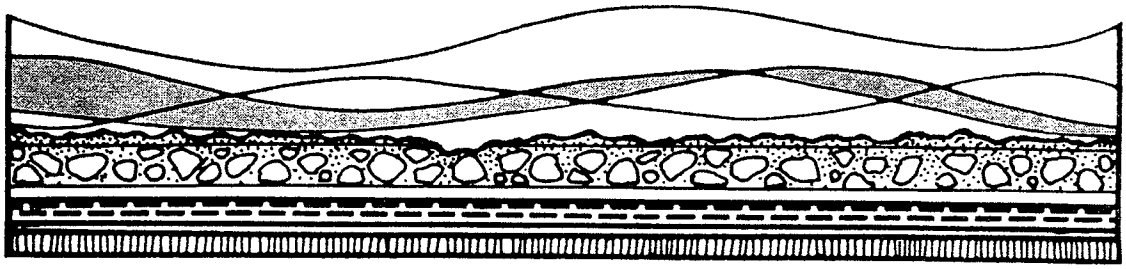
Date Sample Collected: February 26, 2017
Time Sample Collected: 2:00pm
Received Temperature:
Sample Temperature: 66.0°F

Date Sample Received: February 28, 2017
Time Sample Received: 1:00pm
Received by: C Peterson
Sample #: 20170720
Depth: 31.7'

Parameter	Method Number	Date & Time Analyzed		By	Reported * Value	RL mg/l	% Recovery	% RDP
pH Field pH	4500-H+B-2011	2/28/2017	1:10pm	CAP	6.92	0.01		
Dissolved Solids	2540-C-2011	3/1/2017	4:17pm	SW	460	3		2.7
Boron *	EPA 200.7	3/10/2017	4:19pm	AIP	<0.1	0.1	90.3	2.91
Calcium *	EPA 200.7	3/10/2017	4:19pm	AIP	81	0.1	84.4	2.78
Chloride	4500-CLC-2011	3/10/2017	2:32pm	SW	3	3		0.0
Fluoride *	EPA 300.0	3/9/2017	7:08pm	AIP	0.48	0.1	105.0	1.16
Sulfates *	EPA 300.0	3/9/2017	4:35pm	AIP	40.45	3	94.50	0.9

OK Lab #7704 * Samples analyzed by American Interplex
NOTE: Analysis performed in accordance with procedures outlined in 22nd Edition of "Standard Methods for the Examination of Water and Wastewater."
pH is reported as units & other results as mg/l unless noted otherwise.

DATA TESTING INC



March 22, 2017

FOR: Emera, P.C.
P.O. Box 2228
Edmond, Oklahoma 73083

Type of Analysis: Evans & Associates, LE-1884 Big Fork Ranch GWMP # 8A

Date Sample Collected: February 26, 2017
Time Sample Collected: 1:40pm
Received Temperature:
Sample Temperature: 65.0°F

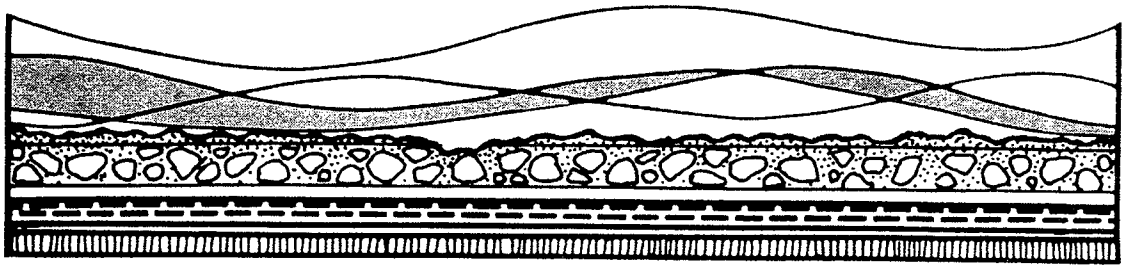
Date Sample Received: February 28, 2017
Time Sample Received: 1:00pm
Received by: C Peterson
Sample #: 20170721
Depth: 41.7'

Parameter	Method Number	Date & Time Analyzed		By	Reported * Value	RL mg/l	% Recovery	% RDP
pH Field pH	4500-H+B-2011	2/28/2017	1:12pm	CAP	7.44	0.01		
Dissolved Solids	2540-C-2011	3/1/2017	4:18pm	SW	352	3		2.7
Boron *	EPA 200.7	3/10/2017	4:23pm	AIP	0.12	0.1	90.3	2.91
Calcium *	EPA 200.7	3/10/2017	4:23pm	AIP	63	0.1	84.4	2.78
Chloride	4500-CLC-201	3/10/2017	2:38pm	SW	3.5	3		0.0
Fluoride *	EPA 300.0	3/9/2017	7:27pm	AIP	0.39	0.1	105.0	1.16
Sulfates *	EPA 300.0	3/9/2017	4:37pm	AIP	37.21	3	94.50	0.9

OK Lab #7704 * Samples analyzed by American Interplex

NOTE: Analysis performed in accordance with procedures outlined in 22nd Edition of "Standard Methods for the Examination of Water and Wastewater." pH is reported as units & other results as mg/l unless noted otherwise.

DATA TESTING INC



March 22, 2017

FOR: Emera, P.C.
P.O. Box 2228
Edmond, Oklahoma 73083

Type of Analysis: Evans & Associates, LE-1884 Big Fork Ranch GWMP # 9A

Date Sample Collected: February 26, 2017
Time Sample Collected: 2:20pm
Received Temperature:
Sample Temperature: 65.0°F

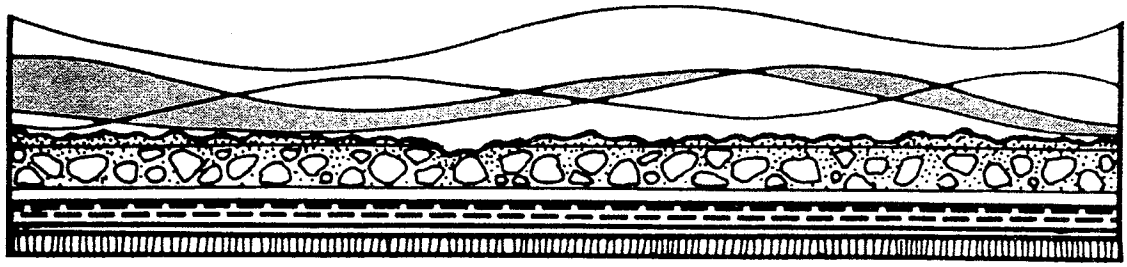
Date Sample Received: February 28, 2017
Time Sample Received: 1:00pm
Received by: C Peterson
Sample #: 20170722
Depth: 12.9'

Parameter	Method Number	Date & Time Analyzed		By	Reported * Value	RL mg/l	% Recovery	% RDP
pH Field pH	4500-H+B-2011	2/28/2017	1:14pm	CAP	7.75	0.01		
Dissolved Solids	2540-C-2011	3/1/2017	4:19pm	SW	496	3		2.7
Boron *	EPA 200.7	3/10/2017	4:28pm	AIP	1.2	0.1	90.3	2.91
Calcium *	EPA 200.7	3/10/2017	4:28pm	AIP	35	0.1	84.4	2.78
Chloride	4500-CLC-2011	3/10/2017	2:40pm	SW	7.5	3		0.0
Fluoride *	EPA 300.0	3/9/2017	7:45pm	AIP	0.76	0.1	105.0	1.16
Sulfates *	EPA 300.0	3/9/2017	4:40pm	AIP	93.18	3	94.50	0.9

OK Lab #7704 * Samples analyzed by American Interplex

NOTE: Analysis performed in accordance with procedures outlined in 22nd Edition of "Standard Methods for the Examination of Water and Wastewater." pH is reported as units & other results as mg/l unless noted otherwise.

DATA TESTING INC



March 22, 2017

FOR: Emera, P.C.
P.O. Box 2228
Edmond, Oklahoma 73083

Type of Analysis: Evans & Associates, LE-1884 Big Fork Ranch GWMP # 10A

Date Sample Collected: February 26, 2017
Time Sample Collected: 2:35pm
Received Temperature:
Sample Temperature: 65.0°F

Date Sample Received: February 28, 2017
Time Sample Received: 1:00pm
Received by: C Peterson
Sample #: 20170723
Depth: 28.6'

Parameter	Method Number	Date & Time Analyzed		By	Reported * Value	RL mg/l	% Recovery	% RDP
pH Field pH	4500-H+B-2011	2/28/2017	1:17pm	CAP	7.19	0.01		
Dissolved Solids	2540-C-2011	3/1/2017	4:20pm	SW	1730	3		2.7
Boron *	EPA 200.7	3/10/2017	4:51pm	AIP	3.4	0.1	90.3	2.91
Calcium *	EPA 200.7	3/10/2017	4:51pm	AIP	130	0.1	84.4	2.78
Chloride	4500-CLC-2011	3/10/2017	2:42pm	SW	7	3		0.0
Fluoride *	EPA 300.0	3/9/2017	7:04pm	AIP	0.32	0.1	105.0	1.16
Sulfates *	EPA 300.0	3/9/2017	4:44pm	AIP	713.03	3	94.50	0.9

OK Lab #7704 * Samples analyzed by American Interplex
NOTE: Analysis performed in accordance with procedures outlined in 22nd Edition of "Standard Methods for the Examination of Water and Wastewater."
pH is reported as units & other results as mg/l unless noted otherwise.

Laboratory Reports For Sample Date 7-29-2017

ENVIRONMENTAL TESTING, INC.

4619 N. Santa Fe
Oklahoma City, OK 73118
405.488.2400 Phone
405.488.2404 Fax
www.etilab.com

Emera Corp.	Project: Sec. 5&8, T24N, R3E, Noble Co., OK	
P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	08/08/17 12:27

GWMP #6A

E7G0524-01 (Aqueous) - Sampled: 07/29/17 14:15

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Qualifiers
Environmental Testing, Inc.									
Conventional Chemistry Parameters by Standard Methods									
pH	**7.31**		pH Units	1	EFH0055	ECF	08/02/17 10:30	SM 4500-H+ B	H-03
Total Dissolved Solids	**372**	100	mg/L	1	EFH0095	ECF	08/03/17 12:45	SM 2540C	
Metals by EPA 200 Series Methods									
Boron	**0.0705**	0.0500	mg/L	1	EFH0057	LSB	08/03/17 13:57	EPA 200.7	
Calcium	**89.8**	1.00	mg/L	1	EFH0057	LSB	08/03/17 13:57	EPA 200.7	
Metals Digestion	Completed		N/A		EFH0057	LSB	08/02/17 19:15	EPA 200.7	
Anions by EPA Method 300.0									
Chloride	**1.73**	0.160	mg/L	1	EFH0135	ECF	08/07/17 11:05	EPA 300.0	
Fluoride	**0.433**	0.100	mg/L	1	EFH0135	ECF	08/07/17 11:05	EPA 300.0	
Sulfate as SO4	**26.5**	1.50	mg/L	5	EFH0135	ECF	08/07/17 12:32	EPA 300.0	

Environmental Testing, Inc.

Russell Britten, President

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ENVIRONMENTAL TESTING, INC.

4619 N. Santa Fe
Oklahoma City, OK 73118
405.488.2400 Phone
405.488.2404 Fax
www.etilab.com

Emera Corp.	Project: Sec. 5&8, T24N, R3E, Noble Co., OK	
P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	08/08/17 12:27

GWMP #8A

E7G0524-02 (Aqueous) - Sampled: 07/29/17 13:50

Environmental Testing, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Qualifiers
Conventional Chemistry Parameters by Standard Methods									
pH	**7.70**		pH Units	1	EFH0055	ECF	08/02/17 10:30	SM 4500-H+ B	H-03
Total Dissolved Solids	**422**	100	mg/L	1	EFH0095	ECF	08/03/17 12:45	SM 2540C	
Metals by EPA 200 Series Methods									
Boron	**0.130**	0.0500	mg/L	1	EFH0057	LSB	08/03/17 14:20	EPA 200.7	
Calcium	**84.8**	1.00	mg/L	1	EFH0057	LSB	08/03/17 14:20	EPA 200.7	
Metals Digestion	Completed		N/A		EFH0057	LSB	08/02/17 19:15	EPA 200.7	
Anions by EPA Method 300.0									
Chloride	**4.55**	0.800	mg/L	5	EFH0135	ECF	08/07/17 12:49	EPA 300.0	
Fluoride	**0.359**	0.100	mg/L	1	EFH0135	ECF	08/07/17 11:23	EPA 300.0	
Sulfate as SO4	**30.8**	1.50	mg/L	5	EFH0135	ECF	08/07/17 12:49	EPA 300.0	

Environmental Testing, Inc.

Russell Britten, President

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Emera Corp.	Project: Sec. 5&8, T24N, R3E, Noble Co., OK	
P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	08/08/17 12:27

GWMP #9A

E7G0524-03 (Aqueous) - Sampled: 07/29/17 14:35

Environmental Testing, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Qualifiers
Conventional Chemistry Parameters by Standard Methods									
pH	**7.97**		pH Units	1	EFH0055	ECF	08/02/17 10:30	SM 4500-H+ B	H-03
Total Dissolved Solids	**530**	100	mg/L	1	EFH0095	ECF	08/03/17 12:45	SM 2540C	
Metals by EPA 200 Series Methods									
Boron	**1.21**	0.0500	mg/L	1	EFH0057	LSB	08/03/17 14:24	EPA 200.7	
Calcium	**35.3**	1.00	mg/L	1	EFH0057	LSB	08/03/17 14:24	EPA 200.7	
Metals Digestion	Completed		N/A		EFH0057	LSB	08/02/17 19:15	EPA 200.7	
Anions by EPA Method 300.0									
Chloride	**18.8**	16.0	mg/L	100	EFH0135	ECF	08/07/17 05:49	EPA 300.0	
Fluoride	**0.747**	0.100	mg/L	1	EFH0135	ECF	08/07/17 11:40	EPA 300.0	
Sulfate as SO4	**111**	30.0	mg/L	100	EFH0135	ECF	08/07/17 05:49	EPA 300.0	

Environmental Testing, Inc.

Russell Britten, President

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Emera Corp.	Project: Sec. 5&8, T24N, R3E, Noble Co., OK	
P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	08/08/17 12:27

GWMP #10A

E7G0524-04 (Aqueous) - Sampled: 07/29/17 14:50

Environmental Testing, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Qualifiers
Conventional Chemistry Parameters by Standard Methods									
pH	**7.51**		pH Units	1	EFH0055	ECF	08/02/17 10:30	SM 4500-H+ B	H-03
Total Dissolved Solids	**1740**	100	mg/L	1	EFH0095	ECF	08/03/17 12:45	SM 2540C	
Metals by EPA 200 Series Methods									
Boron	**3.13**	0.0500	mg/L	1	EFH0057	LSB	08/03/17 14:28	EPA 200.7	
Calcium	**124**	1.00	mg/L	1	EFH0057	LSB	08/03/17 14:28	EPA 200.7	
Metals Digestion	Completed		N/A		EFH0057	LSB	08/02/17 19:15	EPA 200.7	
Anions by EPA Method 300.0									
Chloride	**29.6**	8.00	mg/L	50	EFH0135	ECF	08/07/17 13:24	EPA 300.0	
Fluoride	**0.533**	0.500	mg/L	5	EFH0135	ECF	08/07/17 11:57	EPA 300.0	
Sulfate as SO4	**677**	15.0	mg/L	50	EFH0135	ECF	08/07/17 13:24	EPA 300.0	

Environmental Testing, Inc.

Russell Britten, President

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Emera Corp.	Project: Sec. 5&8, T24N, R3E, Noble Co., OK	
P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	08/08/17 12:27

QUALITY CONTROL

Conventional Chemistry Parameters by Standard Methods
Environmental Testing, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifiers
Batch EFH0055 - General Prep - Wet Chem (Aq)										
LCS (EFH0055-BS1)				Prepared & Analyzed: 08/02/17						
pH	7.00		pH Units	7.00		100	99-101			
Duplicate (EFH0055-DUP1)		**Source: E7G0487-01**		Prepared & Analyzed: 08/02/17						
pH	7.64		pH Units		7.68			0.5	20	
Batch EFH0095 - General Prep - Wet Chem (Aq)										
Blank (EFH0095-BLK1)				Prepared: 08/02/17 Analyzed: 08/03/17						
Total Dissolved Solids	<50.0	50.0	mg/L							
LCS (EFH0095-BS1)				Prepared: 08/02/17 Analyzed: 08/03/17						
Total Dissolved Solids	1010	100	mg/L	1000		101	80-120			
Duplicate (EFH0095-DUP1)		**Source: E7H0038-01**		Prepared: 08/02/17 Analyzed: 08/03/17						
Total Dissolved Solids	3160	167	mg/L		3200			1	20	

Environmental Testing, Inc.

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P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	08/08/17 12:27

QUALITY CONTROL

Metals by EPA 200 Series Methods
Environmental Testing, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifiers
Batch EFH0057 - EPA 200.7										
Blank (EFH0057-BLK1)				Prepared: 08/02/17 Analyzed: 08/03/17						
Boron	<0.0500	0.0500	mg/L							
Calcium	<1.00	1.00	mg/L							
Metals Digestion	Completed		N/A							
LCS (EFH0057-BS1)				Prepared: 08/02/17 Analyzed: 08/03/17						
Boron	0.516	0.0500	mg/L	0.500		103	85-115			
Calcium	20.4	1.00	mg/L	20.0		102	85-115			
Metals Digestion	Completed		N/A							
Duplicate (EFH0057-DUP1)		**Source: E7H0043-01**		Prepared: 08/02/17 Analyzed: 08/03/17						
Boron	0.0771	0.0500	mg/L		0.0746			3	20	
Calcium	99.1	1.00	mg/L		97.0			2	20	
Metals Digestion	Completed		N/A							
Matrix Spike (EFH0057-MS1)		**Source: E7H0043-01**		Prepared: 08/02/17 Analyzed: 08/03/17						
Boron	0.606	0.0500	mg/L	0.500	0.0746	106	70-130			
Calcium	114	1.00	mg/L	20.0	97.0	85	70-130			
Metals Digestion	Completed		N/A							
Matrix Spike Dup (EFH0057-MSD1)		**Source: E7H0043-01**		Prepared: 08/02/17 Analyzed: 08/03/17						
Boron	0.609	0.0500	mg/L	0.500	0.0746	107	70-130	0.5	20	
Calcium	116	1.00	mg/L	20.0	97.0	97	70-130	2	20	
Metals Digestion	Completed		N/A							

Environmental Testing, Inc.

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P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	08/08/17 12:27

QUALITY CONTROL

Anions by EPA Method 300.0
Environmental Testing, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifiers
Batch EFH0135 - General Prep - Wet Chem (Aq)										
Blank (EFH0135-BLK1)				Prepared: 08/06/17 Analyzed: 08/07/17						
Chloride	<0.160	0.160	mg/L							
Fluoride	<0.100	0.100	mg/L							
Sulfate as SO4	<0.300	0.300	mg/L							
LCS (EFH0135-BS1)				Prepared: 08/06/17 Analyzed: 08/07/17						
Chloride	0.608	0.160	mg/L	0.600		101	90-110			
Fluoride	0.392	0.100	mg/L	0.400		98	90-110			
Sulfate as SO4	2.99	0.300	mg/L	3.00		100	90-110			
Matrix Spike (EFH0135-MS1)		**Source: E7G0503-01**		Prepared: 08/06/17 Analyzed: 08/07/17						
Chloride	8390	800	mg/L	3000	5350	101	80-120			
Fluoride	1940	500	mg/L	2000	ND	97	80-120			
Sulfate as SO4	19700	1500	mg/L	15000	4940	98	80-120			
Matrix Spike Dup (EFH0135-MSD1)		**Source: E7G0503-01**		Prepared: 08/06/17 Analyzed: 08/07/17						
Chloride	8260	800	mg/L	3000	5350	97	80-120	2	20	
Fluoride	1930	500	mg/L	2000	ND	97	80-120	0.4	20	
Sulfate as SO4	19600	1500	mg/L	15000	4940	98	80-120	0.5	20	

Environmental Testing, Inc.

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P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	08/08/17 12:27

Non-Certified Analyses included in this Report

Analyte

Certifications

Code	Description	Number	Expires
KDHE	Kansas Accredited	E-10401	01/31/2018
NELAP	NELAP Accredited (LDEQ)	10002	06/30/2018
ODEQ	Oklahoma Accredited	2016-009	08/31/2017
TCEQ	Texas Accredited	T104704498-17-7	03/31/2018

Environmental Testing, Inc.

