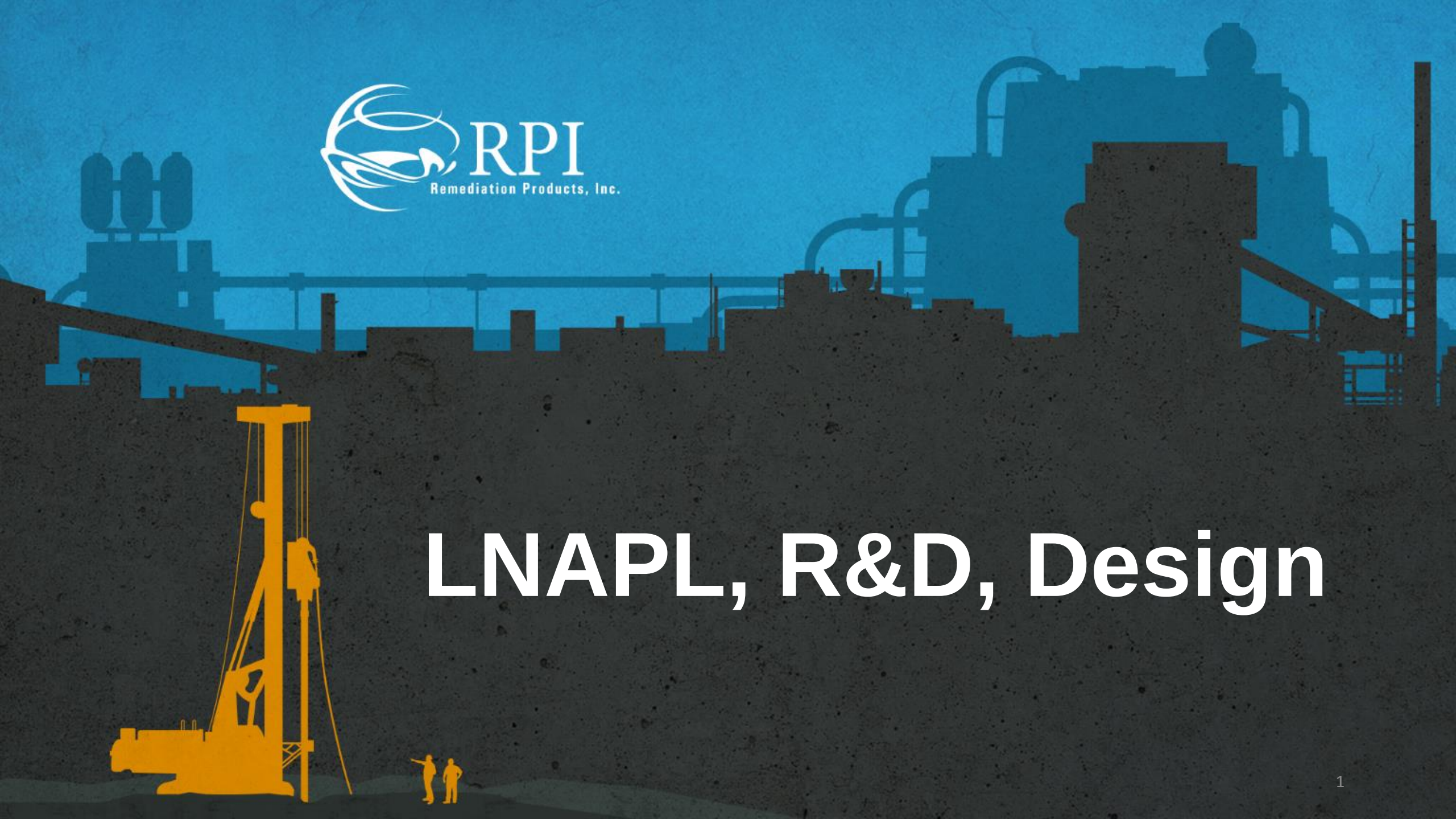


LNAPL, R&D, Design

CAT 100™

Key Elements

- Activated Carbon Impregnated with Metallic Iron (BOS 100®)
- Complex Carbohydrate – Food Grade Starch
- One Set of Microorganisms Designed to Degrade COCs
- Second Set of Microorganisms Designed to Degrade the Carbohydrate