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P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	08/08/17 12:27

Qualifiers and Definitions

COM	Completed
H-03	Sample was received and analyzed past the method holding time.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
x	Non-Certified analyte
NA	Not Applicable

Environmental Testing, Inc.

Russell Britten, President

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CHAIN OF CUSTODY RECORD

EMERA CORP.
P. O. BOX 2228, EDMOND, OK 73083

E7G0524

Company : Evans and Associates Enterprises, Inc.
Address : P. O. Box 30
Ponca City, OK 74602
Phone : 580-765-6693
Client contact : Saeed Zahrai, P. E. 405-557-0000
Site location : Sections 5 & 8, T24N, R3E, Noble Co., OK
Permit No. LE-1884, Big Fork Ranch

SAMPLE TYPE	SAMPLE METHOD	CONTAINER TYPE
1. Water	C - composite	P - plastic
2. Soil	GR - grab	G - glass
3. Sludge		V - voa
4. Oil		O - other
5. Other		

	SAMPLE IDENTIFICATION	SAMPLE TYPE	CONTAINER SIZE	CONTAINER TYPE	CONTAINER #	SAMPLING DATE	SAMPLING TIME	SAMPLE METHOD	PRESERVATIVES	SAMPLE CONDITION / COMMENTS	ANALYSES: TEMPERATURE	FLOW	DEPTH To WATER	pH	B, Ca, Cl, F, pH, SO_4	TDS
1	GWMP #6A	1	1L	P	1	7/29/17	2:15	GR	NONE		69°		31.2	7.34	X	X
		1	250ml	P	1			GR	HN03							
	~~GWMP #7A~~ NA	1	1L	P	1			GR	NONE							
		1	250ml	P	1			GR	HN03							
2	GWMP #8A	1	1L	P	1	7/29/17	1:50	GR	NONE		70°		41.2	8.05	X	X
		1	250ml	P	1			GR	HN03							
3	GWMP #9A	1	1L	P	1	7/29/17	2:35	GR	NONE		70°		12.6	7.92	X	X
		1	250ml	P	1			GR	HN03							
4	GWMP #10A	1	1L	P	1	7/29/17	2:50	GR	NONE		71°		29.8	7.22	X	X
		1	250ml	P	1			GR	HN03							

1.4°C on ice upon receipt

Sample(s) taken by (print name & sign): _____

Relinquished by (print name & sign): Chuck Twibell Chuck Twibell Date : 7-31-17 Time : _____

Received by (print name & sign): [signature] Date : 7/31/17 Time : 1205

ENVIRONMENTAL TESTING, INC.

8/1/17 tm

SAMPLE RECEIPT FORM

E7G0524

Environmental Testing, Inc.

Printed: 7/31/2017 1:33:57PM

Client:	~~EMRA~~ Emera	**Project Manager:**	**Russell Britten**
Project:	**Sec. 5&8, T24N, R3E, Noble Co., OK**	**Project Number:**	**Evans & Associates**

Report To:

~~EMRA~~ Emera
Mr. Saeed Zahrai
P.O. Box 2228
Edmond, OK 73083
Phone: (405) 557-0000
Fax: NA

Invoice To:

~~EMRA~~ Emera
Mr. Saeed Zahrai
P.O. Box 2228
Edmond, OK 73083
Phone: (405) 557-0000
Fax: NA

Date Due:	08/07/17 17:00 (5 day TAT)		
Received By:	Andra Hoot	Date Received:	07/31/17 12:05
Logged In By:	Cassandra Colon	Date Logged In:	07/31/17 13:21

Samples Received at:		1.4°C			
Custody seals	No	Received on ice	Yes	Sufficient sample	Yes
Containers intact	Yes	Sample or temp blank frozen	No		
COC/Labels agree	Yes	Headspace in VOA vials	No		
Preservation confirmed	Yes	Correct containers	Yes		

Notes:

Preservation Confirmation

Container ID	Container Type	pH	Date/Time	Lot #
E7G0524-01 A	Poly HNO3 - 125mL	<2	7/31/17 1330	NA - By client
E7G0524-02 A	Poly HNO3 - 125mL	↓	↓	↓
E7G0524-03 A	Poly HNO3 - 125mL			
E7G0524-04 A	Poly HNO3 - 125mL			

CCalon — Preservation Confirmed By

7/31/17 — Date

Reviewed By

Date

wko_ETIwpres_rev0.7.rpt

Laboratory Reports For Sample Date 9-10-2017

ENVIRONMENTAL TESTING, INC.

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Oklahoma City, OK 73118
405.488.2400 Phone
405.488.2404 Fax
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Emera Corp.	Project: Sec. 5&8, T24N, R3E, Noble Co., OK	
P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	09/19/17 12:56

GWMP #6A

E7I0145-01 (Aqueous) - Sampled: 09/10/17 11:50

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Qualifiers
Environmental Testing, Inc.									
Conventional Chemistry Parameters by Standard Methods									
pH	**7.72**		pH Units	1	EFI0236	ECF	09/14/17 09:30	SM 4500-H+ B	H-03
Total Dissolved Solids	**330**	100	mg/L	1	EFI0265	ECF	09/15/17 10:00	SM 2540C	
Metals by EPA 200 Series Methods									
Boron	**0.0704**	0.0500	mg/L	1	EFI0282	LSB	09/18/17 12:44	EPA 200.7	
Calcium	**105**	1.00	mg/L	1	EFI0282	LSB	09/18/17 12:44	EPA 200.7	
Metals Digestion	Completed		N/A		EFI0282	LSB	09/15/17 18:20	EPA 200.7	
Anions by EPA Method 300.0									
Chloride	**1.99**	0.160	mg/L	1	EFI0179	ECF	09/14/17 13:23	EPA 300.0	
Fluoride	**0.415**	0.100	mg/L	1	EFI0179	ECF	09/14/17 13:23	EPA 300.0	
Sulfate as SO4	**32.3**	30.0	mg/L	100	EFI0179	ECF	09/12/17 18:03	EPA 300.0	

Environmental Testing, Inc.

Keith Hopcus For Russell Britten, President

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Emera Corp.	Project: Sec. 5&8, T24N, R3E, Noble Co., OK	
P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	09/19/17 12:56

GWMP #8A

E7I0145-02 (Aqueous) - Sampled: 09/10/17 11:25

Environmental Testing, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Qualifiers
Conventional Chemistry Parameters by Standard Methods									
pH	**7.51**		pH Units	1	EFI0236	ECF	09/14/17 09:30	SM 4500-H+ B	H-03
Total Dissolved Solids	**316**	100	mg/L	1	EFI0265	ECF	09/15/17 10:00	SM 2540C	
Metals by EPA 200 Series Methods									
Boron	**0.111**	0.0500	mg/L	1	EFI0282	LSB	09/18/17 12:47	EPA 200.7	
Calcium	**92.1**	1.00	mg/L	1	EFI0282	LSB	09/18/17 12:47	EPA 200.7	
Metals Digestion	Completed		N/A		EFI0282	LSB	09/15/17 18:20	EPA 200.7	
Anions by EPA Method 300.0									
Chloride	**4.61**	1.60	mg/L	10	EFI0179	ECF	09/14/17 14:49	EPA 300.0	
Fluoride	**0.346**	0.100	mg/L	1	EFI0179	ECF	09/14/17 13:40	EPA 300.0	
Sulfate as SO4	**31.5**	3.00	mg/L	10	EFI0179	ECF	09/14/17 14:49	EPA 300.0	

Environmental Testing, Inc.

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Emera Corp.	Project: Sec. 5&8, T24N, R3E, Noble Co., OK	
P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	09/19/17 12:56

GWMP #9A

E7I0145-03 (Aqueous) - Sampled: 09/10/17 12:05

Environmental Testing, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Qualifiers
Conventional Chemistry Parameters by Standard Methods									
pH	**7.87**		pH Units	1	EFI0236	ECF	09/14/17 09:30	SM 4500-H+ B	H-03
Total Dissolved Solids	**454**	100	mg/L	1	EFI0265	ECF	09/15/17 10:00	SM 2540C	
Metals by EPA 200 Series Methods									
Boron	**1.32**	0.0500	mg/L	1	EFI0282	LSB	09/18/17 12:51	EPA 200.7	
Calcium	**44.8**	1.00	mg/L	1	EFI0282	LSB	09/18/17 12:51	EPA 200.7	
Metals Digestion	Completed		N/A		EFI0282	LSB	09/15/17 18:20	EPA 200.7	
Anions by EPA Method 300.0									
Chloride	**17.1**	16.0	mg/L	100	EFI0179	ECF	09/12/17 18:38	EPA 300.0	
Fluoride	**0.717**	0.100	mg/L	1	EFI0179	ECF	09/14/17 13:57	EPA 300.0	
Sulfate as SO4	**106**	30.0	mg/L	100	EFI0179	ECF	09/12/17 18:38	EPA 300.0	

Environmental Testing, Inc.

Keith Hopcus For Russell Britten, President

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ENVIRONMENTAL TESTING, INC.

4619 N. Santa Fe
Oklahoma City, OK 73118
405.488.2400 Phone
405.488.2404 Fax
www.etilab.com

Emera Corp.	Project: Sec. 5&8, T24N, R3E, Noble Co., OK	
P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	09/19/17 12:56

GWMP #10A

E7I0145-04 (Aqueous) - Sampled: 09/10/17 12:20

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Qualifiers
Environmental Testing, Inc.									
Conventional Chemistry Parameters by Standard Methods									
pH	**7.94**		pH Units	1	EFI0236	ECF	09/14/17 09:30	SM 4500-H+ B	H-03
Total Dissolved Solids	**2080**	100	mg/L	1	EFI0265	ECF	09/15/17 10:00	SM 2540C	
Metals by EPA 200 Series Methods									
Boron	**4.40**	0.0500	mg/L	1	EFI0282	LSB	09/18/17 12:55	EPA 200.7	
Calcium	**166**	1.00	mg/L	1	EFI0282	LSB	09/18/17 12:55	EPA 200.7	
Metals Digestion	Completed		N/A		EFI0282	LSB	09/15/17 18:20	EPA 200.7	
Anions by EPA Method 300.0									
Chloride	**26.5**	1.60	mg/L	10	EFI0179	ECF	09/14/17 14:15	EPA 300.0	
Fluoride	<1.00	1.00	mg/L	10	EFI0179	ECF	09/14/17 14:15	EPA 300.0	
Sulfate as SO4	**914**	30.0	mg/L	100	EFI0179	ECF	09/12/17 18:55	EPA 300.0	

Environmental Testing, Inc.

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P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	09/19/17 12:56

QUALITY CONTROL

Conventional Chemistry Parameters by Standard Methods
Environmental Testing, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifiers
Batch EFI0236 - General Prep - Wet Chem (Aq)										
LCS (EFI0236-BS1)				Prepared & Analyzed: 09/14/17						
pH	6.99		pH Units	7.00		100	99-101			
Duplicate (EFI0236-DUP1)		**Source: E7I0163-01**		Prepared & Analyzed: 09/14/17						
pH	7.17		pH Units		7.18			0.1	20	
Batch EFI0265 - General Prep - Wet Chem (Aq)										
Blank (EFI0265-BLK1)				Prepared: 09/14/17 Analyzed: 09/15/17						
Total Dissolved Solids	<50.0	50.0	mg/L							
LCS (EFI0265-BS1)				Prepared: 09/14/17 Analyzed: 09/15/17						
Total Dissolved Solids	964	100	mg/L	1000		96	80-120			
Duplicate (EFI0265-DUP1)		**Source: E7I0226-01**		Prepared: 09/14/17 Analyzed: 09/15/17						
Total Dissolved Solids	2420	100	mg/L		2400			0.9	20	
Duplicate (EFI0265-DUP2)		**Source: E7I0226-02**		Prepared: 09/14/17 Analyzed: 09/15/17						
Total Dissolved Solids	1570	100	mg/L		1540			2	20	

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P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	09/19/17 12:56

QUALITY CONTROL

Metals by EPA 200 Series Methods
Environmental Testing, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifiers
Batch EFI0282 - EPA 200.7										
Blank (EFI0282-BLK1)				Prepared: 09/15/17 Analyzed: 09/18/17						
Boron	<0.0500	0.0500	mg/L							
Calcium	<1.00	1.00	mg/L							
Metals Digestion	Completed		N/A							
LCS (EFI0282-BS1)				Prepared: 09/15/17 Analyzed: 09/18/17						
Boron	0.503	0.0500	mg/L	0.500		101	85-115			
Calcium	20.9	1.00	mg/L	20.0		105	85-115			
Metals Digestion	Completed		N/A							
Duplicate (EFI0282-DUP1)		**Source: E7I0163-01RE1**		Prepared: 09/15/17 Analyzed: 09/18/17						
Boron	0.0279	0.0500	mg/L		0.0282			1	20	
Calcium	320	1.00	mg/L		317			0.9	20	
Metals Digestion	Completed		N/A							
Matrix Spike (EFI0282-MS1)		**Source: E7I0163-01RE1**		Prepared: 09/15/17 Analyzed: 09/18/17						
Boron	0.581	0.0500	mg/L	0.500	0.0282	110	70-130			
Calcium	335	1.00	mg/L	20.0	317	88	70-130			
Metals Digestion	Completed		N/A							
Matrix Spike Dup (EFI0282-MSD1)		**Source: E7I0163-01RE1**		Prepared: 09/15/17 Analyzed: 09/18/17						
Boron	0.589	0.0500	mg/L	0.500	0.0282	112	70-130	1	20	
Calcium	336	1.00	mg/L	20.0	317	92	70-130	0.2	20	
Metals Digestion	Completed		N/A							

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Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	09/19/17 12:56

QUALITY CONTROL

Anions by EPA Method 300.0
Environmental Testing, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifiers
Batch EFI0179 - General Prep - Wet Chem (Aq)										
Blank (EFI0179-BLK1)				Prepared & Analyzed: 09/12/17						
Chloride	<0.160	0.160	mg/L							
Fluoride	<0.100	0.100	mg/L							
Sulfate as SO4	<0.300	0.300	mg/L							
LCS (EFI0179-BS1)				Prepared & Analyzed: 09/12/17						
Chloride	0.584	0.160	mg/L	0.600		97	90-110			
Fluoride	0.400	0.100	mg/L	0.400		100	90-110			
Sulfate as SO4	2.98	0.300	mg/L	3.00		99	90-110			
Matrix Spike (EFI0179-MS1)		**Source: E7I0050-01**		Prepared & Analyzed: 09/12/17						
Chloride	1360	160	mg/L	600	782	96	80-120			
Fluoride	411	100	mg/L	400	ND	103	80-120			
Sulfate as SO4	3050	300	mg/L	3000	136	97	80-120			
Matrix Spike Dup (EFI0179-MSD1)		**Source: E7I0050-01**		Prepared & Analyzed: 09/12/17						
Chloride	1370	160	mg/L	600	782	98	80-120	0.7	20	
Fluoride	409	100	mg/L	400	ND	102	80-120	0.5	20	
Sulfate as SO4	3020	300	mg/L	3000	136	96	80-120	0.9	20	

Environmental Testing, Inc.

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P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	09/19/17 12:56

Non-Certified Analyses included in this Report

Analyte

Certifications

Code	Description	Number	Expires
KDHE	Kansas Accredited	E-10401	01/31/2018
NELAP	NELAP Accredited (LDEQ)	10002	06/30/2018
ODEQ	Oklahoma Accredited	2017-128	08/31/2018
TCEQ	Texas Accredited	T104704498-17-7	03/31/2018

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P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	09/19/17 12:56

Qualifiers and Definitions

COM	Completed
H-03	Sample was received and analyzed past the method holding time.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
x	Non-Certified analyte
NA	Not Applicable

Environmental Testing, Inc.

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ETI0145

CHAIN OF CUSTODY RECORD

EMERA CORP.
P. O. BOX 2228, EDMOND, OK 73083

Company : Evans and Associates Enterprises, Inc.
Address : P. O. Box 30
Ponca City, OK 74602
Phone : 580-765-6693
Client contact : Saeed Zahrai, P. E. 405-557-0000
Site location : Sections 5 & 8, T24N, R3E, Noble Co., OK
Permit No. LE-1884, Big Fork Ranch

SAMPLE TYPE	SAMPLE METHOD	CONTAINER TYPE
1. Water	C - composite	P - plastic
2. Soil	GR - grab	G - glass
3. Sludge		V - voa
4. Oil		O - other
5. Other		

	SAMPLE IDENTIFICATION	SAMPLE TYPE	CONTAINER SIZE	CONTAINER TYPE	CONTAINER #	SAMPLING DATE	SAMPLING TIME	SAMPLE METHOD	PRESERVATIVES	SAMPLE CONDITION / COMMENTS	ANALYSES: TEMPERATURE	FLOW	DEPTH To WATER	pH	B, Ca, Cl, F, pH	TDS, EC
1	GWMP #6A	1	1L	P	1	9-10-17	11:50	GR	NONE		69°		31.0'	6.34	X	X
		1	250ml	P	1			GR	HN03							
	~~GWMP #7A~~ N/A	1	1L	P	1			GR	NONE							
		1	250ml	P	1			GR	HN03							
2	GWMP #8A	1	1L	P	1	9-10-17	11:25	GR	NONE		68°		42.4	7.20	X	X
		1	250ml	P	1			GR	HN03							
3	GWMP #9A	1	1L	P	1	9-10-17	12:05	GR	NONE		70°		12.2	7.18	X	X
		1	250ml	P	1			GR	HN03							
4	GWMP #10A	1	1L	P	1	9-10-17	12:20	GR	NONE		72°		30.5	6.78	X	X
		1	250ml	P	1			GR	HN03							

Sample(s) taken by (print name & sign): Chuck Tw.bell Chuck Twibell

RUSH @ 0.2°C E00184

Relinquished by (print name & sign): Chuck Tw, bell Chuck Twibell Date : 9-11-2017 Time : 11:25

Received by (print name & sign): Cassandra Colon Cassandra Colon Date : 9/11/17 Time : 1125

ENVIRONMENTAL TESTING, INC.

SAMPLE RECEIPT FORM

E7I0145

Environmental Testing, Inc.

Printed: 9/11/2017 1:14:12PM

Client:	**Emera Corp.**	**Project Manager:**	**Russell Britten**
Project:	**Sec. 5&8, T24N, R3E, Noble Co., OK**	**Project Number:**	**Evans & Associates**

Report To:
Emera Corp.
Mr. Saeed Zahrai
P.O. Box 2228
Edmond, OK 73083
Phone: (405) 557-0000
Fax: NA

Invoice To:
Emera Corp.
Mr. Saeed Zahrai
P.O. Box 2228
Edmond, OK 73083
Phone: (405) 557-0000
Fax: NA

Date Due:	09/18/17 17:00 (5 day TAT)		
Received By:	Cassandra Colon	Date Received:	09/11/17 11:25
Logged In By:	Cassandra Colon	Date Logged In:	09/11/17 13:12

Samples Received at:		0.2°C			
Custody seals	No	Received on ice	Yes	Sufficient sample	Yes
Containers intact	Yes	Sample or temp blank frozen	No		
COC/Labels agree	Yes	Headspace in VOA vials	No		
Preservation confirmed	Yes	Correct containers	Yes		

Notes:

Preservation Confirmation

Container ID	Container Type	pH	Date/Time	Lot #
E7I0145-01 A	Poly HNO3 - 250mL	2	9/11/17 1320	162027
E7I0145-02 A	Poly HNO3 - 250mL	↓	↓	↓
E7I0145-03 A	Poly HNO3 - 250mL			
E7I0145-04 A	Poly HNO3 - 250mL			

ACOLON
Preservation Confirmed By

9/11/17
Date

Reviewed By

Date

wko_ET\wpres_rev0.7.rpt

Laboratory Reports For Sample Date 10-14-2017

ENVIRONMENTAL TESTING, INC.