WHY

- Exploit Characteristics of Carbon
- Capitalize on the Unique Activity of the BOS 100® Metallic Iron
- Profit from Microorganisms Attraction to Activated Carbon
- Gain Enhanced Reductive Dechlorination on Steroids
- Preserve the Metallic Surface that Electrifies the Process
- Low Maintenance – Extended Performance

ACTIVATED CARBON

- Simple Phase Change
- Not Bioavailable – the bugs are to big
- Bio-regeneration not viable

Fig 1.

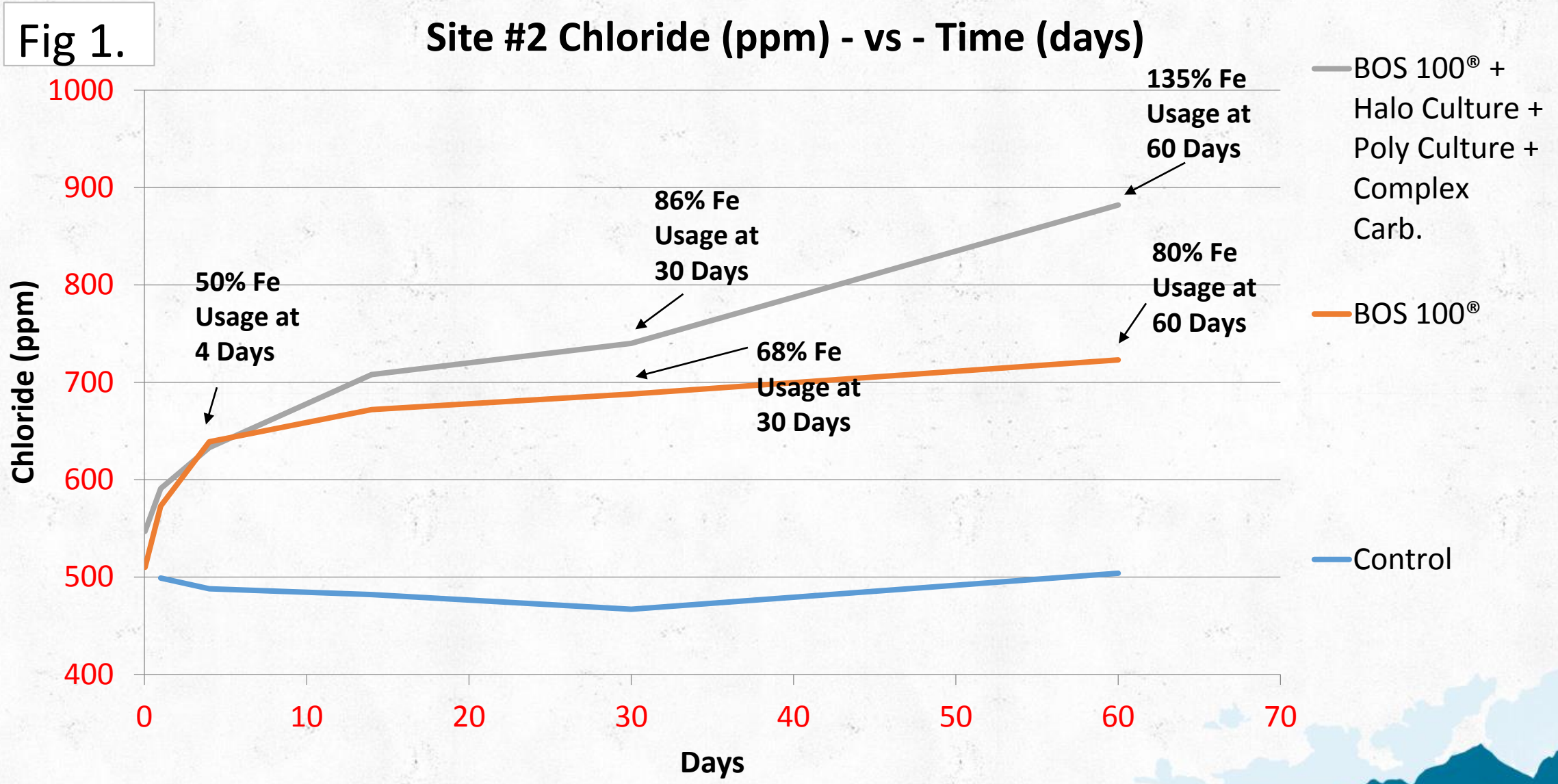

Site #2 Chloride (ppm) - vs - Time (days)
Chloride (ppm)
1000
900
800
700
600
500
400
0
10
20
30
40
50
60
70
Days
50% Fe Usage at 4 Days
86% Fe Usage at 30 Days
135% Fe Usage at 60 Days
68% Fe Usage at 30 Days
80% Fe Usage at 60 Days
BOS 100® + Halo Culture + Poly Culture + Complex Carb.
BOS 100®
Control

Fig 2.