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Oklahoma City, OK 73118
405.488.2400 Phone
405.488.2404 Fax
www.etilab.com

Emera Corp.	Project: Sec. 5&8, T24N, R3E, Noble Co., OK	
P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	10/23/17 16:45

GWMP #6A

E7J0270-01 (Aqueous) - Sampled: 10/14/17 10:50

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Qualifiers
Environmental Testing, Inc.									
Conventional Chemistry Parameters by Standard Methods									
pH	**7.72**		pH Units	1	EFJ0425	BLS	10/20/17 11:10	SM 4500-H+ B	H-03
Total Dissolved Solids	**380**	100	mg/L	1	EFJ0399	ECF	10/19/17 12:30	SM 2540C	
Metals by EPA 200 Series Methods									
Boron	**0.0654**	0.0500	mg/L	1	EFJ0450	LSB	10/23/17 13:13	EPA 200.7	
Calcium	**97.3**	1.00	mg/L	1	EFJ0450	LSB	10/23/17 13:13	EPA 200.7	
Metals Digestion	Completed		N/A		EFJ0450	LSB	10/20/17 17:25	EPA 200.7	
Anions by EPA Method 300.0									
Chloride	**1.53**	0.160	mg/L	1	EFJ0326	BLS	10/17/17 10:48	EPA 300.0	
Fluoride	**0.394**	0.100	mg/L	1	EFJ0326	BLS	10/17/17 10:48	EPA 300.0	
Sulfate as SO4	**26.4**	1.50	mg/L	5	EFJ0326	BLS	10/17/17 18:36	EPA 300.0	

Environmental Testing, Inc.

Keith Hopcus For Russell Britten, President

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Emera Corp.	Project: Sec. 5&8, T24N, R3E, Noble Co., OK	
P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	10/23/17 16:45

GWMP #8A

E7J0270-02 (Aqueous) - Sampled: 10/14/17 10:35

Environmental Testing, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Qualifiers
Conventional Chemistry Parameters by Standard Methods									
pH	**7.57**		pH Units	1	EFJ0425	BLS	10/20/17 11:10	SM 4500-H+ B	H-03
Total Dissolved Solids	**372**	100	mg/L	1	EFJ0399	ECF	10/19/17 12:30	SM 2540C	
Metals by EPA 200 Series Methods									
Boron	**0.108**	0.0500	mg/L	1	EFJ0450	LSB	10/23/17 13:32	EPA 200.7	
Calcium	**74.7**	1.00	mg/L	1	EFJ0450	LSB	10/23/17 13:32	EPA 200.7	
Metals Digestion	Completed		N/A		EFJ0450	LSB	10/20/17 17:25	EPA 200.7	
Anions by EPA Method 300.0									
Chloride	**3.78**	0.800	mg/L	5	EFJ0326	BLS	10/17/17 18:54	EPA 300.0	
Fluoride	**0.310**	0.100	mg/L	1	EFJ0326	BLS	10/17/17 11:05	EPA 300.0	
Sulfate as SO4	**32.3**	1.50	mg/L	5	EFJ0326	BLS	10/17/17 18:54	EPA 300.0	

Environmental Testing, Inc.

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P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	10/23/17 16:45

GWMP #9A

E7J0270-03 (Aqueous) - Sampled: 10/14/17 11:10

Environmental Testing, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Qualifiers
Conventional Chemistry Parameters by Standard Methods									
pH	**8.26**		pH Units	1	EFJ0425	BLS	10/20/17 11:10	SM 4500-H+ B	H-03
Total Dissolved Solids	**510**	100	mg/L	1	EFJ0399	ECF	10/19/17 12:30	SM 2540C	
Metals by EPA 200 Series Methods									
Boron	**1.36**	0.0500	mg/L	1	EFJ0450	LSB	10/23/17 13:36	EPA 200.7	
Calcium	**36.8**	1.00	mg/L	1	EFJ0450	LSB	10/23/17 13:36	EPA 200.7	
Metals Digestion	Completed		N/A		EFJ0450	LSB	10/20/17 17:25	EPA 200.7	
Anions by EPA Method 300.0									
Chloride	**16.4**	1.60	mg/L	10	EFJ0326	BLS	10/17/17 19:11	EPA 300.0	
Fluoride	**0.679**	0.100	mg/L	1	EFJ0326	BLS	10/17/17 11:23	EPA 300.0	
Sulfate as SO4	**101**	3.00	mg/L	10	EFJ0326	BLS	10/17/17 19:11	EPA 300.0	

Environmental Testing, Inc.

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P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	10/23/17 16:45

GWMP #10A

E7J0270-04 (Aqueous) - Sampled: 10/14/17 11:20

Environmental Testing, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Qualifiers
Conventional Chemistry Parameters by Standard Methods									
pH	**7.42**		pH Units	1	EFJ0425	BLS	10/20/17 11:10	SM 4500-H+ B	H-03
Total Dissolved Solids	**2140**	100	mg/L	1	EFJ0399	ECF	10/19/17 12:30	SM 2540C	
Metals by EPA 200 Series Methods									
Boron	**4.52**	0.0500	mg/L	1	EFJ0450	LSB	10/23/17 13:55	EPA 200.7	
Calcium	**167**	1.00	mg/L	1	EFJ0450	LSB	10/23/17 13:55	EPA 200.7	
Metals Digestion	Completed		N/A		EFJ0450	LSB	10/20/17 17:25	EPA 200.7	
Anions by EPA Method 300.0									
Chloride	**27.3**	8.00	mg/L	50	EFJ0326	BLS	10/17/17 19:28	EPA 300.0	
Fluoride	<0.500	0.500	mg/L	5	EFJ0326	BLS	10/17/17 11:40	EPA 300.0	
Sulfate as SO4	**1140**	150	mg/L	500	EFJ0326	BLS	10/17/17 19:46	EPA 300.0	

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P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	10/23/17 16:45

QUALITY CONTROL

Conventional Chemistry Parameters by Standard Methods
Environmental Testing, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifiers
Batch EFJ0399 - General Prep - Wet Chem (Aq)										
Blank (EFJ0399-BLK1)				Prepared: 10/18/17 Analyzed: 10/19/17						
Total Dissolved Solids	<50.0	50.0	mg/L							
LCS (EFJ0399-BS1)				Prepared: 10/18/17 Analyzed: 10/19/17						
Total Dissolved Solids	1000	100	mg/L	1000		100	80-120			
Duplicate (EFJ0399-DUP1)		**Source: E7J0301-01**		Prepared: 10/18/17 Analyzed: 10/19/17						
Total Dissolved Solids	15900	1000	mg/L		15500			2	20	
Duplicate (EFJ0399-DUP2)		**Source: E7J0314-04**		Prepared: 10/18/17 Analyzed: 10/19/17						
Total Dissolved Solids	2460	100	mg/L		2440			0.7	20	
Batch EFJ0425 - General Prep - Wet Chem (Aq)										
LCS (EFJ0425-BS1)				Prepared & Analyzed: 10/20/17						
pH	7.00		pH Units	7.00		100	99-101			
Duplicate (EFJ0425-DUP1)		**Source: E7J0313-01**		Prepared & Analyzed: 10/20/17						
pH	7.85		pH Units		7.90			0.6	20	

Environmental Testing, Inc.

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Keith Hopcus For Russell Britten, President

ENVIRONMENTAL TESTING, INC.

4619 N. Santa Fe
Oklahoma City, OK 73118
405.488.2400 Phone
405.488.2404 Fax
www.etilab.com

Emera Corp.	Project: Sec. 5&8, T24N, R3E, Noble Co., OK	
P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	10/23/17 16:45

QUALITY CONTROL

Metals by EPA 200 Series Methods
Environmental Testing, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifiers
Batch EFJ0450 - EPA 200.7										
Blank (EFJ0450-BLK1)				Prepared: 10/20/17 Analyzed: 10/23/17						
Boron	<0.0500	0.0500	mg/L							
Calcium	<1.00	1.00	mg/L							
Metals Digestion	Completed		N/A							
LCS (EFJ0450-BS1)				Prepared: 10/20/17 Analyzed: 10/23/17						
Boron	0.520	0.0500	mg/L	0.500		104	85-115			
Calcium	21.1	1.00	mg/L	20.0		106	85-115			
Metals Digestion	Completed		N/A							
Duplicate (EFJ0450-DUP1)		**Source: E7J0270-01**		Prepared: 10/20/17 Analyzed: 10/23/17						
Boron	0.0692	0.0500	mg/L		0.0654			6	20	
Calcium	102	1.00	mg/L		97.3			5	20	
Metals Digestion	Completed		N/A							
Matrix Spike (EFJ0450-MS1)		**Source: E7J0270-01**		Prepared: 10/20/17 Analyzed: 10/23/17						
Boron	0.602	0.0500	mg/L	0.500	0.0654	107	70-130			
Calcium	117	1.00	mg/L	20.0	97.3	100	70-130			
Metals Digestion	Completed		N/A							
Matrix Spike Dup (EFJ0450-MSD1)		**Source: E7J0270-01**		Prepared: 10/20/17 Analyzed: 10/23/17						
Boron	0.603	0.0500	mg/L	0.500	0.0654	108	70-130	0.3	20	
Calcium	118	1.00	mg/L	20.0	97.3	102	70-130	0.4	20	
Metals Digestion	Completed		N/A							

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P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	10/23/17 16:45

QUALITY CONTROL

Anions by EPA Method 300.0
Environmental Testing, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifiers
Batch EFJ0326 - General Prep - Wet Chem (Aq)										
Blank (EFJ0326-BLK1)				Prepared & Analyzed: 10/17/17						
Chloride	<0.160	0.160	mg/L							
Fluoride	<0.100	0.100	mg/L							
Sulfate as SO4	<0.300	0.300	mg/L							
LCS (EFJ0326-BS1)				Prepared & Analyzed: 10/17/17						
Chloride	0.628	0.160	mg/L	0.600		105	90-110			
Fluoride	0.385	0.100	mg/L	0.400		96	90-110			
Sulfate as SO4	3.04	0.300	mg/L	3.00		101	90-110			
Matrix Spike (EFJ0326-MS1)		**Source: E7J0266-01**		Prepared & Analyzed: 10/17/17						
Chloride	49.2	8.00	mg/L	30.0	19.3	100	80-120			
Fluoride	18.6	5.00	mg/L	20.0	ND	93	80-120			
Sulfate as SO4	257	15.0	mg/L	150	111	97	80-120			
Matrix Spike Dup (EFJ0326-MSD1)		**Source: E7J0266-01**		Prepared & Analyzed: 10/17/17						
Chloride	48.2	8.00	mg/L	30.0	19.3	96	80-120	2	20	
Fluoride	18.9	5.00	mg/L	20.0	ND	95	80-120	2	20	
Sulfate as SO4	255	15.0	mg/L	150	111	96	80-120	0.8	20	

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P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	10/23/17 16:45

Non-Certified Analyses included in this Report

Analyte

Certifications

Code	Description	Number	Expires
KDHE	Kansas Accredited	E-10401	01/31/2018
NELAP	NELAP Accredited (LDEQ)	10002	06/30/2018
ODEQ	Oklahoma Accredited	2017-128	08/31/2018
TCEQ	Texas Accredited	T104704498-17-7	03/31/2018

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Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	10/23/17 16:45

Qualifiers and Definitions

COM	Completed
H-03	Sample was received and analyzed past the method holding time.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
x	Non-Certified analyte
NA	Not Applicable

Environmental Testing, Inc.

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CHAIN OF CUSTODY RECORD

EMERA CORP.
P. O. BOX 2228, EDMOND, OK 73083

17J0270

Company : Evans and Associates Enterprises, Inc.
Address : P. O. Box 30
Ponca City, OK 74602
Phone : 580-765-6693
Client contact : Saeed Zahrai, P. E. 405-557-0000
Site location : Sections 5 & 8, T24N, R3E, Noble Co., OK
Permit No. LE-1864, Big Fork Ranch

SAMPLE TYPE	SAMPLE METHOD	CONTAINER TYPE
1. Water	C - composite	P - plastic
2. Soil	GR - grab	G - glass
3. Sludge		V - voa
4. Oil		O - other
5. Other		

	SAMPLE IDENTIFICATION	SAMPLE TYPE	CONTAINER SIZE	CONTAINER TYPE	CONTAINER #	SAMPLING DATE	SAMPLING TIME	SAMPLE METHOD	PRESERVATIVES	SAMPLE CONDITION / COMMENTS	ANALYSES: TEMPERATURE	FLOW	DEPTH To WATER	pH	Bicarb, Cl, F, pH, TDS, Sulfate
1	GWMP #6A	1	1L	P	1	10-14-17	10:50	GR	NONE		69		32.9	6.47	
		1	250ml	P	1			GR	HN03						
	~~GWMP #7A~~	1	1L	P	1			GR	NONE						
		1	250ml	P	1			GR	HN03						
2	GWMP #8A	1	1L	P	1			GR	NONE						
		1	250ml	P	1	10-14-17	10:35	GR	HN03		68		40.6	<7.02	
3	GWMP #9A	1	1L	P	1			GR	NONE						
		1	250ml	P	1	10-14-17	11:10	GR	HN03		70		12.3	7.19	
4	GWMP #10A	1	1L	P	1			GR	NONE						
		1	250ml	P	1	10-14-17	11:30	GR	HN03		69		19.4	6.32	

Sample(s) taken by (print name & sign): Chuck Twibell Chuck Twi
Relinquished by (print name & sign): Chuck Twibell Chuck Twi Date : 10-16-17 Time : 12:57
Received by (print name & sign): Date : 10-16-17 Time : 1257

0.8°C IR 400784

CC: 17I0145

ENVIRONMENTAL TESTING, INC.

SAMPLE RECEIPT FORM

E7J0270

Environmental Testing, Inc.

Printed: 10/16/2017 1:12:02PM

Client:	**Emera Corp.**	**Project Manager:**	**Russell Britten**
Project:	**Sec. 5&8, T24N, R3E, Noble Co., OK**	**Project Number:**	**Evans & Associates**

Report To:
Emera Corp.
Mr. Saeed Zahrai
P.O. Box 2228
Edmond, OK 73083
Phone: (405) 557-0000
Fax: NA

Invoice To:
Emera Corp.
Mr. Saeed Zahrai
P.O. Box 2228
Edmond, OK 73083
Phone: (405) 557-0000
Fax: NA

Date Due:	10/23/17 17:00 (5 day TAT)		
Received By:	Andra Hoot	Date Received:	10/16/17 12:57
Logged In By:	Andra Hoot	Date Logged In:	10/16/17 13:06

Samples Received at:		0.8°C			
Custody seals	No	Received on ice	Yes	Sufficient sample	Yes
Containers intact	Yes	Sample or temp blank frozen	No		
COC/Labels agree	Yes	Headspace in VOA vials	No		
Preservation confirmed	Yes	Correct containers	Yes		

Notes:

Preservation Confirmation

Container ID	Container Type	pH	Date/Time	Lot #
E7J0270-01 A	Poly HNO3 - 250mL	<2	10/16/17 1321	1602027
E7J0270-02 A	Poly HNO3 - 250mL			
E7J0270-03 A	Poly HNO3 - 250mL			
E7J0270-04 A	Poly HNO3 - 250mL			

Preservation Confirmed By

Date 10/16/17

Reviewed By

Date

wko_ETIwpres_rev0.7.rpt

Laboratory Reports For Sample Date 11-11-2017

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Emera Corp.	Project: Sec. 5&8, T24N, R3E, Noble Co., OK	
P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	11/21/17 17:08

GWMP #6A

E7K0225-01 (Aqueous) - Sampled: 11/11/17 12:30

Environmental Testing, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Qualifiers
Conventional Chemistry Parameters by Standard Methods									
pH	**7.27**		pH Units	1	EFK0282	BLS	11/15/17 11:00	SM 4500-H+ B	H-03
Total Dissolved Solids	**380**	100	mg/L	1	EFK0257	BLS	11/14/17 12:50	SM 2540C	
Metals by EPA 200 Series Methods									
Boron	**0.0766**	0.0500	mg/L	1	EFK0293	LSB	11/16/17 13:56	EPA 200.7	
Calcium	**99.4**	1.00	mg/L	1	EFK0293	LSB	11/16/17 13:56	EPA 200.7	
Metals Digestion	Completed		N/A		EFK0293	LSB	11/15/17 17:45	EPA 200.7	
Anions by EPA Method 300.0									
Chloride	**1.29**	0.800	mg/L	5	EFK0353	BLS	11/20/17 05:21	EPA 300.0	
Fluoride	**0.412**	0.100	mg/L	1	EFK0396	BLS	11/20/17 19:52	EPA 300.0	
Sulfate as SO4	**26.5**	1.50	mg/L	5	EFK0353	BLS	11/20/17 05:21	EPA 300.0	

Environmental Testing, Inc.

Keith Hopcus For Russell Britten, President

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P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	11/21/17 17:08

GWMP #8A

E7K0225-02 (Aqueous) - Sampled: 11/11/17 12:50

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Qualifiers
Environmental Testing, Inc.									
Conventional Chemistry Parameters by Standard Methods									
pH	**7.53**		pH Units	1	EFK0282	BLS	11/15/17 11:00	SM 4500-H+ B	H-03
Total Dissolved Solids	**354**	100	mg/L	1	EFK0314	ECF	11/16/17 12:45	SM 2540C	
Metals by EPA 200 Series Methods									
Boron	**1.36**	0.0500	mg/L	1	EFK0293	LSB	11/16/17 14:00	EPA 200.7	
Calcium	**38.9**	1.00	mg/L	1	EFK0293	LSB	11/16/17 14:00	EPA 200.7	
Metals Digestion	Completed		N/A		EFK0293	LSB	11/15/17 17:45	EPA 200.7	
Anions by EPA Method 300.0									
Chloride	**3.57**	0.800	mg/L	5	EFK0353	BLS	11/20/17 05:38	EPA 300.0	
Fluoride	**0.322**	0.100	mg/L	1	EFK0396	BLS	11/20/17 20:09	EPA 300.0	
Sulfate as SO4	**31.9**	1.50	mg/L	5	EFK0353	BLS	11/20/17 05:38	EPA 300.0	

Environmental Testing, Inc.