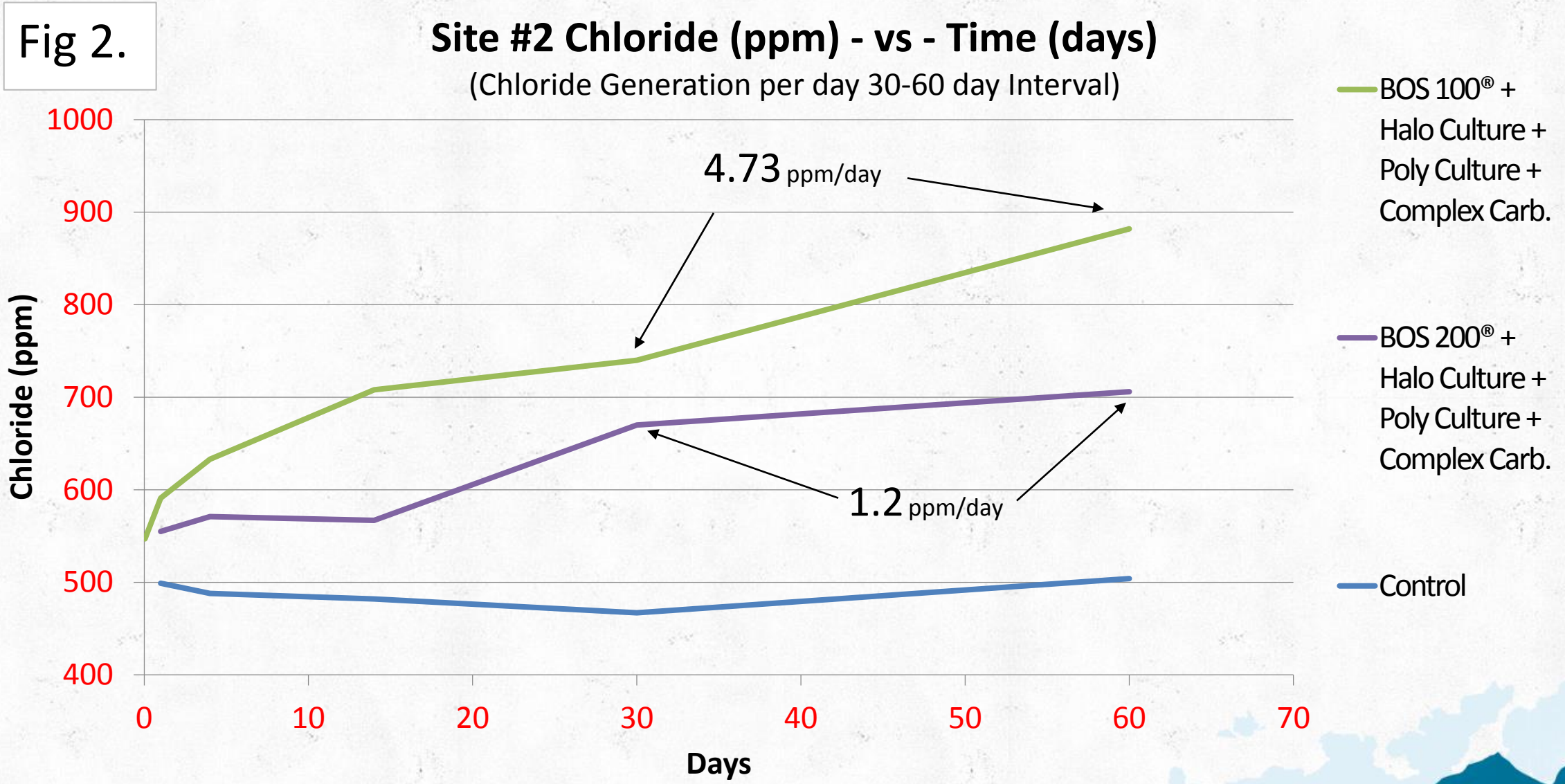

Site #2 Chloride (ppm) - vs - Time (days)
(Chloride Generation per day 30-60 day Interval)
Chloride (ppm)
1000
900
800
700
600
500
400
0
10
20
30
40
50
60
70
Days
4.73 ppm/day
1.2 ppm/day
BOS 100® + Halo Culture + Poly Culture + Complex Carb.
BOS 200® + Halo Culture + Poly Culture + Complex Carb.
Control

Fig 3. **Site #2 Remaining/Generation of Carbon Tetrachloride/Chloroform**

(BOS 100® + Halo Culture + Poly Culture + Complex Carb.)