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P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	11/21/17 17:08

GWMP #9A

E7K0225-03 (Aqueous) - Sampled: 11/11/17 13:10

Environmental Testing, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Qualifiers
Conventional Chemistry Parameters by Standard Methods									
pH	**7.81**		pH Units	1	EFK0282	BLS	11/15/17 11:00	SM 4500-H+ B	H-03
Total Dissolved Solids	**516**	100	mg/L	1	EFK0314	ECF	11/16/17 12:45	SM 2540C	
Metals by EPA 200 Series Methods									
Boron	**0.109**	0.0500	mg/L	1	EFK0293	LSB	11/16/17 14:04	EPA 200.7	
Calcium	**73.7**	1.00	mg/L	1	EFK0293	LSB	11/16/17 14:04	EPA 200.7	
Metals Digestion	Completed		N/A		EFK0293	LSB	11/15/17 17:45	EPA 200.7	
Anions by EPA Method 300.0									
Chloride	**17.7**	8.00	mg/L	50	EFK0353	BLS	11/18/17 01:05	EPA 300.0	
Fluoride	**0.703**	0.100	mg/L	1	EFK0396	BLS	11/20/17 20:26	EPA 300.0	
Sulfate as SO4	**96.8**	15.0	mg/L	50	EFK0353	BLS	11/18/17 01:05	EPA 300.0	

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P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	11/21/17 17:08

GWMP #10A

E7K0225-04 (Aqueous) - Sampled: 11/11/17 13:20

Environmental Testing, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Qualifiers
Conventional Chemistry Parameters by Standard Methods									
pH	**6.95**		pH Units	1	EFK0282	BLS	11/15/17 11:00	SM 4500-H+ B	H-03
Total Dissolved Solids	**1940**	100	mg/L	1	EFK0314	ECF	11/16/17 12:45	SM 2540C	
Metals by EPA 200 Series Methods									
Boron	**4.17**	0.0500	mg/L	1	EFK0293	LSB	11/16/17 14:08	EPA 200.7	
Calcium	**134**	1.00	mg/L	1	EFK0293	LSB	11/16/17 14:08	EPA 200.7	
Metals Digestion	Completed		N/A		EFK0293	LSB	11/15/17 17:45	EPA 200.7	
Anions by EPA Method 300.0									
Chloride	**78.9**	8.00	mg/L	50	EFK0353	BLS	11/18/17 01:23	EPA 300.0	
Fluoride	**0.394**	0.100	mg/L	1	EFK0396	BLS	11/20/17 20:42	EPA 300.0	
Sulfate as SO4	**804**	30.0	mg/L	100	EFK0353	BLS	11/21/17 14:02	EPA 300.0	

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Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	11/21/17 17:08

QUALITY CONTROL

Conventional Chemistry Parameters by Standard Methods
Environmental Testing, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifiers
Batch EFK0257 - General Prep - Wet Chem (Aq)										
Blank (EFK0257-BLK1)				Prepared: 11/13/17 Analyzed: 11/14/17						
Total Dissolved Solids	<50.0	50.0	mg/L							
LCS (EFK0257-BS1)				Prepared: 11/13/17 Analyzed: 11/14/17						
Total Dissolved Solids	974	100	mg/L	1000		97	80-120			
Duplicate (EFK0257-DUP1)		**Source: E7K0194-03**		Prepared: 11/13/17 Analyzed: 11/14/17						
Total Dissolved Solids	88600	5000	mg/L		87900			0.8	20	
Batch EFK0282 - General Prep - Wet Chem (Aq)										
LCS (EFK0282-BS1)				Prepared & Analyzed: 11/15/17						
pH	7.03		pH Units	7.00		100	99-101			
Duplicate (EFK0282-DUP1)		**Source: E7K0190-01**		Prepared & Analyzed: 11/15/17						
pH	7.87		pH Units		7.88			0.1	20	
Batch EFK0314 - General Prep - Wet Chem (Aq)										
Blank (EFK0314-BLK1)				Prepared: 11/15/17 Analyzed: 11/16/17						
Total Dissolved Solids	<50.0	50.0	mg/L							
LCS (EFK0314-BS1)				Prepared: 11/15/17 Analyzed: 11/16/17						
Total Dissolved Solids	928	100	mg/L	1000		93	80-120			
Duplicate (EFK0314-DUP1)		**Source: E7K0225-02**		Prepared: 11/15/17 Analyzed: 11/16/17						
Total Dissolved Solids	358	100	mg/L		354			1	20	

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QUALITY CONTROL

Conventional Chemistry Parameters by Standard Methods
Environmental Testing, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifiers
Batch EFK0314 - General Prep - Wet Chem (Aq)										
Duplicate (EFK0314-DUP2)		**Source: E7K0271-04**		Prepared: 11/15/17 Analyzed: 11/16/17						
Total Dissolved Solids	1860	100	mg/L		1850			0.8	20	

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QUALITY CONTROL

Metals by EPA 200 Series Methods
Environmental Testing, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifiers
Batch EFK0293 - EPA 200.7										
Blank (EFK0293-BLK1)				Prepared: 11/15/17 Analyzed: 11/16/17						
Boron	<0.0500	0.0500	mg/L							
Calcium	<1.00	1.00	mg/L							
Metals Digestion	Completed		N/A							
LCS (EFK0293-BS1)				Prepared: 11/15/17 Analyzed: 11/16/17						
Boron	0.522	0.0500	mg/L	0.500		104	85-115			
Calcium	20.9	1.00	mg/L	20.0		105	85-115			
Metals Digestion	Completed		N/A							
Duplicate (EFK0293-DUP1)		**Source: E7K0219-03**		Prepared: 11/15/17 Analyzed: 11/16/17						
Boron	0.0117	0.0500	mg/L		0.0121			3	20	
Calcium	0.333	1.00	mg/L		0.370			11	20	
Metals Digestion	Completed		N/A							
Matrix Spike (EFK0293-MS1)		**Source: E7K0219-03**		Prepared: 11/15/17 Analyzed: 11/16/17						
Boron	0.567	0.0500	mg/L	0.500	0.0121	111	70-130			
Calcium	20.4	1.00	mg/L	20.0	0.370	100	70-130			
Metals Digestion	Completed		N/A							
Matrix Spike Dup (EFK0293-MSD1)		**Source: E7K0219-03**		Prepared: 11/15/17 Analyzed: 11/16/17						
Boron	0.564	0.0500	mg/L	0.500	0.0121	110	70-130	0.5	20	
Calcium	20.2	1.00	mg/L	20.0	0.370	99	70-130	0.9	20	
Metals Digestion	Completed		N/A							

Environmental Testing, Inc.

Keith Hopcus For Russell Britten, President

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ENVIRONMENTAL TESTING, INC.

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Emera Corp.	Project: Sec. 5&8, T24N, R3E, Noble Co., OK	
P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	11/21/17 17:08

QUALITY CONTROL

Anions by EPA Method 300.0

Environmental Testing, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifiers
Batch EFK0353 - General Prep - Wet Chem (Aq)										
Blank (EFK0353-BLK1)				Prepared & Analyzed: 11/17/17						
Chloride	<0.160	0.160	mg/L							
Sulfate as SO4	<0.300	0.300	mg/L							
LCS (EFK0353-BS1)				Prepared & Analyzed: 11/17/17						
Chloride	0.603	0.160	mg/L	0.600		101	90-110			
Sulfate as SO4	2.87	0.300	mg/L	3.00		96	90-110			
Matrix Spike (EFK0353-MS1)		**Source: E7K0188-01**		Prepared & Analyzed: 11/17/17						
Chloride	165000	8000	mg/L	30000	135000	101	80-120			
Sulfate as SO4	145000	15000	mg/L	150000	ND	97	80-120			
Matrix Spike Dup (EFK0353-MSD1)		**Source: E7K0188-01**		Prepared & Analyzed: 11/17/17						
Chloride	174000	8000	mg/L	30000	135000	132	80-120	5	20	M-02
Sulfate as SO4	146000	15000	mg/L	150000	ND	97	80-120	0.8	20	
Batch EFK0396 - General Prep - Wet Chem (Aq)										
Blank (EFK0396-BLK1)				Prepared & Analyzed: 11/20/17						
Fluoride	<0.100	0.100	mg/L							
LCS (EFK0396-BS1)				Prepared & Analyzed: 11/20/17						
Fluoride	0.391	0.100	mg/L	0.400		98	90-110			
Matrix Spike (EFK0396-MS1)		**Source: E7K0262-01**		Prepared & Analyzed: 11/20/17						
Fluoride	199	50.0	mg/L	200	ND	100	80-120			
Matrix Spike Dup (EFK0396-MSD1)		**Source: E7K0262-01**		Prepared & Analyzed: 11/20/17						
Fluoride	199	50.0	mg/L	200	ND	100	80-120	0.03	20	

Environmental Testing, Inc.

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P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	11/21/17 17:08

Non-Certified Analyses included in this Report

Analyte

Certifications

Code	Description	Number	Expires
KDHE	Kansas Accredited	E-10401	01/31/2018
NELAP	NELAP Accredited (LDEQ)	10002	06/30/2018
ODEQ	Oklahoma Accredited	2017-128	08/31/2018
TCEQ	Texas Accredited	T104704498-17-7	03/31/2018

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Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	11/21/17 17:08

Qualifiers and Definitions

COM	Completed
H-03	Sample was received and analyzed past the method holding time.
M-02	The matrix spike recovery was higher than expected due to sample matrix interference.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
x	Non-Certified analyte
NA	Not Applicable

Environmental Testing, Inc.

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CHAIN OF CUSTODY RECORD

EMERA CORP.
P. O. BOX 2228, EDMOND, OK 73083

Regular TAT ETK0225

Company : Evans and Associates Enterprises, Inc.
Address : P. O. Box 30
Ponca City, OK 74602
Phone : 580-765-6693
Client contact : Saeed Zahrai, P. E. 405-557-0000
Site location : Sections 5 & 8, T24N, R3E, Noble Co., OK
Permit No. LE-1884, Big Fork Ranch

SAMPLE TYPE	SAMPLE METHOD	CONTAINER TYPE
1. Water	C - composite	P - plastic
2. Soil	GR - grab	G - glass
3. Sludge		V - voa
4. Oil		O - other
5. Other		

	SAMPLE IDENTIFICATION	SAMPLE TYPE	CONTAINER SIZE	CONTAINER TYPE	CONTAINER #	SAMPLING DATE	SAMPLING TIME	SAMPLE METHOD	PRESERVATIVES	SAMPLE CONDITION / COMMENTS	ANALYSES: TEMPERATURE	FLOW	DEPTH To WATER	pH	BTCA	Cl, F, pH, TDS, SO4
1	GWMP #6A	1	1L	P	1	11-11-17	12:30	GR	NONE		66		31.6	8.1	X	X
		1	250ml	P	1			GR	HN03							
	~~GWMP #7A~~ cc No Sample	1	1L	P	1			GR	NONE							
		1	250ml	P	1			GR	HN03							
2	GWMP #8A	1	1L	P	1	11-11-17	12:50	GR	NONE		65		32.4	9.2	X	X
		1	250ml	P	1			GR	HN03							
3	GWMP #9A	1	1L	P	1	11-11-17	1:10	GR	NONE		69		11.5	7.4	↓	↓
		1	250ml	P	1			GR	HN03							
4	GWMP #10A	1	1L	P	1	11-11-17	1:20	GR	NONE		67		28.6	7.2	↓	↓
		1	250ml	P	1			GR	HN03							
										RCVD @ 0.0°C EDD18K ON ice						

Sample(s) taken by (print name & sign): Chuck Twibell Chuck Twibell
Relinquished by (print name & sign): Chuck Twibell Chuck Twibell Date : 11-13-17 Time : 11:50
Received by (print name & sign): CCOLON Cassandra Colon Date : 11/13/17 Time : 1150

ENVIRONMENTAL TESTING, INC.

SAMPLE RECEIPT FORM

E7K0225

Environmental Testing, Inc.

Printed: 11/13/2017 11:56:23AM

Client:	**Emera Corp.**	**Project Manager:**	**Russell Britten**
Project:	**Sec. 5&8, T24N, R3E, Noble Co., OK**	**Project Number:**	**Evans & Associates**

Report To:
Emera Corp.
Mr. Saeed Zahrai
P.O. Box 2228
Edmond, OK 73083
Phone: (405) 557-0000
Fax: NA

Invoice To:
Emera Corp.
Mr. Saeed Zahrai
P.O. Box 2228
Edmond, OK 73083
Phone: (405) 557-0000
Fax: NA

Date Due:	11/20/17 17:00 (5 day TAT)		
Received By:	Cassandra Colon	Date Received:	11/13/17 11:50
Logged In By:	Cassandra Colon	Date Logged In:	11/13/17 11:54

Samples Received at: 0°C

Custody seals	No	Received on ice	Yes	Sufficient sample	Yes
Containers intact	Yes	Sample or temp blank frozen	No		
COC/Labels agree	Yes	Headspace in VOA vials	No		
Preservation confirmed	~~Yes~~ No	Correct containers	Yes		

CC

Notes:

Preservation Confirmation

Container ID	Container Type	pH	Date/Time	Lot #
E7K0225-01 A	Poly HNO3 - 250mL	pres. @ lab <2	11/13/17 1158	E171101
E7K0225-02 A	Poly HNO3 - 250mL	<2	↓	pres. by client
E7K0225-03 A	Poly HNO3 - 250mL	↓	↓	↓
E7K0225-04 A	Poly HNO3 - 250mL	↓	↓	↓

CColon
Preservation Confirmed By

11/13/17
Date

Reviewed By

Date

wko_ETIwpres_rev0.7.rpt

Laboratory Reports For Sample Date 1-6-2018

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Emera Corp.	Project: Sec. 5&8, T24N, R3E, Noble Co., OK	
P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	02/26/18 16:54

GWMP #6A

E8A0105-01 (Aqueous) - Sampled: 01/06/18 13:10

Environmental Testing, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Qualifiers
Conventional Chemistry Parameters by Standard Methods									
pH	**7.09**		pH Units	1	EGA0115	ECF	01/09/18 14:00	SM 4500-H+ B	H-03
Total Dissolved Solids	**400**	100	mg/L	1	EGA0142	ECF	01/11/18 12:20	SM 2540C	
Metals by EPA 200 Series Methods									
Arsenic	<0.0100	0.0100	mg/L	1	EGA0211	LSB	01/15/18 13:09	EPA 200.7	
Boron	**0.0680**	0.0500	mg/L	1	EGA0211	LSB	01/15/18 13:09	EPA 200.7	
Barium	**0.394**	0.0100	mg/L	1	EGA0211	LSB	01/15/18 13:09	EPA 200.7	
Beryllium	<0.0100	0.0100	mg/L	1	EGA0211	LSB	01/15/18 13:09	EPA 200.7	
Calcium	**110**	1.00	mg/L	1	EGA0211	LSB	01/15/18 13:09	EPA 200.7	
Cadmium	<0.0100	0.0100	mg/L	1	EGA0211	LSB	01/15/18 13:09	EPA 200.7	
Cobalt	<0.0100	0.0100	mg/L	1	EGA0211	LSB	01/15/18 13:09	EPA 200.7	
Chromium	<0.0100	0.0100	mg/L	1	EGA0211	LSB	01/15/18 13:09	EPA 200.7	
x Lithium	<0.0500	0.0500	mg/L	1	EGA0211	LSB	01/15/18 13:09	EPA 200.7	
Molybdenum	<0.0100	0.0100	mg/L	1	EGA0211	LSB	01/15/18 13:09	EPA 200.7	
Lead	<0.0100	0.0100	mg/L	1	EGA0211	LSB	01/15/18 13:09	EPA 200.7	
Antimony	<0.0100	0.0100	mg/L	1	EGA0211	LSB	01/15/18 13:09	EPA 200.7	
Selenium	<0.0200	0.0200	mg/L	1	EGA0211	LSB	01/15/18 13:09	EPA 200.7	
Thallium	<0.0200	0.0200	mg/L	1	EGA0211	LSB	01/15/18 13:09	EPA 200.7	
Mercury	<0.000200	0.000200	mg/L	1	EGB0497	LSB	02/23/18 14:20	EPA 245.1	H-01
Metals Digestion	Completed		N/A		EGA0211	LSB	01/12/18 17:20	EPA 200.7	
Mercury Digestion	Completed		N/A		EGB0497	LSB	02/22/18 16:40	EPA 245.1	
Anions by EPA Method 300.0									
Chloride	**1.58**	0.160	mg/L	1	EGA0148	BLS	01/11/18 10:05	EPA 300.0	
Fluoride	**0.380**	0.100	mg/L	1	EGA0148	BLS	01/11/18 10:05	EPA 300.0	
Sulfate as SO4	**31.3**	30.0	mg/L	100	EGA0148	BLS	01/10/18 18:36	EPA 300.0	

Environmental Testing, Inc.

Keith Hopcus For Russell Britten, President

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Emera Corp.	Project: Sec. 5&8, T24N, R3E, Noble Co., OK	
P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	02/26/18 16:54

GWMP #8A

E8A0105-02 (Aqueous) - Sampled: 01/06/18 12:56

Environmental Testing, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Qualifiers
Conventional Chemistry Parameters by Standard Methods									
pH	**7.66**		pH Units	1	EGA0115	ECF	01/09/18 14:00	SM 4500-H+ B	H-03
Total Dissolved Solids	**374**	100	mg/L	1	EGA0142	ECF	01/11/18 12:20	SM 2540C	
Metals by EPA 200 Series Methods									
Arsenic	<0.0100	0.0100	mg/L	1	EGA0211	LSB	01/15/18 13:13	EPA 200.7	
Boron	**0.110**	0.0500	mg/L	1	EGA0211	LSB	01/15/18 13:13	EPA 200.7	
Barium	**0.298**	0.0100	mg/L	1	EGA0211	LSB	01/15/18 13:13	EPA 200.7	
Beryllium	<0.0100	0.0100	mg/L	1	EGA0211	LSB	01/15/18 13:13	EPA 200.7	
Calcium	**86.0**	1.00	mg/L	1	EGA0211	LSB	01/15/18 13:13	EPA 200.7	
Cadmium	<0.0100	0.0100	mg/L	1	EGA0211	LSB	01/15/18 13:13	EPA 200.7	
Cobalt	<0.0100	0.0100	mg/L	1	EGA0211	LSB	01/15/18 13:13	EPA 200.7	
Chromium	**0.0111**	0.0100	mg/L	1	EGA0211	LSB	01/15/18 13:13	EPA 200.7	
x Lithium	<0.0500	0.0500	mg/L	1	EGA0211	LSB	01/15/18 13:13	EPA 200.7	
Molybdenum	<0.0100	0.0100	mg/L	1	EGA0211	LSB	01/15/18 13:13	EPA 200.7	
Lead	<0.0100	0.0100	mg/L	1	EGA0211	LSB	01/15/18 13:13	EPA 200.7	
Antimony	<0.0100	0.0100	mg/L	1	EGA0211	LSB	01/15/18 13:13	EPA 200.7	
Selenium	<0.0200	0.0200	mg/L	1	EGA0211	LSB	01/15/18 13:13	EPA 200.7	
Thallium	<0.0200	0.0200	mg/L	1	EGA0211	LSB	01/15/18 13:13	EPA 200.7	
Mercury	<0.000200	0.000200	mg/L	1	EGB0497	LSB	02/23/18 14:26	EPA 245.1	H-01
Metals Digestion	Completed		N/A		EGA0211	LSB	01/12/18 17:20	EPA 200.7	
Mercury Digestion	Completed		N/A		EGB0497	LSB	02/22/18 16:40	EPA 245.1	
Anions by EPA Method 300.0									
Chloride	**3.55**	0.800	mg/L	5	EGA0148	BLS	01/11/18 11:14	EPA 300.0	
Fluoride	**0.344**	0.100	mg/L	1	EGA0148	BLS	01/11/18 10:22	EPA 300.0	
Sulfate as SO4	**31.2**	1.50	mg/L	5	EGA0148	BLS	01/11/18 11:14	EPA 300.0	

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Emera Corp.	Project: Sec. 5&8, T24N, R3E, Noble Co., OK	
P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	02/26/18 16:54

GWMP #9A

E8A0105-03 (Aqueous) - Sampled: 01/06/18 13:30

Environmental Testing, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Qualifiers
Conventional Chemistry Parameters by Standard Methods									
pH	**7.97**		pH Units	1	EGA0115	ECF	01/09/18 14:00	SM 4500-H+ B	H-03
Total Dissolved Solids	**512**	100	mg/L	1	EGA0142	ECF	01/11/18 12:20	SM 2540C	
Metals by EPA 200 Series Methods									
Arsenic	<0.0100	0.0100	mg/L	1	EGA0211	LSB	01/15/18 13:17	EPA 200.7	
Boron	**1.43**	0.0500	mg/L	1	EGA0211	LSB	01/15/18 13:17	EPA 200.7	
Barium	**0.0574**	0.0100	mg/L	1	EGA0211	LSB	01/15/18 13:17	EPA 200.7	
Beryllium	<0.0100	0.0100	mg/L	1	EGA0211	LSB	01/15/18 13:17	EPA 200.7	
Calcium	**38.0**	1.00	mg/L	1	EGA0211	LSB	01/15/18 13:17	EPA 200.7	
Cadmium	<0.0100	0.0100	mg/L	1	EGA0211	LSB	01/15/18 13:17	EPA 200.7	
Cobalt	<0.0100	0.0100	mg/L	1	EGA0211	LSB	01/15/18 13:17	EPA 200.7	
Chromium	<0.0100	0.0100	mg/L	1	EGA0211	LSB	01/15/18 13:17	EPA 200.7	
x Lithium	<0.0500	0.0500	mg/L	1	EGA0211	LSB	01/15/18 13:17	EPA 200.7	
Molybdenum	**0.0140**	0.0100	mg/L	1	EGA0211	LSB	01/15/18 13:17	EPA 200.7	
Lead	<0.0100	0.0100	mg/L	1	EGA0211	LSB	01/15/18 13:17	EPA 200.7	
Antimony	<0.0100	0.0100	mg/L	1	EGA0211	LSB	01/15/18 13:17	EPA 200.7	
Selenium	<0.0200	0.0200	mg/L	1	EGA0211	LSB	01/15/18 13:17	EPA 200.7	
Thallium	<0.0200	0.0200	mg/L	1	EGA0211	LSB	01/15/18 13:17	EPA 200.7	
Mercury	<0.000200	0.000200	mg/L	1	EGB0497	LSB	02/23/18 14:28	EPA 245.1	H-01
Metals Digestion	Completed		N/A		EGA0211	LSB	01/12/18 17:20	EPA 200.7	
Mercury Digestion	Completed		N/A		EGB0497	LSB	02/22/18 16:40	EPA 245.1	
Anions by EPA Method 300.0									
Chloride	**16.9**	16.0	mg/L	100	EGA0148	BLS	01/10/18 19:10	EPA 300.0	
Fluoride	**0.729**	0.100	mg/L	1	EGA0148	BLS	01/11/18 10:39	EPA 300.0	
Sulfate as SO4	**98.3**	30.0	mg/L	100	EGA0148	BLS	01/10/18 19:10	EPA 300.0	

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Emera Corp.	Project: Sec. 5&8, T24N, R3E, Noble Co., OK	
P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	02/26/18 16:54

GWMP #10A

E8A0105-04 (Aqueous) - Sampled: 01/06/18 13:40

Environmental Testing, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Qualifiers
Conventional Chemistry Parameters by Standard Methods									
pH	**7.48**		pH Units	1	EGA0115	ECF	01/09/18 14:00	SM 4500-H+ B	H-03
Total Dissolved Solids	**1760**	100	mg/L	1	EGA0142	ECF	01/11/18 12:20	SM 2540C	
Metals by EPA 200 Series Methods									
Arsenic	<0.0100	0.0100	mg/L	1	EGA0211	LSB	01/15/18 13:21	EPA 200.7	
Boron	**4.05**	0.0500	mg/L	1	EGA0211	LSB	01/15/18 13:21	EPA 200.7	
Barium	**0.0588**	0.0100	mg/L	1	EGA0211	LSB	01/15/18 13:21	EPA 200.7	
Beryllium	<0.0100	0.0100	mg/L	1	EGA0211	LSB	01/15/18 13:21	EPA 200.7	
Calcium	**122**	1.00	mg/L	1	EGA0211	LSB	01/15/18 13:21	EPA 200.7	
Cadmium	<0.0100	0.0100	mg/L	1	EGA0211	LSB	01/15/18 13:21	EPA 200.7	
Cobalt	<0.0100	0.0100	mg/L	1	EGA0211	LSB	01/15/18 13:21	EPA 200.7	
Chromium	<0.0100	0.0100	mg/L	1	EGA0211	LSB	01/15/18 13:21	EPA 200.7	
x Lithium	<0.0500	0.0500	mg/L	1	EGA0211	LSB	01/15/18 13:21	EPA 200.7	
Molybdenum	<0.0100	0.0100	mg/L	1	EGA0211	LSB	01/15/18 13:21	EPA 200.7	
Lead	<0.0100	0.0100	mg/L	1	EGA0211	LSB	01/15/18 13:21	EPA 200.7	
Antimony	<0.0100	0.0100	mg/L	1	EGA0211	LSB	01/15/18 13:21	EPA 200.7	
Selenium	<0.0200	0.0200	mg/L	1	EGA0211	LSB	01/15/18 13:21	EPA 200.7	
Thallium	<0.0200	0.0200	mg/L	1	EGA0211	LSB	01/15/18 13:21	EPA 200.7	
Mercury	<0.000200	0.000200	mg/L	1	EGB0497	LSB	02/23/18 14:30	EPA 245.1	H-01
Metals Digestion	Completed		N/A		EGA0211	LSB	01/12/18 17:20	EPA 200.7	
Mercury Digestion	Completed		N/A		EGB0497	LSB	02/22/18 16:40	EPA 245.1	
Anions by EPA Method 300.0									
Chloride	**28.2**	8.00	mg/L	50	EGA0148	BLS	01/11/18 11:59	EPA 300.0	
Fluoride	**0.522**	0.500	mg/L	5	EGA0148	BLS	01/11/18 10:57	EPA 300.0	
Sulfate as SO4	**711**	15.0	mg/L	50	EGA0148	BLS	01/11/18 11:59	EPA 300.0	

Environmental Testing, Inc.