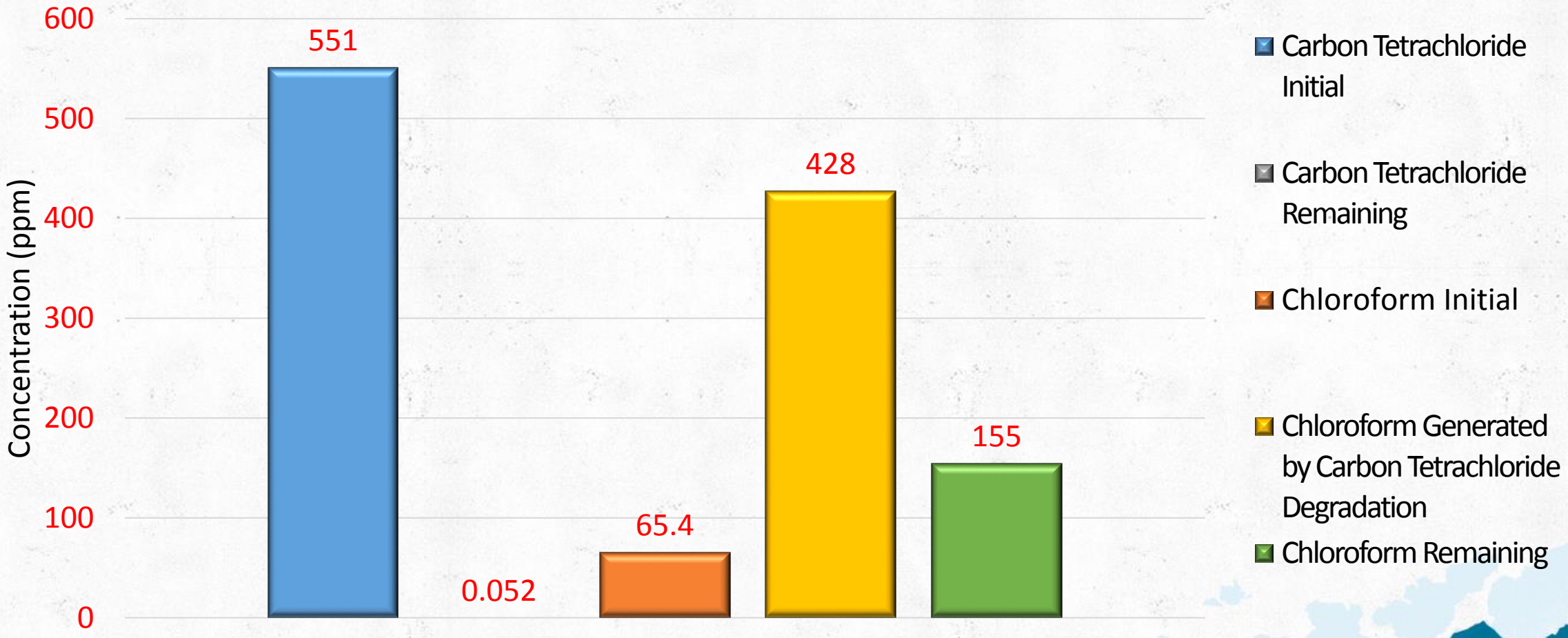