Keith Hopcus For Russell Britten, President

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Emera Corp.	Project: Sec. 5&8, T24N, R3E, Noble Co., OK	
P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	02/26/18 16:54

QUALITY CONTROL

Conventional Chemistry Parameters by Standard Methods
Environmental Testing, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifiers
Batch EGA0115 - General Prep - Wet Chem (Aq)										
LCS (EGA0115-BS1)				Prepared & Analyzed: 01/09/18						
pH	7.01		pH Units	7.00		100	99-101			
Duplicate (EGA0115-DUP1)		**Source: E8A0105-01**		Prepared & Analyzed: 01/09/18						
pH	7.09		pH Units		7.09			0	20	
Batch EGA0142 - General Prep - Wet Chem (Aq)										
Blank (EGA0142-BLK1)				Prepared: 01/10/18 Analyzed: 01/11/18						
Total Dissolved Solids	<50.0	50.0	mg/L							
LCS (EGA0142-BS1)				Prepared: 01/10/18 Analyzed: 01/11/18						
Total Dissolved Solids	1010	100	mg/L	1000		101	80-120			
Duplicate (EGA0142-DUP1)		**Source: E8A0083-01**		Prepared: 01/10/18 Analyzed: 01/11/18						
Total Dissolved Solids	192000	10000	mg/L		193000			0.3	10	
Duplicate (EGA0142-DUP2)		**Source: E8A0084-01**		Prepared: 01/10/18 Analyzed: 01/11/18						
Total Dissolved Solids	179000	10000	mg/L		174000			3	10	

Environmental Testing, Inc.

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Keith Hopcus For Russell Britten, President

ENVIRONMENTAL TESTING, INC.

4619 N. Santa Fe
Oklahoma City, OK 73118
405.488.2400 Phone
405.488.2404 Fax
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Emera Corp.	Project: Sec. 5&8, T24N, R3E, Noble Co., OK	
P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	02/26/18 16:54

QUALITY CONTROL

Metals by EPA 200 Series Methods
Environmental Testing, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifiers
Batch EGA0211 - EPA 200.7										
Blank (EGA0211-BLK1)				Prepared: 01/12/18 Analyzed: 01/15/18						
Antimony	<0.0100	0.0100	mg/L							
Arsenic	<0.0100	0.0100	mg/L							
Barium	<0.0100	0.0100	mg/L							
Beryllium	<0.0100	0.0100	mg/L							
Boron	<0.0500	0.0500	mg/L							
Cadmium	<0.0100	0.0100	mg/L							
Calcium	<1.00	1.00	mg/L							
Chromium	<0.0100	0.0100	mg/L							
Cobalt	<0.0100	0.0100	mg/L							
Lead	<0.0100	0.0100	mg/L							
Lithium	<0.0500	0.0500	mg/L							
Molybdenum	<0.0100	0.0100	mg/L							
Selenium	<0.0200	0.0200	mg/L							
Thallium	<0.0200	0.0200	mg/L							
Metals Digestion	Completed		N/A							
LCS (EGA0211-BS1)				Prepared: 01/12/18 Analyzed: 01/15/18						
Antimony	0.548	0.0100	mg/L	0.500		110	85-115			
Arsenic	0.525	0.0100	mg/L	0.500		105	85-115			
Barium	0.495	0.0100	mg/L	0.500		99	85-115			
Beryllium	0.528	0.0100	mg/L	0.500		106	85-115			
Boron	0.510	0.0500	mg/L	0.500		102	85-115			
Cadmium	0.538	0.0100	mg/L	0.500		108	85-115			
Calcium	21.7	1.00	mg/L	20.0		109	85-115			
Chromium	0.504	0.0100	mg/L	0.500		101	85-115			
Cobalt	0.529	0.0100	mg/L	0.500		106	85-115			
Lead	0.520	0.0100	mg/L	0.500		104	85-115			
Lithium	0.519	0.0500	mg/L	0.500		104	85-115			
Molybdenum	0.530	0.0100	mg/L	0.500		106	85-115			
Selenium	0.533	0.0200	mg/L	0.500		107	85-115			
Thallium	0.500	0.0200	mg/L	0.500		100	85-115			
Metals Digestion	Completed		N/A							

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Emera Corp.	Project: Sec. 5&8, T24N, R3E, Noble Co., OK	
P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	02/26/18 16:54

QUALITY CONTROL

Metals by EPA 200 Series Methods
Environmental Testing, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifiers
Batch EGA0211 - EPA 200.7										
Duplicate (EGA0211-DUP1)		**Source: E8A0161-01**		Prepared: 01/12/18 Analyzed: 01/15/18						
Arsenic	<0.0100	0.0100	mg/L		ND				20	
Antimony	0.00680	0.0100	mg/L		0.00300			78	20	R-01
Barium	0.0341	0.0100	mg/L		0.0340			0.3	20	
Beryllium	<0.0100	0.0100	mg/L		ND				20	
Boron	0.315	0.0500	mg/L		0.314			0.6	20	
Cadmium	<0.0100	0.0100	mg/L		ND				20	
Calcium	61.3	1.00	mg/L		61.0			0.5	20	
Chromium	0.000500	0.0100	mg/L		0.000400			22	20	R-01
Cobalt	<0.0100	0.0100	mg/L		ND				20	
Lead	<0.0100	0.0100	mg/L		ND				20	
Lithium	0.0308	0.0500	mg/L		0.0292			5	20	
Molybdenum	0.00600	0.0100	mg/L		0.00360			50	20	R-01
Selenium	<0.0200	0.0200	mg/L		0.00460				20	
Thallium	<0.0200	0.0200	mg/L		ND				20	
Metals Digestion	Completed		N/A							
Matrix Spike (EGA0211-MS1)		**Source: E8A0161-01**		Prepared: 01/12/18 Analyzed: 01/15/18						
Antimony	0.564	0.0100	mg/L	0.500	0.00300	112	70-130			
Arsenic	0.546	0.0100	mg/L	0.500	ND	109	70-130			
Barium	0.535	0.0100	mg/L	0.500	0.0340	100	70-130			
Beryllium	0.536	0.0100	mg/L	0.500	ND	107	70-130			
Boron	0.849	0.0500	mg/L	0.500	0.314	107	70-130			
Cadmium	0.532	0.0100	mg/L	0.500	ND	106	70-130			
Calcium	81.3	1.00	mg/L	20.0	61.0	102	70-130			
Chromium	0.512	0.0100	mg/L	0.500	0.000400	102	70-130			
Cobalt	0.536	0.0100	mg/L	0.500	ND	107	70-130			
Lead	0.520	0.0100	mg/L	0.500	ND	104	70-130			
Lithium	0.582	0.0500	mg/L	0.500	0.0292	111	70-130			
Molybdenum	0.537	0.0100	mg/L	0.500	0.00360	107	70-130			
Selenium	0.540	0.0200	mg/L	0.500	0.00460	107	70-130			
Thallium	0.491	0.0200	mg/L	0.500	ND	98	70-130			
Metals Digestion	Completed		N/A							

Environmental Testing, Inc.

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Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	02/26/18 16:54

QUALITY CONTROL

Metals by EPA 200 Series Methods

Environmental Testing, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifiers
Batch EGA0211 - EPA 200.7										
Matrix Spike Dup (EGA0211-MSD1)		**Source: E8A0161-01**		Prepared: 01/12/18 Analyzed: 01/15/18						
Arsenic	0.547	0.0100	mg/L	0.500	ND	109	70-130	0.2	20	
Antimony	0.564	0.0100	mg/L	0.500	0.00300	112	70-130	0.05	20	
Barium	0.532	0.0100	mg/L	0.500	0.0340	100	70-130	0.5	20	
Beryllium	0.532	0.0100	mg/L	0.500	ND	106	70-130	0.7	20	
Boron	0.844	0.0500	mg/L	0.500	0.314	106	70-130	0.7	20	
Cadmium	0.528	0.0100	mg/L	0.500	ND	106	70-130	0.7	20	
Calcium	81.0	1.00	mg/L	20.0	61.0	100	70-130	0.4	20	
Chromium	0.510	0.0100	mg/L	0.500	0.000400	102	70-130	0.4	20	
Cobalt	0.532	0.0100	mg/L	0.500	ND	106	70-130	0.7	20	
Lead	0.516	0.0100	mg/L	0.500	ND	103	70-130	0.8	20	
Lithium	0.576	0.0500	mg/L	0.500	0.0292	109	70-130	1	20	
Molybdenum	0.537	0.0100	mg/L	0.500	0.00360	107	70-130	0.02	20	
Selenium	0.542	0.0200	mg/L	0.500	0.00460	107	70-130	0.2	20	
Thallium	0.487	0.0200	mg/L	0.500	ND	97	70-130	0.8	20	
Metals Digestion	Completed		N/A							
Batch EGB0497 - EPA 245.1										
Blank (EGB0497-BLK1)				Prepared: 02/22/18 Analyzed: 02/23/18						
Mercury	<0.000200	0.000200	mg/L							
Mercury Digestion	Completed		N/A							
LCS (EGB0497-BS1)				Prepared: 02/22/18 Analyzed: 02/23/18						
Mercury	0.00204	0.000200	mg/L	0.00200		102	85-115			
Mercury Digestion	Completed		N/A							
Matrix Spike (EGB0497-MS1)		**Source: E8A0105-01**		Prepared: 02/22/18 Analyzed: 02/23/18						
Mercury	0.00193	0.000200	mg/L	0.00200	ND	96	70-130			
Mercury Digestion	Completed		N/A							

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Emera Corp.	Project: Sec. 5&8, T24N, R3E, Noble Co., OK	
P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	02/26/18 16:54

QUALITY CONTROL

Metals by EPA 200 Series Methods
Environmental Testing, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifiers
Batch EGB0497 - EPA 245.1										
Matrix Spike Dup (EGB0497-MSD1)		**Source: E8A0105-01**		Prepared: 02/22/18 Analyzed: 02/23/18						
Mercury	0.00179	0.000200	mg/L	0.00200	ND	90	70-130	8	20	
Mercury Digestion	Completed		N/A							

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Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	02/26/18 16:54

QUALITY CONTROL

Anions by EPA Method 300.0

Environmental Testing, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifiers
Batch EGA0148 - General Prep - Wet Chem (Aq)										
Blank (EGA0148-BLK1)				Prepared & Analyzed: 01/10/18						
Chloride	<0.160	0.160	mg/L							
Fluoride	<0.100	0.100	mg/L							
Sulfate as SO4	<0.300	0.300	mg/L							
LCS (EGA0148-BS1)				Prepared & Analyzed: 01/10/18						
Chloride	0.595	0.160	mg/L	0.600		99	90-110			
Fluoride	0.391	0.100	mg/L	0.400		98	90-110			
Sulfate as SO4	2.99	0.300	mg/L	3.00		100	90-110			
Matrix Spike (EGA0148-MS1)		**Source: E8A0166-01**		Prepared & Analyzed: 01/10/18						
Chloride	3700	160	mg/L	600	2790	152	80-120			M-02
Fluoride	380	100	mg/L	400	ND	95	80-120			
Sulfate as SO4	2880	300	mg/L	3000	ND	96	80-120			
Matrix Spike Dup (EGA0148-MSD1)		**Source: E8A0166-01**		Prepared & Analyzed: 01/10/18						
Chloride	3400	160	mg/L	600	2790	101	80-120	9	20	
Fluoride	385	100	mg/L	400	ND	96	80-120	1	20	
Sulfate as SO4	2920	300	mg/L	3000	ND	97	80-120	1	20	

Environmental Testing, Inc.

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P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	02/26/18 16:54

Non-Certified Analyses included in this Report

Analyte
EPA 200.7 in Aqueous
Lithium

Certifications

Code	Description	Number	Expires
KDHE	Kansas Accredited	E-10401	01/31/2019
NELAP	NELAP Accredited (LDEQ)	10002	06/30/2018
ODEQ	Oklahoma Accredited	2017-128	08/31/2018
TCEQ	Texas Accredited	T104704498-17-7	03/31/2018

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P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	02/26/18 16:54

Qualifiers and Definitions

COM	Completed
H-01	Sample analysis was performed past the method holding time.
H-03	Sample was received and analyzed past the method holding time.
M-02	The matrix spike recovery was higher than expected due to sample matrix interference.
R-01	The RPD between sample duplicates exceeded the method or laboratory control limit. This may indicate the results are not as precise as expected.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
x	Non-Certificd analyte
NA	Not Applicable

CHAIN OF CUSTODY RECORD

EMERA CORP.
P. O. BOX 2228, EDMOND, OK 73083

98A0105

Company : Evans and Associates Enterprises, Inc.
Address : P. O. Box 30
Ponca City, OK 74602
Phone : 580-765-6693
Client contact : Saeed Zahrai, P. E. 405-557-0000
Site location : Sections 5 & 8, T24N, R3E, Noble Co., OK
Permit No. LE-1884, Big Fork Ranch

SAMPLE TYPE	SAMPLE METHOD	CONTAINER TYPE
1. Water	C - composite	P - plastic
2. Soil	GR - grab	G - glass
3. Sludge		V - voa
4. Oil		O - other
5. Other		

SAMPLE IDENTIFICATION	SAMPLE TYPE	CONTAINER SIZE	CONTAINER TYPE	CONTAINER #	SAMPLING DATE	SAMPLING TIME	SAMPLE METHOD	PRESERVATIVES	SAMPLE CONDITION / COMMENTS	ANALYSES: TEMPERATURE	FLOW	DEPTH To WATER	pH	Ba, Ca	Cl, F, Alk, TDS, DO4
GWMP #6A	1	1L	P	1	12-6-18	1:10	GR	NONE		64°		33.9	6.32		
	1	250ml	P	1			GR	HN03							
~~GWMP #7A~~	1	1L	P	1			GR	NONE							
	1	250ml	P	1	11/8/18		GR	HN03							
GWMP #8A •	1	1L	P	1	12-6-18	12:50	GR	NONE		65°		41.3	5.82		
	1	250ml	P	1			GR	HN03							
GWMP #9A	1	1L	P	1	12-6-18	1:30	GR	NONE		66°		16.4	7.24		
	1	250ml	P	1			GR	HN03							
GWMP #10A	1	1L	P	1	12-6-18	1:40	GR	NONE		64°		29.1	7.24		
	1	250ml	P	1			GR	HN03							

Sample(s) taken by (print name & sign): Chuck Twiball Chuck Twiball
Relinquished by (print name & sign): Chuck Twiball Chuck Twiball Date : 1-8-18 Time : 12:20
Received by (print name & sign): Date : 1/8/18 Time : 1230 1220

0.1°C IR #1000318
11/8/18 bt

ENVIRONMENTAL TESTING, INC.

SAMPLE RECEIPT FORM

E8A0105

Environmental Testing, Inc.

Printed: 1/8/2018 12:28:59PM

Client:	**Emera Corp.**	**Project Manager:**	**Russell Britten**
Project:	**Sec. 5&8, T24N, R3E, Noble Co., OK**	**Project Number:**	**Evans & Associates**

Report To:
Emera Corp.
Mr. Saeed Zahrai
P.O. Box 2228
Edmond, OK 73083
Phone: (405) 557-0000
Fax: NA

Invoice To:
Emera Corp.
Mr. Saeed Zahrai
P.O. Box 2228
Edmond, OK 73083
Phone: (405) 557-0000
Fax: NA

Date Due:	01/15/18 17:00 (5 day TAT)		
Received By:	Andra Hoot	Date Received:	01/08/18 12:20
Logged In By:	Andra Hoot	Date Logged In:	01/08/18 12:23

Samples Received at:		0.1°C			
Custody seals	No	Received on ice	Yes	Sufficient sample	Yes
Containers intact	Yes	Sample or temp blank frozen	No		
COC/Labels agree	Yes	Headspace in VOA vials	No		
Preservation confirmed	Yes	Correct containers	Yes		

Notes:

Preservation Confirmation

Container ID	Container Type	pH	Date/Time	Lot #
E8A0105-01 A	Poly HNO3 - 250mL	<2	1/8/18 1240	42514
E8A0105-02 A	Poly HNO3 - 250mL			
E8A0105-03 A	Poly HNO3 - 250mL			
E8A0105-04 A	Poly HNO3 - 250mL			

Preservation Confirmed By

Date 1/8/18

Reviewed By

Date

wko_ETIwpres_rev0.7.rpt

Laboratory Reports For Sample Date 3-3-2018

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P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	03/12/18 16:47

GWMP #6A

E8C0065-01 (Aqueous) - Sampled: 03/03/18 11:16

Environmental Testing, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Qualifiers
Conventional Chemistry Parameters by Standard Methods									
pH	**7.09**		pH Units	1	EGC0236	BLS	03/09/18 13:15	SM 4500-H+ B	H-03
Total Dissolved Solids	**470**	100	mg/L	1	EGC0202	BLS	03/08/18 11:40	SM 2540C	
Metals by EPA 200 Series Methods									
Arsenic	**0.0158**	0.0100	mg/L	1	EGC0206	LSB	03/09/18 11:37	EPA 200.7	
Boron	**0.113**	0.0500	mg/L	1	EGC0206	LSB	03/09/18 11:37	EPA 200.7	
Barium	**1.05**	0.0100	mg/L	1	EGC0206	LSB	03/09/18 11:37	EPA 200.7	
Beryllium	<0.0100	0.0100	mg/L	1	EGC0206	LSB	03/09/18 11:37	EPA 200.7	
Calcium	**121**	1.00	mg/L	1	EGC0206	LSB	03/09/18 11:37	EPA 200.7	
Cadmium	<0.0100	0.0100	mg/L	1	EGC0206	LSB	03/09/18 11:37	EPA 200.7	
Cobalt	**0.0730**	0.0100	mg/L	1	EGC0206	LSB	03/09/18 11:37	EPA 200.7	
Chromium	**0.0657**	0.0100	mg/L	1	EGC0206	LSB	03/09/18 11:37	EPA 200.7	
***x* Lithium**	**0.0654**	0.0500	mg/L	1	EGC0206	LSB	03/09/18 11:37	EPA 200.7	
Molybdenum	<0.0100	0.0100	mg/L	1	EGC0206	LSB	03/09/18 11:37	EPA 200.7	
Lead	**0.0456**	0.0100	mg/L	1	EGC0206	LSB	03/09/18 11:37	EPA 200.7	
Antimony	**0.0104**	0.0100	mg/L	1	EGC0206	LSB	03/09/18 11:37	EPA 200.7	
Selenium	<0.0200	0.0200	mg/L	1	EGC0206	LSB	03/09/18 11:37	EPA 200.7	
Thallium	<0.0200	0.0200	mg/L	1	EGC0206	LSB	03/09/18 11:37	EPA 200.7	
Mercury	<0.000200	0.000200	mg/L	1	EGC0126	LSB	03/07/18 15:36	EPA 245.1	
Metals Digestion	Completed		N/A		EGC0206	LSB	03/08/18 18:45	EPA 200.7	
Mercury Digestion	Completed		N/A		EGC0126	LSB	03/06/18 18:50	EPA 245.1	
Anions by EPA Method 300.0									
Chloride	**1.22**	0.160	mg/L	1	EGC0191	BLS	03/10/18 04:23	EPA 300.0	
Fluoride	**0.420**	0.100	mg/L	1	EGC0191	BLS	03/10/18 04:23	EPA 300.0	
Sulfate as SO4	**23.6**	1.50	mg/L	5	EGC0191	BLS	03/08/18 20:33	EPA 300.0	

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Emera Corp.	Project: Sec. 5&8, T24N, R3E, Noble Co., OK	
P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	03/12/18 16:47

GWMP #8A

E8C0065-02 (Aqueous) - Sampled: 03/03/18 10:58

Environmental Testing, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Qualifiers
Conventional Chemistry Parameters by Standard Methods									
pH	**7.52**		pH Units	1	EGC0236	BLS	03/09/18 13:15	SM 4500-H+ B	H-03
Total Dissolved Solids	**444**	100	mg/L	1	EGC0202	BLS	03/08/18 11:40	SM 2540C	
Metals by EPA 200 Series Methods									
Arsenic	<0.0100	0.0100	mg/L	1	EGC0206	LSB	03/09/18 11:41	EPA 200.7	
Boron	**0.107**	0.0500	mg/L	1	EGC0206	LSB	03/09/18 11:41	EPA 200.7	
Barium	**0.272**	0.0100	mg/L	1	EGC0206	LSB	03/09/18 11:41	EPA 200.7	
Beryllium	<0.0100	0.0100	mg/L	1	EGC0206	LSB	03/09/18 11:41	EPA 200.7	
Calcium	**78.3**	1.00	mg/L	1	EGC0206	LSB	03/09/18 11:41	EPA 200.7	
Cadmium	<0.0100	0.0100	mg/L	1	EGC0206	LSB	03/09/18 11:41	EPA 200.7	
Cobalt	<0.0100	0.0100	mg/L	1	EGC0206	LSB	03/09/18 11:41	EPA 200.7	
Chromium	<0.0100	0.0100	mg/L	1	EGC0206	LSB	03/09/18 11:41	EPA 200.7	
x Lithium	<0.0500	0.0500	mg/L	1	EGC0206	LSB	03/09/18 11:41	EPA 200.7	
Molybdenum	<0.0100	0.0100	mg/L	1	EGC0206	LSB	03/09/18 11:41	EPA 200.7	
Lead	<0.0100	0.0100	mg/L	1	EGC0206	LSB	03/09/18 11:41	EPA 200.7	
Antimony	<0.0100	0.0100	mg/L	1	EGC0206	LSB	03/09/18 11:41	EPA 200.7	
Selenium	<0.0200	0.0200	mg/L	1	EGC0206	LSB	03/09/18 11:41	EPA 200.7	
Thallium	<0.0200	0.0200	mg/L	1	EGC0206	LSB	03/09/18 11:41	EPA 200.7	
Mercury	<0.000200	0.000200	mg/L	1	EGC0126	LSB	03/07/18 15:38	EPA 245.1	
Metals Digestion	Completed		N/A		EGC0206	LSB	03/08/18 18:45	EPA 200.7	
Mercury Digestion	Completed		N/A		EGC0126	LSB	03/06/18 18:50	EPA 245.1	
Anions by EPA Method 300.0									
Chloride	**3.59**	0.800	mg/L	5	EGC0191	BLS	03/08/18 20:51	EPA 300.0	
Fluoride	**0.363**	0.100	mg/L	1	EGC0191	BLS	03/10/18 04:40	EPA 300.0	
Sulfate as SO4	**33.1**	1.50	mg/L	5	EGC0191	BLS	03/08/18 20:51	EPA 300.0	

Environmental Testing, Inc.

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P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	04/02/18 08:04

GWMP #9A

E8C0065-03 (Aqueous) - Sampled: 03/03/18 11:33

Environmental Testing, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Qualifiers
Conventional Chemistry Parameters by Standard Methods									
pH	**7.88**		pH Units	1	EGC0236	BLS	03/09/18 13:15	SM 4500-H+ B	H-03
Total Dissolved Solids	**526**	100	mg/L	1	EGC0202	BLS	03/08/18 11:40	SM 2540C	
Metals by EPA 200 Series Methods									
Arsenic	<0.0100	0.0100	mg/L	1	EGC0206	LSB	03/09/18 11:45	EPA 200.7	
Boron	**1.43**	0.0500	mg/L	1	EGC0206	LSB	03/09/18 11:45	EPA 200.7	
Barium	**0.0591**	0.0100	mg/L	1	EGC0206	LSB	03/09/18 11:45	EPA 200.7	
Beryllium	<0.0100	0.0100	mg/L	1	EGC0206	LSB	03/09/18 11:45	EPA 200.7	
Calcium	**35.4**	1.00	mg/L	1	EGC0206	LSB	03/09/18 11:45	EPA 200.7	
Cadmium	<0.0100	0.0100	mg/L	1	EGC0206	LSB	03/09/18 11:45	EPA 200.7	
Cobalt	<0.0100	0.0100	mg/L	1	EGC0206	LSB	03/09/18 11:45	EPA 200.7	
Chromium	<0.0100	0.0100	mg/L	1	EGC0206	LSB	03/09/18 11:45	EPA 200.7	
x Lithium	<0.0500	0.0500	mg/L	1	EGC0206	LSB	03/09/18 11:45	EPA 200.7	
Molybdenum	**0.0128**	0.0100	mg/L	1	EGC0206	LSB	03/09/18 11:45	EPA 200.7	
Lead	<0.0100	0.0100	mg/L	1	EGC0206	LSB	03/09/18 11:45	EPA 200.7	
Antimony	<0.0100	0.0100	mg/L	1	EGC0206	LSB	03/09/18 11:45	EPA 200.7	
Selenium	<0.0200	0.0200	mg/L	1	EGC0206	LSB	03/09/18 11:45	EPA 200.7	
Thallium	<0.0200	0.0200	mg/L	1	EGC0206	LSB	03/09/18 11:45	EPA 200.7	
Mercury	<0.000200	0.000200	mg/L	1	EGC0126	LSB	03/07/18 15:21	EPA 245.1	
Metals Digestion	Completed		N/A		EGC0206	LSB	03/08/18 18:45	EPA 200.7	
Anions by EPA Method 300.0									
Chloride	**17.0**	1.60	mg/L	10	EGC0191	BLS	03/10/18 04:23	EPA 300.0	
Fluoride	**0.784**	0.500	mg/L	5	EGC0191	BLS	03/08/18 21:08	EPA 300.0	
Sulfate as SO4	**106**	3.00	mg/L	10	EGC0191	BLS	03/10/18 04:23	EPA 300.0	

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P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	03/12/18 16:47

GWMP #10A

E8C0065-04 (Aqueous) - Sampled: 03/03/18 11:46

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Qualifiers
Environmental Testing, Inc.									
Conventional Chemistry Parameters by Standard Methods									
pH	**7.31**		pH Units	1	EGC0236	BLS	03/09/18 13:15	SM 4500-H+ B	H-03
Total Dissolved Solids	**1800**	100	mg/L	1	EGC0202	BLS	03/08/18 11:40	SM 2540C	
Metals by EPA 200 Series Methods									
Arsenic	<0.0100	0.0100	mg/L	1	EGC0206	LSB	03/09/18 11:49	EPA 200.7	
Boron	**4.41**	0.0500	mg/L	1	EGC0206	LSB	03/09/18 11:49	EPA 200.7	
Barium	**0.109**	0.0100	mg/L	1	EGC0206	LSB	03/09/18 11:49	EPA 200.7	
Beryllium	<0.0100	0.0100	mg/L	1	EGC0206	LSB	03/09/18 11:49	EPA 200.7	
Calcium	**123**	1.00	mg/L	1	EGC0206	LSB	03/09/18 11:49	EPA 200.7	
Cadmium	<0.0100	0.0100	mg/L	1	EGC0206	LSB	03/09/18 11:49	EPA 200.7	
Cobalt	<0.0100	0.0100	mg/L	1	EGC0206	LSB	03/09/18 11:49	EPA 200.7	
Chromium	<0.0100	0.0100	mg/L	1	EGC0206	LSB	03/09/18 11:49	EPA 200.7	
x Lithium	<0.0500	0.0500	mg/L	1	EGC0206	LSB	03/09/18 11:49	EPA 200.7	
Molybdenum	<0.0100	0.0100	mg/L	1	EGC0206	LSB	03/09/18 11:49	EPA 200.7	
Lead	<0.0100	0.0100	mg/L	1	EGC0206	LSB	03/09/18 11:49	EPA 200.7	
Antimony	<0.0100	0.0100	mg/L	1	EGC0206	LSB	03/09/18 11:49	EPA 200.7	
Selenium	<0.0200	0.0200	mg/L	1	EGC0206	LSB	03/09/18 11:49	EPA 200.7	
Thallium	<0.0200	0.0200	mg/L	1	EGC0206	LSB	03/09/18 11:49	EPA 200.7	
Mercury	<0.000200	0.000200	mg/L	1	EGC0126	LSB	03/07/18 15:40	EPA 245.1	
Metals Digestion	Completed		N/A		EGC0206	LSB	03/08/18 18:45	EPA 200.7	
Mercury Digestion	Completed		N/A		EGC0126	LSB	03/06/18 18:50	EPA 245.1	
Anions by EPA Method 300.0									
Chloride	**27.8**	1.60	mg/L	10	EGC0191	BLS	03/08/18 21:26	EPA 300.0	
Fluoride	<1.00	1.00	mg/L	10	EGC0191	BLS	03/08/18 21:26	EPA 300.0	
Sulfate as SO4	**814**	150	mg/L	500	EGC0191	BLS	03/08/18 18:15	EPA 300.0	

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P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	03/12/18 16:47

QUALITY CONTROL

Conventional Chemistry Parameters by Standard Methods
Environmental Testing, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifiers
Batch EGC0202 - General Prep - Wet Chem (Aq)										
Blank (EGC0202-BLK1)				Prepared: 03/07/18 Analyzed: 03/08/18						
Total Dissolved Solids	<50.0	50.0	mg/L							
LCS (EGC0202-BS1)				Prepared: 03/07/18 Analyzed: 03/08/18						
Total Dissolved Solids	990	100	mg/L	1000		99	80-120			
Duplicate (EGC0202-DUP1)		**Source: E8C0032-01**		Prepared: 03/07/18 Analyzed: 03/08/18						
Total Dissolved Solids	200000	10000	mg/L		195000			3	10	
Duplicate (EGC0202-DUP2)		**Source: E8C0045-09**		Prepared: 03/07/18 Analyzed: 03/08/18						
Total Dissolved Solids	18700	1000	mg/L		18700			0.2	10	
Batch EGC0236 - General Prep - Wet Chem (Aq)										
LCS (EGC0236-BS1)				Prepared & Analyzed: 03/09/18						
pH	7.01		pH Units	7.00		100	99-101			
Duplicate (EGC0236-DUP1)		**Source: E8C0109-01**		Prepared & Analyzed: 03/09/18						
pH	7.71		pH Units		7.79			1	20	

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P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	03/12/18 16:47

QUALITY CONTROL

Metals by EPA 200 Series Methods
Environmental Testing, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifiers
Batch EGC0206 - EPA 200.7										
Blank (EGC0206-BLK1)				Prepared: 03/08/18 Analyzed: 03/09/18						
Antimony	<0.0100	0.0100	mg/L							
Arsenic	<0.0100	0.0100	mg/L							
Barium	<0.0100	0.0100	mg/L							
Beryllium	<0.0100	0.0100	mg/L							
Boron	<0.0500	0.0500	mg/L							
Cadmium	<0.0100	0.0100	mg/L							
Calcium	<1.00	1.00	mg/L							
Chromium	<0.0100	0.0100	mg/L							
Cobalt	<0.0100	0.0100	mg/L							
Lead	<0.0100	0.0100	mg/L							
Lithium	<0.0500	0.0500	mg/L							
Molybdenum	<0.0100	0.0100	mg/L							
Selenium	<0.0200	0.0200	mg/L							
Thallium	<0.0200	0.0200	mg/L							
Metals Digestion	Completed		N/A							
LCS (EGC0206-BS1)				Prepared: 03/08/18 Analyzed: 03/09/18						
Arsenic	0.525	0.0100	mg/L	0.500		105	85-115			
Antimony	0.536	0.0100	mg/L	0.500		107	85-115			
Barium	0.497	0.0100	mg/L	0.500		99	85-115			
Beryllium	0.520	0.0100	mg/L	0.500		104	85-115			
Boron	0.521	0.0500	mg/L	0.500		104	85-115			
Cadmium	0.515	0.0100	mg/L	0.500		103	85-115			
Calcium	21.0	1.00	mg/L	20.0		105	85-115			
Chromium	0.494	0.0100	mg/L	0.500		99	85-115			
Cobalt	0.515	0.0100	mg/L	0.500		103	85-115			
Lead	0.514	0.0100	mg/L	0.500		103	85-115			
Lithium	0.513	0.0500	mg/L	0.500		103	85-115			
Molybdenum	0.531	0.0100	mg/L	0.500		106	85-115			
Selenium	0.520	0.0200	mg/L	0.500		104	85-115			
Thallium	0.500	0.0200	mg/L	0.500		100	85-115			
Metals Digestion	Completed		N/A							

Environmental Testing, Inc.

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P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	03/12/18 16:47

QUALITY CONTROL

Metals by EPA 200 Series Methods
Environmental Testing, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifiers
Batch EGC0206 - EPA 200.7										
Duplicate (EGC0206-DUP1)		**Source: E8C0075-01RE1**		Prepared: 03/08/18 Analyzed: 03/09/18						
Antimony	0.00770	0.0100	mg/L		0.00870			12	20	
Arsenic	0.0104	0.0100	mg/L		0.0114			9	20	
Barium	0.0796	0.0100	mg/L		0.0799			0.4	20	
Beryllium	<0.0100	0.0100	mg/L		ND				20	
Boron	0.818	0.0500	mg/L		0.821			0.5	20	
Cadmium	<0.0100	0.0100	mg/L		ND				20	
Calcium	79.5	1.00	mg/L		79.7			0.3	20	
Chromium	<0.0100	0.0100	mg/L		ND				20	
Cobalt	0.00350	0.0100	mg/L		0.00300			15	20	
Lead	0.00470	0.0100	mg/L		0.00380			21	20	R-01
Lithium	0.0225	0.0500	mg/L		0.0213			5	20	
Molybdenum	0.0117	0.0100	mg/L		0.00800			38	20	R-01
Selenium	0.00720	0.0200	mg/L		0.00850			17	20	
Thallium	<0.0200	0.0200	mg/L		ND				20	
Metals Digestion	Completed		N/A							
Matrix Spike (EGC0206-MS1)		**Source: E8C0075-01RE1**		Prepared: 03/08/18 Analyzed: 03/09/18						
Arsenic	0.571	0.0100	mg/L	0.500	0.0114	112	70-130			
Antimony	0.564	0.0100	mg/L	0.500	0.00870	111	70-130			
Barium	0.585	0.0100	mg/L	0.500	0.0799	101	70-130			
Beryllium	0.526	0.0100	mg/L	0.500	ND	105	70-130			
Boron	1.37	0.0500	mg/L	0.500	0.821	110	70-130			
Cadmium	0.509	0.0100	mg/L	0.500	ND	102	70-130			
Calcium	98.1	1.00	mg/L	20.0	79.7	92	70-130			
Chromium	0.503	0.0100	mg/L	0.500	ND	101	70-130			
Cobalt	0.525	0.0100	mg/L	0.500	0.00300	104	70-130			
Lead	0.508	0.0100	mg/L	0.500	0.00380	101	70-130			
Lithium	0.606	0.0500	mg/L	0.500	0.0213	117	70-130			
Molybdenum	0.558	0.0100	mg/L	0.500	0.00800	110	70-130			
Selenium	0.544	0.0200	mg/L	0.500	0.00850	107	70-130			
Thallium	0.480	0.0200	mg/L	0.500	ND	96	70-130			
Metals Digestion	Completed		N/A							

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Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	03/12/18 16:47

QUALITY CONTROL

Metals by EPA 200 Series Methods
Environmental Testing, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifiers
Batch EGC0206 - EPA 200.7										
Matrix Spike Dup (EGC0206-MSD1)		**Source: E8C0075-01RE1**		Prepared: 03/08/18 Analyzed: 03/09/18						
Arsenic	0.566	0.0100	mg/L	0.500	0.0114	111	70-130	0.9	20	
Antimony	0.565	0.0100	mg/L	0.500	0.00870	111	70-130	0.2	20	
Barium	0.585	0.0100	mg/L	0.500	0.0799	101	70-130	0.07	20	
Beryllium	0.532	0.0100	mg/L	0.500	ND	106	70-130	1	20	
Boron	1.38	0.0500	mg/L	0.500	0.821	111	70-130	0.3	20	
Cadmium	0.510	0.0100	mg/L	0.500	ND	102	70-130	0.2	20	
Calcium	99.2	1.00	mg/L	20.0	79.7	98	70-130	1	20	
Chromium	0.505	0.0100	mg/L	0.500	ND	101	70-130	0.3	20	
Cobalt	0.526	0.0100	mg/L	0.500	0.00300	105	70-130	0.2	20	
Lead	0.512	0.0100	mg/L	0.500	0.00380	102	70-130	0.8	20	
Lithium	0.604	0.0500	mg/L	0.500	0.0213	117	70-130	0.2	20	
Molybdenum	0.562	0.0100	mg/L	0.500	0.00800	111	70-130	0.8	20	
Selenium	0.548	0.0200	mg/L	0.500	0.00850	108	70-130	0.7	20	
Thallium	0.482	0.0200	mg/L	0.500	ND	96	70-130	0.4	20	
Metals Digestion	Completed		N/A							

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Emera Corp.	Project: Sec. 5&8, T24N, R3E, Noble Co., OK	
P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	03/12/18 16:47

QUALITY CONTROL

Anions by EPA Method 300.0
Environmental Testing, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifiers
Batch EGC0191 - General Prep - Wet Chem (Aq)										
Blank (EGC0191-BLK1)				Prepared & Analyzed: 03/08/18						
Chloride	<0.160	0.160	mg/L							
Fluoride	<0.100	0.100	mg/L							
Sulfate as SO4	<0.300	0.300	mg/L							
LCS (EGC0191-BS1)				Prepared & Analyzed: 03/08/18						
Chloride	0.600	0.160	mg/L	0.600		100	90-110			
Fluoride	0.391	0.100	mg/L	0.400		98	90-110			
Sulfate as SO4	3.09	0.300	mg/L	3.00		103	90-110			
Matrix Spike (EGC0191-MS1)		**Source: E8C0065-01RE1**		Prepared & Analyzed: 03/08/18						
Chloride	296	80.0	mg/L	300	ND	99	80-120			
Fluoride	197	50.0	mg/L	200	ND	98	80-120			
Sulfate as SO4	1560	150	mg/L	1500	ND	104	80-120			
Matrix Spike Dup (EGC0191-MSD1)		**Source: E8C0065-01RE1**		Prepared & Analyzed: 03/08/18						
Chloride	294	80.0	mg/L	300	ND	98	80-120	0.7	20	
Fluoride	194	50.0	mg/L	200	ND	97	80-120	1	20	
Sulfate as SO4	1550	150	mg/L	1500	ND	103	80-120	0.6	20	

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Keith Hopcus For Russell Britten, President

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ENVIRONMENTAL TESTING, INC.