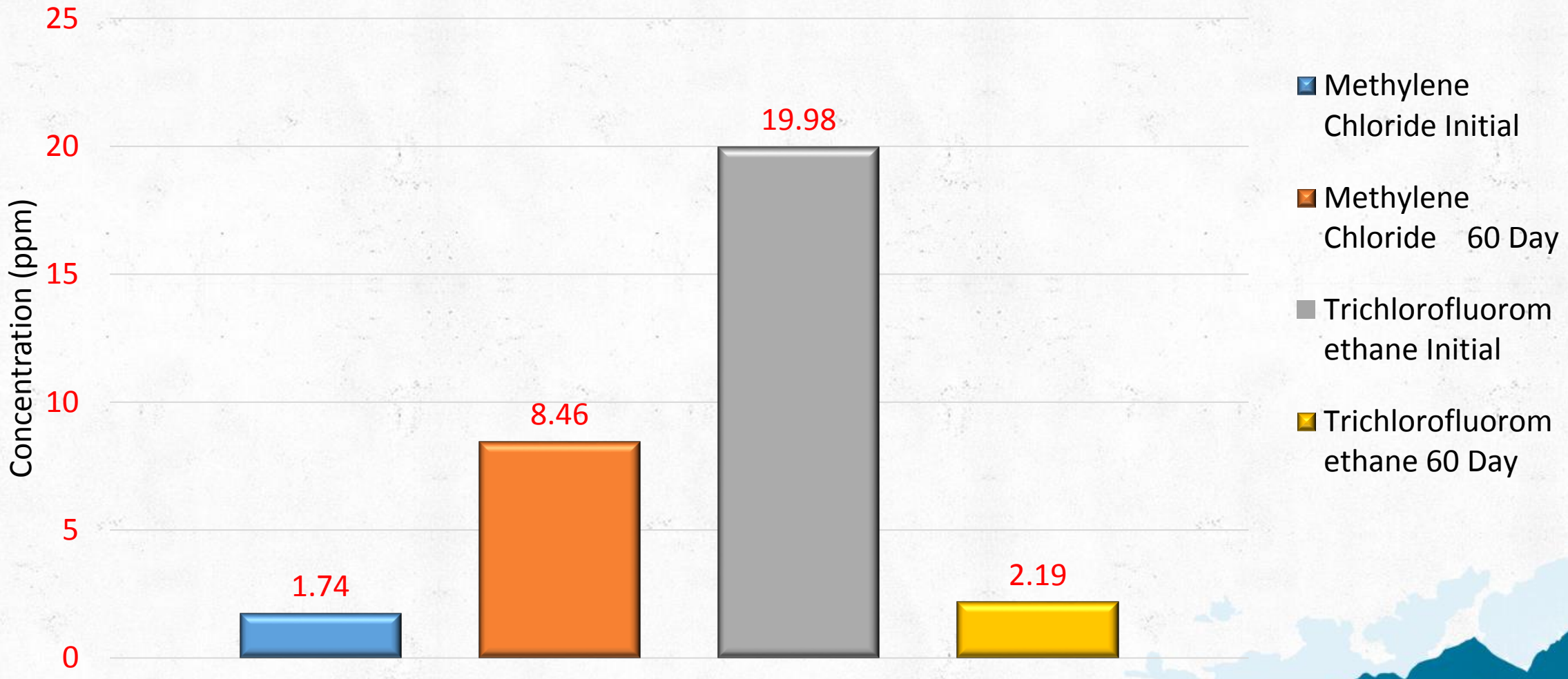