4619 N. Santa Fe
Oklahoma City, OK 73118
405.488.2400 Phone
405.488.2404 Fax
www.etilab.com

Emera Corp.	Project: Sec. 5&8, T24N, R3E, Noble Co., OK	
P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	03/12/18 16:47

Non-Certified Analyses included in this Report

Analyte
EPA 200.7 in Aqueous
Lithium

Certifications

Code	Description	Number	Expires
KDHE	Kansas Accredited	E-10401	01/31/2019
NELAP	NELAP Accredited (LDEQ)	10002	06/30/2018
ODEQ	Oklahoma Accredited	2017-128	08/31/2018
TCEQ	Texas Accredited	T104704498-17-7	03/31/2018

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Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	03/12/18 16:47

Qualifiers and Definitions

COM	Completed
H-03	Sample was received and analyzed past the method holding time.
R-01	The RPD between sample duplicates exceeded the method or laboratory control limit. This may indicate the results are not as precise as expected.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
x	Non-Certified analyte
NA	Not Applicable

98C00065

CHAIN OF CUSTODY RECORD

EMERA CORP.
P. O. BOX 2228, EDMOND, OK 73083

1.7°C on ice

Company : Evans and Associates Enterprises, Inc.
Address : P. O. Box 30
Ponca City, OK 74602
Phone : 580-765-6693
Client contact : Saeed Zahrai, P. E. 405-557-0000
Site location : Sections 5 & 8, T24N, R3E, Noble Co., OK
Permit No. LE-1884, Big Fork Ranch

SAMPLE TYPE	SAMPLE METHOD	CONTAINER TYPE
1. Water	C - composite	P - plastic
2. Soil	GR - grab	G - glass
3. Sludge		V - voa
4. Oil		O - other
5. Other		

ANALYSES 8003318 — Cl, F, pH, TDS, SO4, metals

	SAMPLE IDENTIFICATION	SAMPLE TYPE	CONTAINER SIZE	CONTAINER TYPE	CONTAINER #	SAMPLING DATE	SAMPLING TIME	SAMPLE METHOD	PRESERVATIVES	SAMPLE CONDITION / COMMENTS	TEMPERATURE	FLOW	DEPTH To WATER	pH		
1	GWMP #6A	1	1L	P	1	3-3-18	11:16	GR	NONE		67°		34.5	7.6		
		1	250ml	P	1			GR	HN03							
	~~GWMP #7A~~	1	1L	P	1			GR	NONE							
		1	250ml	P	1			GR	HN03							
2	GWMP #8A	1	1L	P	1	3-3-18	10:58	GR	NONE		68°		41.0	6.8		
		1	250ml	P	1			GR	HN03							
3	GWMP #9A	1	1L	P	1	3-3-18	11:33	GR	NONE		67°		12.7	7.3		
		1	250ml	P	1			GR	HN03							
4	GWMP #10A	1	1L	P	1	3-3-18	11:46	GR	NONE		68°		28.8	7.9		
		1	250ml	P	1			GR	HN03							

Sample(s) taken by (print name & sign): Chuck Twibell [signature]

Relinquished by (print name & sign): Chuck Twibell [signature] Date : 3-5-18 Time : 12:25

Received by (print name & sign): Erin Langer [signature] Date : 3-5-18 Time : 12:25

ENVIRONMENTAL TESTING, INC.

SAMPLE RECEIPT FORM

E8C0065

Printed: 3/5/2018 1:08:59PM

Environmental Testing, Inc.

Client:	**Emera Corp.**	**Project Manager:**	**Russell Britten**
Project:	**Sec. 5&8, T24N, R3E, Noble Co., OK**	**Project Number:**	**Evans & Associates**

Report To:
Emera Corp.
Mr. Saeed Zahrai
P.O. Box 2228
Edmond, OK 73083
Phone: (405) 557-0000
Fax: NA

Invoice To:
Emera Corp.
Mr. Saeed Zahrai
P.O. Box 2228
Edmond, OK 73083
Phone: (405) 557-0000
Fax: NA

Date Due:	03/12/18 17:00 (5 day TAT)		
Received By:	~~Andra Hoot~~ Evin Langer 3/5/18 0:11	Date Received:	03/05/18 12:25
Logged In By:	Andra Hoot	Date Logged In:	03/05/18 13:06

Samples Received at:		1.7°C			
Custody seals	No	Received on ice	Yes	Sufficient sample	Yes
Containers intact	Yes	Sample or temp blank frozen	No		
COC/Labels agree	Yes	Headspace in VOA vials	No		
Preservation confirmed	Yes	Correct containers	Yes		

Notes:

Preservation Confirmation

Container ID	Container Type	pH	Date/Time	Lot #
E8C0065-01 A	Poly HNO3 - 250mL	≤2	3/5/18 1442	42514
E8C0065-02 A	Poly HNO3 - 250mL			
E8C0065-03 A	Poly HNO3 - 250mL			
E8C0065-04 A	Poly HNO3 - 250mL			

Preservation Confirmed By JAAN

Date 3/5/18

Reviewed By

Date

wko_ETIwpres_rev0.7.rpt

Client Sample ID: E8C0065-01

Date Collected: 03/03/18 11:16
Date Received: 03/22/18 08:50

Lab Sample ID: 160-27447-1
Matrix: Water

Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-226	**1.64**		0.466	0.489	1.00	0.378	pCi/L	03/23/18 09:33	04/16/18 06:01	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Barium	*79.9*		*40 - 110*	*03/23/18 09:33*	*04/16/18 06:01*	*1*

Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-228	**3.98**	**G**	1.31	1.36	1.00	1.76	pCi/L	03/23/18 10:11	04/02/18 17:57	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Barium	*79.9*		*40 - 110*	*03/23/18 10:11*	*04/02/18 17:57*	*1*
Yttrium	*92.7*		*40 - 110*	*03/23/18 10:11*	*04/02/18 17:57*	*1*

Client Sample ID: E8C0065-02

Date Collected: 03/03/18 10:58
Date Received: 03/22/18 08:50

Lab Sample ID: 160-27447-2
Matrix: Water

Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-226	**0.241**		0.101	0.103	1.00	0.0974	pCi/L	03/23/18 09:33	04/16/18 06:01	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Barium	*94.1*		*40 - 110*	*03/23/18 09:33*	*04/16/18 06:01*	*1*

Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-228	**0.672**		0.362	0.368	1.00	0.541	pCi/L	03/23/18 10:11	04/02/18 17:57	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Barium	*94.1*		*40 - 110*	*03/23/18 10:11*	*04/02/18 17:57*	*1*
Yttrium	*83.0*		*40 - 110*	*03/23/18 10:11*	*04/02/18 17:57*	*1*

Client Sample ID: E8C0065-03

Date Collected: 03/03/18 11:33
Date Received: 03/22/18 08:50

Lab Sample ID: 160-27447-3
Matrix: Water

Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-226	0.0928	U	0.0765	0.0770	1.00	0.111	pCi/L	03/23/18 09:33	04/16/18 06:01	1

Client Sample ID: E8C0065-03

Date Collected: 03/03/18 11:33
Date Received: 03/22/18 08:50

Lab Sample ID: 160-27447-3
Matrix: Water

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Barium	93.5		40 - 110	03/23/18 09:33	04/16/18 06:01	1

Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-228	**0.740**		0.346	0.353	1.00	0.502	pCi/L	03/23/18 10:11	04/02/18 17:57	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Barium	93.5		40 - 110	03/23/18 10:11	04/02/18 17:57	1
Yttrium	86.4		40 - 110	03/23/18 10:11	04/02/18 17:57	1

Client Sample ID: E8C0065-04

Date Collected: 03/03/18 11:46
Date Received: 03/22/18 08:50

Lab Sample ID: 160-27447-4
Matrix: Water

Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-226	**0.394**		0.175	0.178	1.00	0.171	pCi/L	03/23/18 09:33	04/16/18 06:01	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Barium	45.4		40 - 110	03/23/18 09:33	04/16/18 06:01	1

Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-228	**1.05**		0.653	0.660	1.00	0.997	pCi/L	03/23/18 10:11	04/02/18 17:57	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Barium	45.4		40 - 110	03/23/18 10:11	04/02/18 17:57	1
Yttrium	89.0		40 - 110	03/23/18 10:11	04/02/18 17:57	1

Laboratory Reports For Sample Date 4-14-2018

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Emera Corp.	Project: Sec. 5&8, T24N, R3E, Noble Co., OK	
P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	05/18/18 09:53

GWMP #6A

E8D0325-01 (Aqueous) - Sampled: 04/14/18 11:45

Environmental Testing, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Qualifiers
Conventional Chemistry Parameters by Standard Methods									
pH	**7.34**		pH Units	1	EGD0418	BLS	04/18/18 10:30	SM 4500-H+ B	H-03
Total Dissolved Solids	**432**	100	mg/L	1	EGD0460	BLS	04/19/18 12:30	SM 2540C	
Metals by EPA 200 Series Methods									
Arsenic	**0.0139**	0.0100	mg/L	1	EGD0509	LSB	04/23/18 14:43	EPA 200.7	
Boron	**0.121**	0.0500	mg/L	1	EGD0509	LSB	04/23/18 14:43	EPA 200.7	
Barium	**1.10**	0.0100	mg/L	1	EGD0509	LSB	04/23/18 14:43	EPA 200.7	
Beryllium	<0.0100	0.0100	mg/L	1	EGD0509	LSB	04/23/18 14:43	EPA 200.7	
Calcium	**127**	1.00	mg/L	1	EGD0509	LSB	04/23/18 14:43	EPA 200.7	
Cadmium	<0.0100	0.0100	mg/L	1	EGD0509	LSB	04/23/18 14:43	EPA 200.7	
Cobalt	**0.0867**	0.0100	mg/L	1	EGD0509	LSB	04/23/18 14:43	EPA 200.7	
Chromium	**0.0741**	0.0100	mg/L	1	EGD0509	LSB	04/23/18 14:43	EPA 200.7	
***x* Lithium**	**0.0687**	0.0500	mg/L	1	EGD0509	LSB	04/23/18 14:43	EPA 200.7	
Molybdenum	<0.0100	0.0100	mg/L	1	EGD0509	LSB	04/23/18 14:43	EPA 200.7	
Lead	**0.0525**	0.0100	mg/L	1	EGD0509	LSB	04/23/18 14:43	EPA 200.7	
Antimony	<0.0100	0.0100	mg/L	1	EGD0509	LSB	04/23/18 14:43	EPA 200.7	
Selenium	<0.0200	0.0200	mg/L	1	EGD0509	LSB	04/23/18 14:43	EPA 200.7	
Thallium	<0.0200	0.0200	mg/L	1	EGD0509	LSB	04/23/18 14:43	EPA 200.7	
Mercury	<0.000200	0.000200	mg/L	1	EGD0475	LSB	04/20/18 14:58	EPA 245.1	
Metals Digestion	Completed		N/A		EGD0509	LSB	04/20/18 18:05	EPA 200.7	
Mercury Digestion	Completed		N/A		EGD0475	LSB	04/19/18 18:40	EPA 245.1	
Anions by EPA Method 300.0									
Chloride	**1.14**	0.800	mg/L	5	EGD0378	ECF	04/17/18 14:38	EPA 300.0	
Fluoride	**0.510**	0.500	mg/L	5	EGD0378	ECF	04/17/18 14:38	EPA 300.0	
Sulfate as SO4	**21.6**	1.50	mg/L	5	EGD0378	ECF	04/17/18 14:38	EPA 300.0	

Environmental Testing, Inc.

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Emera Corp.	Project: Sec. 5&8, T24N, R3E, Noble Co., OK	
P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	05/18/18 09:53

GWMP #8A

E8D0325-02 (Aqueous) - Sampled: 04/14/18 10:55

Environmental Testing, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Qualifiers
Conventional Chemistry Parameters by Standard Methods									
pH	**7.81**		pH Units	1	EGD0418	BLS	04/18/18 10:30	SM 4500-H+ B	H-03
Total Dissolved Solids	**430**	100	mg/L	1	EGD0460	BLS	04/19/18 12:30	SM 2540C	
Metals by EPA 200 Series Methods									
Arsenic	<0.0100	0.0100	mg/L	1	EGD0509	LSB	04/23/18 14:47	EPA 200.7	
Boron	**0.108**	0.0500	mg/L	1	EGD0509	LSB	04/23/18 14:47	EPA 200.7	
Barium	**0.290**	0.0100	mg/L	1	EGD0509	LSB	04/23/18 14:47	EPA 200.7	
Beryllium	<0.0100	0.0100	mg/L	1	EGD0509	LSB	04/23/18 14:47	EPA 200.7	
Calcium	**84.1**	1.00	mg/L	1	EGD0509	LSB	04/23/18 14:47	EPA 200.7	
Cadmium	<0.0100	0.0100	mg/L	1	EGD0509	LSB	04/23/18 14:47	EPA 200.7	
Cobalt	<0.0100	0.0100	mg/L	1	EGD0509	LSB	04/23/18 14:47	EPA 200.7	
Chromium	<0.0100	0.0100	mg/L	1	EGD0509	LSB	04/23/18 14:47	EPA 200.7	
x Lithium	<0.0500	0.0500	mg/L	1	EGD0509	LSB	04/23/18 14:47	EPA 200.7	
Molybdenum	<0.0100	0.0100	mg/L	1	EGD0509	LSB	04/23/18 14:47	EPA 200.7	
Lead	<0.0100	0.0100	mg/L	1	EGD0509	LSB	04/23/18 14:47	EPA 200.7	
Antimony	<0.0100	0.0100	mg/L	1	EGD0509	LSB	04/23/18 14:47	EPA 200.7	
Selenium	<0.0200	0.0200	mg/L	1	EGD0509	LSB	04/23/18 14:47	EPA 200.7	
Thallium	<0.0200	0.0200	mg/L	1	EGD0509	LSB	04/23/18 14:47	EPA 200.7	
Mercury	<0.000200	0.000200	mg/L	1	EGD0475	LSB	04/20/18 15:00	EPA 245.1	
Metals Digestion	Completed		N/A		EGD0509	LSB	04/20/18 18:05	EPA 200.7	
Mercury Digestion	Completed		N/A		EGD0475	LSB	04/19/18 18:40	EPA 245.1	
Anions by EPA Method 300.0									
Chloride	**3.52**	0.800	mg/L	5	EGD0378	ECF	04/17/18 14:56	EPA 300.0	
Fluoride	**0.396**	0.100	mg/L	1	EGD0378	ECF	04/17/18 15:49	EPA 300.0	
Sulfate as SO4	**30.2**	1.50	mg/L	5	EGD0378	ECF	04/17/18 14:56	EPA 300.0	

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Emera Corp.	Project: Sec. 5&8, T24N, R3E, Noble Co., OK	
P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	05/18/18 09:53

GWMP #9A

E8D0325-03 (Aqueous) - Sampled: 04/14/18 12:20

Environmental Testing, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Qualifiers
Conventional Chemistry Parameters by Standard Methods									
pH	**8.01**		pH Units	1	EGD0418	BLS	04/18/18 10:30	SM 4500-H+ B	H-03
Total Dissolved Solids	**524**	100	mg/L	1	EGD0460	BLS	04/19/18 16:10	SM 2540C	
Metals by EPA 200 Series Methods									
Arsenic	<0.0100	0.0100	mg/L	1	EGD0509	LSB	04/23/18 14:51	EPA 200.7	
Boron	**1.36**	0.0500	mg/L	1	EGD0509	LSB	04/23/18 14:51	EPA 200.7	
Barium	**0.0602**	0.0100	mg/L	1	EGD0509	LSB	04/23/18 14:51	EPA 200.7	
Beryllium	<0.0100	0.0100	mg/L	1	EGD0509	LSB	04/23/18 14:51	EPA 200.7	
Calcium	**36.4**	1.00	mg/L	1	EGD0509	LSB	04/23/18 14:51	EPA 200.7	
Cadmium	<0.0100	0.0100	mg/L	1	EGD0509	LSB	04/23/18 14:51	EPA 200.7	
Cobalt	<0.0100	0.0100	mg/L	1	EGD0509	LSB	04/23/18 14:51	EPA 200.7	
Chromium	<0.0100	0.0100	mg/L	1	EGD0509	LSB	04/23/18 14:51	EPA 200.7	
x Lithium	<0.0500	0.0500	mg/L	1	EGD0509	LSB	04/23/18 14:51	EPA 200.7	
Molybdenum	**0.0124**	0.0100	mg/L	1	EGD0509	LSB	04/23/18 14:51	EPA 200.7	
Lead	<0.0100	0.0100	mg/L	1	EGD0509	LSB	04/23/18 14:51	EPA 200.7	
Antimony	<0.0100	0.0100	mg/L	1	EGD0509	LSB	04/23/18 14:51	EPA 200.7	
Selenium	<0.0200	0.0200	mg/L	1	EGD0509	LSB	04/23/18 14:51	EPA 200.7	
Thallium	<0.0200	0.0200	mg/L	1	EGD0509	LSB	04/23/18 14:51	EPA 200.7	
Mercury	<0.000200	0.000200	mg/L	1	EGD0475	LSB	04/20/18 15:02	EPA 245.1	
Metals Digestion	Completed		N/A		EGD0509	LSB	04/20/18 18:05	EPA 200.7	
Mercury Digestion	Completed		N/A		EGD0475	LSB	04/19/18 18:40	EPA 245.1	
Anions by EPA Method 300.0									
Chloride	**17.4**	16.0	mg/L	100	EGD0378	ECF	04/17/18 13:04	EPA 300.0	
Fluoride	**0.822**	0.500	mg/L	5	EGD0378	ECF	04/17/18 15:14	EPA 300.0	
Sulfate as SO4	**101**	30.0	mg/L	100	EGD0378	ECF	04/17/18 13:04	EPA 300.0	

Environmental Testing, Inc.

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Emera Corp.	Project: Sec. 5&8, T24N, R3E, Noble Co., OK	
P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	05/18/18 09:53

GWMP #10A

E8D0325-04 (Aqueous) - Sampled: 04/14/18 12:50

Environmental Testing, Inc.

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Analyzed	Method	Qualifiers
Conventional Chemistry Parameters by Standard Methods									
pH	**7.81**		pH Units	1	EGD0418	BLS	04/18/18 10:30	SM 4500-H+ B	H-03
Total Dissolved Solids	**1790**	100	mg/L	1	EGD0460	BLS	04/19/18 16:10	SM 2540C	
Metals by EPA 200 Series Methods									
Arsenic	<0.0100	0.0100	mg/L	1	EGD0509	LSB	04/23/18 15:10	EPA 200.7	
Boron	**4.43**	0.0500	mg/L	1	EGD0509	LSB	04/23/18 15:10	EPA 200.7	
Barium	**0.732**	0.0100	mg/L	1	EGD0509	LSB	04/23/18 15:10	EPA 200.7	
Beryllium	<0.0100	0.0100	mg/L	1	EGD0509	LSB	04/23/18 15:10	EPA 200.7	
Calcium	**115**	1.00	mg/L	1	EGD0509	LSB	04/23/18 15:10	EPA 200.7	
Cadmium	<0.0100	0.0100	mg/L	1	EGD0509	LSB	04/23/18 15:10	EPA 200.7	
Cobalt	**0.0258**	0.0100	mg/L	1	EGD0509	LSB	04/23/18 15:10	EPA 200.7	
Chromium	**0.0125**	0.0100	mg/L	1	EGD0509	LSB	04/23/18 15:10	EPA 200.7	
x Lithium	<0.0500	0.0500	mg/L	1	EGD0509	LSB	04/23/18 15:10	EPA 200.7	
Molybdenum	<0.0100	0.0100	mg/L	1	EGD0509	LSB	04/23/18 15:10	EPA 200.7	
Lead	**0.0222**	0.0100	mg/L	1	EGD0509	LSB	04/23/18 15:10	EPA 200.7	
Antimony	<0.0100	0.0100	mg/L	1	EGD0509	LSB	04/23/18 15:10	EPA 200.7	
Selenium	<0.0200	0.0200	mg/L	1	EGD0509	LSB	04/23/18 15:10	EPA 200.7	
Thallium	<0.0200	0.0200	mg/L	1	EGD0509	LSB	04/23/18 15:10	EPA 200.7	
Mercury	<0.000200	0.000200	mg/L	1	EGD0475	LSB	04/20/18 15:04	EPA 245.1	
Metals Digestion	Completed		N/A		EGD0509	LSB	04/20/18 18:05	EPA 200.7	
Mercury Digestion	Completed		N/A		EGD0475	LSB	04/19/18 18:40	EPA 245.1	
Anions by EPA Method 300.0									
Chloride	**26.3**	1.60	mg/L	10	EGD0378	ECF	04/17/18 15:31	EPA 300.0	
Fluoride	<1.00	1.00	mg/L	10	EGD0378	ECF	04/17/18 15:31	EPA 300.0	
Sulfate as SO4	**682**	150	mg/L	500	EGD0378	ECF	04/17/18 13:22	EPA 300.0	

Environmental Testing, Inc.