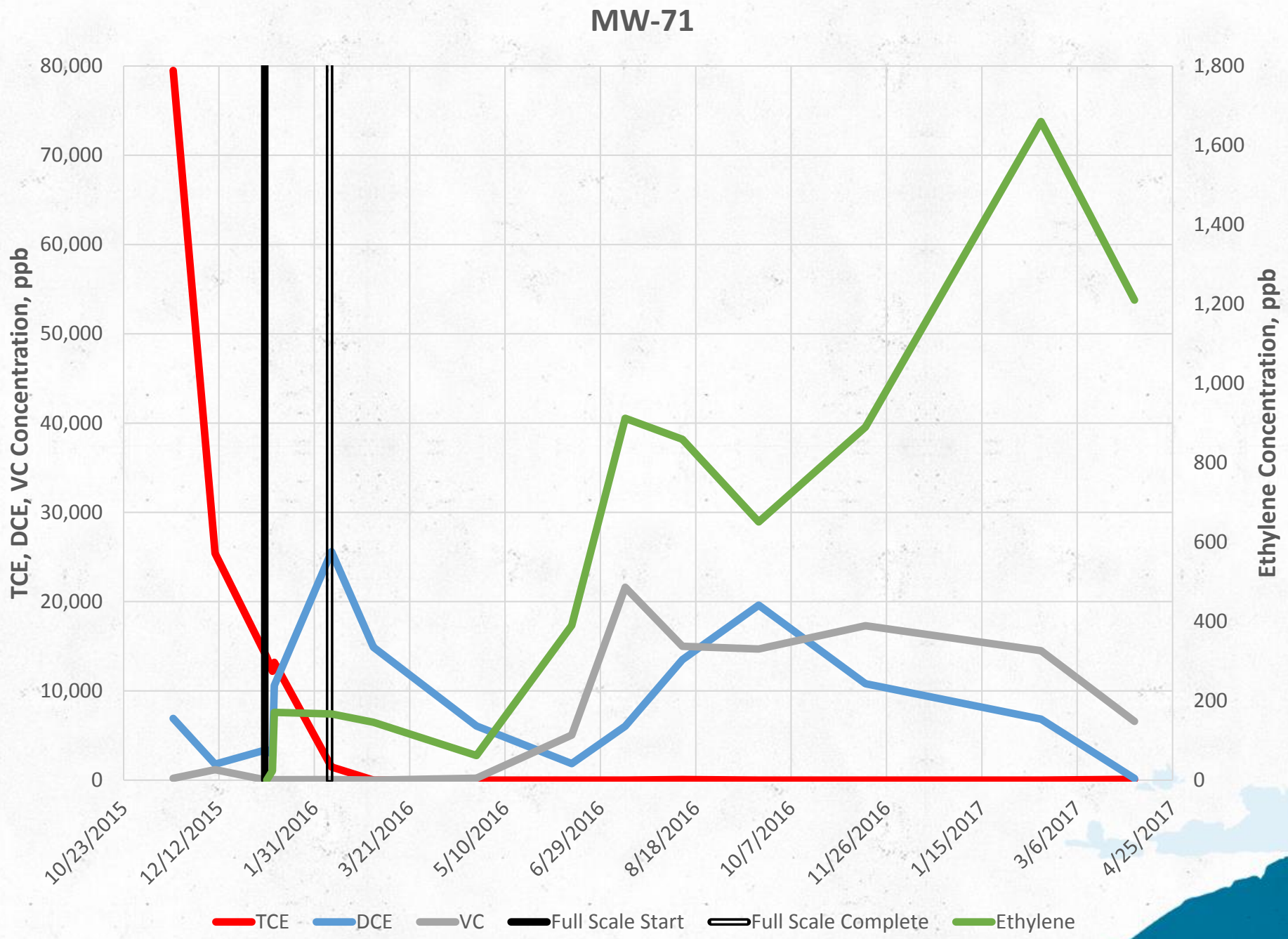


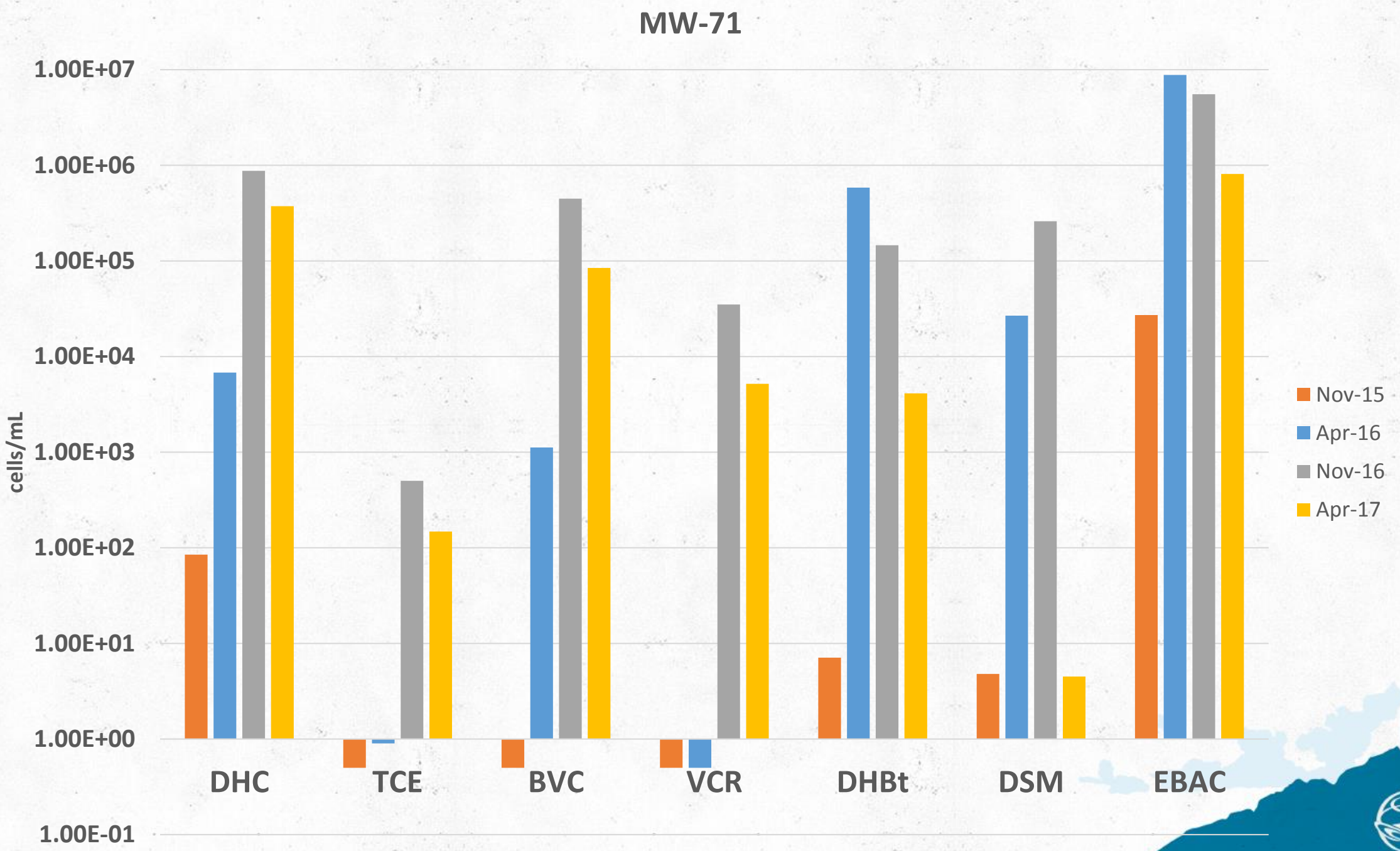
Fig 4.