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Keith Hopcus For Russell Britten, President

ENVIRONMENTAL TESTING, INC.

4619 N. Santa Fe
Oklahoma City, OK 73118
405.488.2400 Phone
405.488.2404 Fax
www.etilab.com

Emera Corp.	Project: Sec. 5&8, T24N, R3E, Noble Co., OK	
P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	05/18/18 09:53

QUALITY CONTROL

Conventional Chemistry Parameters by Standard Methods
Environmental Testing, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifiers
Batch EGD0418 - General Prep - Wet Chem (Aq)										
LCS (EGD0418-BS1)				Prepared & Analyzed: 04/18/18						
pH	7.03		pH Units	7.00		100	99-101			
Duplicate (EGD0418-DUP1)		**Source: E8D0297-01**		Prepared & Analyzed: 04/18/18						
pH	7.67		pH Units		7.99			4	20	
Batch EGD0460 - General Prep - Wet Chem (Aq)										
Blank (EGD0460-BLK1)				Prepared: 04/18/18 Analyzed: 04/19/18						
Total Dissolved Solids	<50.0	50.0	mg/L							
LCS (EGD0460-BS1)				Prepared: 04/18/18 Analyzed: 04/19/18						
Total Dissolved Solids	970	100	mg/L	1000		97	80-120			
Duplicate (EGD0460-DUP1)		**Source: E8D0348-01**		Prepared: 04/18/18 Analyzed: 04/19/18						
Total Dissolved Solids	752	100	mg/L		792			5	10	
Duplicate (EGD0460-DUP2)		**Source: E8D0348-02**		Prepared: 04/18/18 Analyzed: 04/19/18						
Total Dissolved Solids	846	100	mg/L		816			4	10	

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P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	05/18/18 09:53

QUALITY CONTROL

Metals by EPA 200 Series Methods
Environmental Testing, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifiers
Batch EGD0475 - EPA 245.1										
Blank (EGD0475-BLK1)				Prepared: 04/19/18 Analyzed: 04/20/18						
Mercury	<0.000200	0.000200	mg/L							
Mercury Digestion	Completed		N/A							
LCS (EGD0475-BS1)				Prepared: 04/19/18 Analyzed: 04/20/18						
Mercury	0.00206	0.000200	mg/L	0.00200		103	85-115			
Mercury Digestion	Completed		N/A							
Matrix Spike (EGD0475-MS1)		**Source: E8D0343-01**		Prepared: 04/19/18 Analyzed: 04/20/18						
Mercury	0.00204	0.000200	mg/L	0.00200	0.0000370	100	70-130			
Mercury Digestion	Completed		N/A							
Matrix Spike Dup (EGD0475-MSD1)		**Source: E8D0343-01**		Prepared: 04/19/18 Analyzed: 04/20/18						
Mercury	0.00206	0.000200	mg/L	0.00200	0.0000370	101	70-130	1	20	
Mercury Digestion	Completed		N/A							
Batch EGD0509 - EPA 200.7										
Blank (EGD0509-BLK1)				Prepared: 04/20/18 Analyzed: 04/23/18						
Arsenic	<0.0100	0.0100	mg/L							
Antimony	<0.0100	0.0100	mg/L							
Barium	<0.0100	0.0100	mg/L							
Beryllium	<0.0100	0.0100	mg/L							
Boron	<0.0500	0.0500	mg/L							
Cadmium	<0.0100	0.0100	mg/L							
Calcium	<1.00	1.00	mg/L							
Chromium	<0.0100	0.0100	mg/L							
Cobalt	<0.0100	0.0100	mg/L							
Lead	<0.0100	0.0100	mg/L							
Lithium	<0.0500	0.0500	mg/L							
Molybdenum	<0.0100	0.0100	mg/L							
Selenium	<0.0200	0.0200	mg/L							
Thallium	<0.0200	0.0200	mg/L							
Metals Digestion	Completed		N/A							

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P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	05/18/18 09:53

QUALITY CONTROL

Metals by EPA 200 Series Methods
Environmental Testing, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifiers
Batch EGD0509 - EPA 200.7										
LCS (EGD0509-BS1)				Prepared: 04/20/18 Analyzed: 04/23/18						
Arsenic	0.526	0.0100	mg/L	0.500		105	85-115			
Antimony	0.554	0.0100	mg/L	0.500		111	85-115			
Barium	0.494	0.0100	mg/L	0.500		99	85-115			
Beryllium	0.526	0.0100	mg/L	0.500		105	85-115			
Boron	0.518	0.0500	mg/L	0.500		104	85-115			
Cadmium	0.525	0.0100	mg/L	0.500		105	85-115			
Calcium	21.1	1.00	mg/L	20.0		106	85-115			
Chromium	0.499	0.0100	mg/L	0.500		100	85-115			
Cobalt	0.518	0.0100	mg/L	0.500		104	85-115			
Lead	0.521	0.0100	mg/L	0.500		104	85-115			
Lithium	0.500	0.0500	mg/L	0.500		100	85-115			
Molybdenum	0.539	0.0100	mg/L	0.500		108	85-115			
Selenium	0.548	0.0200	mg/L	0.500		110	85-115			
Thallium	0.508	0.0200	mg/L	0.500		102	85-115			
Metals Digestion	Completed		N/A							
Duplicate (EGD0509-DUP1)		**Source: E8D0347-01RE1**		Prepared: 04/20/18 Analyzed: 04/23/18						
Arsenic	0.00710	0.0100	mg/L		0.00570			22	20	R-01
Antimony	<0.0100	0.0100	mg/L		ND				20	
Barium	0.0754	0.0100	mg/L		0.0765			1	20	
Beryllium	<0.0100	0.0100	mg/L		ND				20	
Boron	0.129	0.0500	mg/L		0.131			2	20	
Cadmium	<0.0100	0.0100	mg/L		ND				20	
Calcium	62.4	1.00	mg/L		63.7			2	20	
Chromium	0.000500	0.0100	mg/L		0.000500			0	20	
Cobalt	<0.0100	0.0100	mg/L		ND				20	
Lead	<0.0100	0.0100	mg/L		ND				20	
Lithium	0.00950	0.0500	mg/L		0.00910			4	20	
Molybdenum	0.00860	0.0100	mg/L		0.00600			36	20	R-01
Selenium	0.0313	0.0200	mg/L		0.0345			10	20	
Thallium	<0.0200	0.0200	mg/L		ND				20	
Metals Digestion	Completed		N/A							

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P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	05/18/18 09:53

QUALITY CONTROL

Metals by EPA 200 Series Methods
Environmental Testing, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifiers
Batch EGD0509 - EPA 200.7										
Matrix Spike (EGD0509-MS1)		**Source: E8D0347-01RE1**		Prepared: 04/20/18 Analyzed: 04/23/18						
Arsenic	0.575	0.0100	mg/L	0.500	0.00570	114	70-130			
Antimony	0.588	0.0100	mg/L	0.500	ND	118	70-130			
Barium	0.576	0.0100	mg/L	0.500	0.0765	100	70-130			
Beryllium	0.529	0.0100	mg/L	0.500	ND	106	70-130			
Boron	0.690	0.0500	mg/L	0.500	0.131	112	70-130			
Cadmium	0.524	0.0100	mg/L	0.500	ND	105	70-130			
Calcium	82.5	1.00	mg/L	20.0	63.7	94	70-130			
Chromium	0.511	0.0100	mg/L	0.500	0.000500	102	70-130			
Cobalt	0.530	0.0100	mg/L	0.500	ND	106	70-130			
Lead	0.516	0.0100	mg/L	0.500	ND	103	70-130			
Lithium	0.625	0.0500	mg/L	0.500	0.00910	123	70-130			
Molybdenum	0.563	0.0100	mg/L	0.500	0.00600	111	70-130			
Selenium	0.617	0.0200	mg/L	0.500	0.0345	117	70-130			
Thallium	0.465	0.0200	mg/L	0.500	ND	93	70-130			
Metals Digestion	Completed		N/A							
Matrix Spike Dup (EGD0509-MSD1)		**Source: E8D0347-01RE1**		Prepared: 04/20/18 Analyzed: 04/23/18						
Antimony	0.583	0.0100	mg/L	0.500	ND	117	70-130	0.8	20	
Arsenic	0.577	0.0100	mg/L	0.500	0.00570	114	70-130	0.2	20	
Barium	0.577	0.0100	mg/L	0.500	0.0765	100	70-130	0.2	20	
Beryllium	0.528	0.0100	mg/L	0.500	ND	106	70-130	0.1	20	
Boron	0.690	0.0500	mg/L	0.500	0.131	112	70-130	0.06	20	
Cadmium	0.526	0.0100	mg/L	0.500	ND	105	70-130	0.2	20	
Calcium	82.7	1.00	mg/L	20.0	63.7	95	70-130	0.2	20	
Chromium	0.512	0.0100	mg/L	0.500	0.000500	102	70-130	0.1	20	
Cobalt	0.530	0.0100	mg/L	0.500	ND	106	70-130	0	20	
Lead	0.518	0.0100	mg/L	0.500	ND	104	70-130	0.3	20	
Lithium	0.625	0.0500	mg/L	0.500	0.00910	123	70-130	0.1	20	
Molybdenum	0.565	0.0100	mg/L	0.500	0.00600	112	70-130	0.5	20	
Selenium	0.617	0.0200	mg/L	0.500	0.0345	117	70-130	0	20	
Thallium	0.465	0.0200	mg/L	0.500	ND	93	70-130	0.02	20	
Metals Digestion	Completed		N/A							

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Emera Corp.	Project: Sec. 5&8, T24N, R3E, Noble Co., OK	
P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	05/18/18 09:53

QUALITY CONTROL

Anions by EPA Method 300.0
Environmental Testing, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifiers
Batch EGD0378 - General Prep - Wet Chem (Aq)										
Blank (EGD0378-BLK1)				Prepared & Analyzed: 04/17/18						
Chloride	<0.160	0.160	mg/L							
Fluoride	<0.100	0.100	mg/L							
Sulfate as SO4	<0.300	0.300	mg/L							
LCS (EGD0378-BS1)				Prepared & Analyzed: 04/17/18						
Chloride	0.568	0.160	mg/L	0.600		95	90-110			
Fluoride	0.430	0.100	mg/L	0.400		108	90-110			
Sulfate as SO4	2.79	0.300	mg/L	3.00		93	90-110			
Matrix Spike (EGD0378-MS1)		**Source: E8D0223-01RE1**		Prepared & Analyzed: 04/17/18						
Chloride	400	16.0	mg/L	60.0	346	90	80-120			
Fluoride	42.2	10.0	mg/L	40.0	ND	105	80-120			
Sulfate as SO4	302	30.0	mg/L	300	28.7	91	80-120			
Matrix Spike Dup (EGD0378-MSD1)		**Source: E8D0223-01RE1**		Prepared & Analyzed: 04/17/18						
Chloride	400	16.0	mg/L	60.0	346	90	80-120	0.002	20	
Fluoride	42.7	10.0	mg/L	40.0	ND	107	80-120	1	20	
Sulfate as SO4	305	30.0	mg/L	300	28.7	92	80-120	1	20	

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P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	05/18/18 09:53

Non-Certified Analyses included in this Report

Analyte
EPA 200.7 in Aqueous
Lithium

Certifications

Code	Description	Number	Expires
KDHE	Kansas Accredited	E-10401	01/31/2019
NELAP	NELAP Accredited (LDEQ)	10002	06/30/2018
ODEQ	Oklahoma Accredited	2017-128	08/31/2018
TCEQ	Texas Accredited	T104704498-18-8	03/31/2019

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P.O. Box 2228	Project Number: Evans & Associates	**Reported:**
Edmond OK, 73083	Project Manager: Mr. Saeed Zahrai	05/18/18 09:53

Qualifiers and Definitions

COM	Completed
H-03	Sample was received and analyzed past the method holding time.
R-01	The RPD between sample duplicates exceeded the method or laboratory control limit. This may indicate the results are not as precise as expected.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
x	Non-Certified analyte
NA	Not Applicable

CHAIN OF CUSTODY RECORD

EMERA CORP.
P. O. BOX 2228, EDMOND, OK 73083

48D0325

Company : Evans and Associates Enterprises, Inc.
Address : P. O. Box 30
Ponca City, OK 74602
Phone : 580-765-6693
Client contact : Saeed Zahrai, P. E. 405-557-0000
Site location : Sections 5 & 8, T24N, R3E, Noble Co., OK
Permit No. LE-1884, Big Fork Ranch

SAMPLE TYPE	SAMPLE METHOD	CONTAINER TYPE
1. Water	C - composite	P - plastic
2. Soil	GR - grab	G - glass
3. Sludge		V - voa
4. Oil		O - other
5. Other		

	SAMPLE IDENTIFICATION	SAMPLE TYPE	CONTAINER SIZE	CONTAINER TYPE	CONTAINER #	SAMPLING DATE	SAMPLING TIME	SAMPLE METHOD	PRESERVATIVES	SAMPLE CONDITION / COMMENTS	TEMPERATURE	FLOW	DEPTH To WATER	pH (B, Ca / Cl, F, pH, TDS, SO4)	TDS (Sb, As, Ba, Be, Cd, Cr)	Co, Pb, Li, Hg, Mo, Se, Tl / Rad 226, 228
1	GWMP #6A	1	1L	P	1	4-14-18	11:45	GR	NONE		62		32.6	1.92	330	
		1	250ml	P	1			GR	HN03							
	~~GWMP #7A~~	1	1L	P	1	4-14-18		GR	NONE							
		1	250ml	P	1			GR	HN03							
2	GWMP #8A	1	1L	P	1	4-14-18	10:55	GR	NONE		64		40.5	8.21	380	
		1	250ml	P	1			GR	HN03							
3	GWMP #9A	1	1L	P	1	4-14-18	12:20	GR	NONE		62		13.5	6.11	421	
		1	250ml	P	1			GR	HN03							
4	GWMP #10A	1	1L	P	1	4-14-18	12:50	GR	NONE		62		29.4	6.65	1,360	
		1	250ml	P	1			GR	HN03							

Sample(s) taken by (print name & sign): Chuck Thibell Chuck Thibell
Relinquished by (print name & sign): Chuck Thibell Chuck Thibell Date : 4-16-18 Time : 2:25
Received by (print name & sign): [illegible signature] Date : 4-16-18 Time : 14:25

Ice 1.1°C 21000318

ENVIRONMENTAL TESTING, INC.

SAMPLE RECEIPT FORM

E8D0325

Environmental Testing, Inc.

Printed: 4/16/2018 3:46:22PM

Client:	**Emera Corp.**	**Project Manager:**	**Russell Britten**
Project:	**Sec. 5&8, T24N, R3E, Noble Co., OK**	**Project Number:**	**Evans & Associates**

Report To:
Emera Corp.
Mr. Saeed Zahrai
P.O. Box 2228
Edmond, OK 73083
Phone: (405) 557-0000
Fax: NA

Invoice To:
Emera Corp.
Mr. Saeed Zahrai
P.O. Box 2228
Edmond, OK 73083
Phone: (405) 557-0000
Fax: NA

Date Due:	04/23/18 17:00 (5 day TAT)		
Received By:	Erin Langer	Date Received:	04/16/18 14:25
Logged In By:	Andra Hoot	Date Logged In:	04/16/18 14:39

Samples Received at:		1.1°C			
Custody seals	No	Received on ice	Yes	Sufficient sample	Yes
Containers intact	Yes	Sample or temp blank frozen	No		
COC/Labels agree	Yes	Headspace in VOA vials	No		
Preservation confirmed	Yes	Correct containers	Yes		

Notes:

Preservation Confirmation

Container ID	Container Type	pH	Date/Time	Lot #
E8D0325-01 A	Poly HNO3 - 250mL	<2	4/16/18 1554	179935
E8D0325-01 C	Poly HNO3 - 1000mL			160287
E8D0325-02 A	Poly HNO3 - 250mL			
E8D0325-02 C	Poly HNO3 - 1000mL			
E8D0325-03 A	Poly HNO3 - 250mL			
E8D0325-03 C	Poly HNO3 - 1000mL			
E8D0325-04 A	Poly HNO3 - 250mL			
E8D0325-04 C	Poly HNO3 - 1000mL			

Preservation Confirmed By: AHK

Date: 4/16/18

Reviewed By

Date

wko_ETIwpres_rev0.7.rpt

Client Sample ID: E8D0325-01

Date Collected: 04/14/18 00:00
Date Received: 04/19/18 08:30

Lab Sample ID: 160-27903-1
Matrix: Water

Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-226	**1.20**		0.387	0.402	1.00	0.312	pCi/L	04/23/18 13:26	05/15/18 05:33	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Barium	*87.6*		*40 - 110*	*04/23/18 13:26*	*05/15/18 05:33*	*1*

Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-228	**2.84**	**G**	1.25	1.28	1.00	1.79	pCi/L	04/23/18 14:52	04/27/18 15:01	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Barium	*87.6*		*40 - 110*	*04/23/18 14:52*	*04/27/18 15:01*	*1*
Yttrium	*84.9*		*40 - 110*	*04/23/18 14:52*	*04/27/18 15:01*	*1*

Client Sample ID: E8D0325-02

Date Collected: 04/14/18 00:00
Date Received: 04/19/18 08:30

Lab Sample ID: 160-27903-2
Matrix: Water

Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-226	**0.215**		0.109	0.111	1.00	0.131	pCi/L	04/23/18 13:26	05/15/18 05:33	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Barium	*83.8*		*40 - 110*	*04/23/18 13:26*	*05/15/18 05:33*	*1*

Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-228	0.628	U	0.413	0.417	1.00	0.637	pCi/L	04/23/18 14:52	04/27/18 15:01	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Barium	*83.8*		*40 - 110*	*04/23/18 14:52*	*04/27/18 15:01*	*1*
Yttrium	*83.4*		*40 - 110*	*04/23/18 14:52*	*04/27/18 15:01*	*1*

Client Sample ID: E8D0325-03

Date Collected: 04/14/18 00:00
Date Received: 04/19/18 08:30

Lab Sample ID: 160-27903-3
Matrix: Water

Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-226	0.00173	U	0.0513	0.0513	1.00	0.109	pCi/L	04/23/18 13:26	05/15/18 05:33	1

Client Sample ID: E8D0325-03
Date Collected: 04/14/18 00:00
Date Received: 04/19/18 08:30

Lab Sample ID: 160-27903-3
Matrix: Water

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Barium	91.7		40 - 110	04/23/18 13:26	05/15/18 05:33	1

Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-228	-0.134	U	0.334	0.334	1.00	0.617	pCi/L	04/23/18 14:52	04/27/18 15:01	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Barium	91.7		40 - 110	04/23/18 14:52	04/27/18 15:01	1
Yttrium	86.0		40 - 110	04/23/18 14:52	04/27/18 15:01	1

Client Sample ID: E8D0325-04
Date Collected: 04/14/18 00:00
Date Received: 04/19/18 08:30

Lab Sample ID: 160-27903-4
Matrix: Water

Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-226	**0.350**		0.149	0.153	1.00	0.149	pCi/L	04/23/18 13:26	05/15/18 05:33	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Barium	57.5		40 - 110	04/23/18 13:26	05/15/18 05:33	1

Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Ra-228	0.532	U	0.576	0.578	1.00	0.943	pCi/L	04/23/18 14:52	04/27/18 15:02	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Barium	57.5		40 - 110	04/23/18 14:52	04/27/18 15:02	1
Yttrium	84.9		40 - 110	04/23/18 14:52	04/27/18 15:02	1