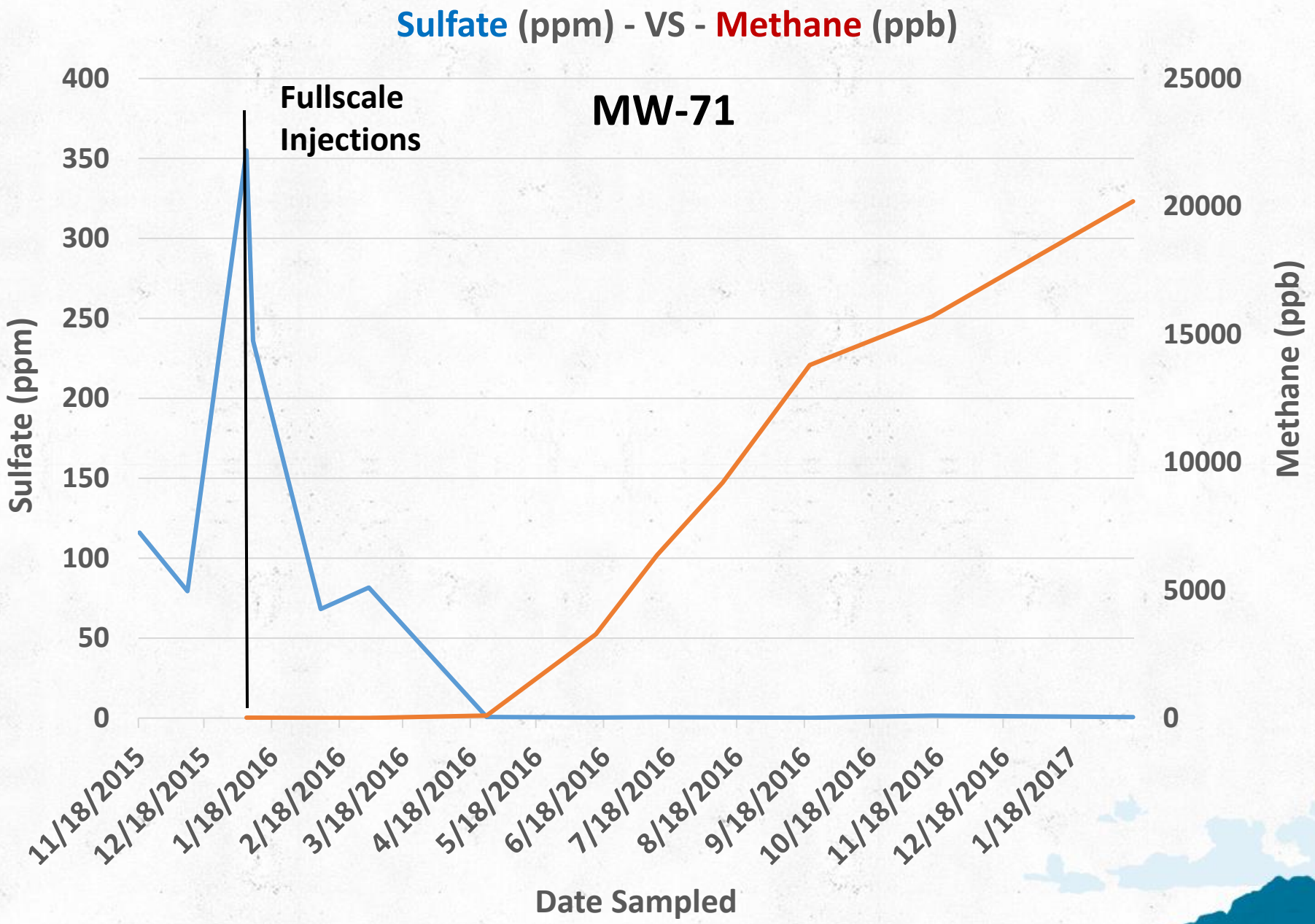
Site #2 Methylene Chloride & Trichlorofluoromethane

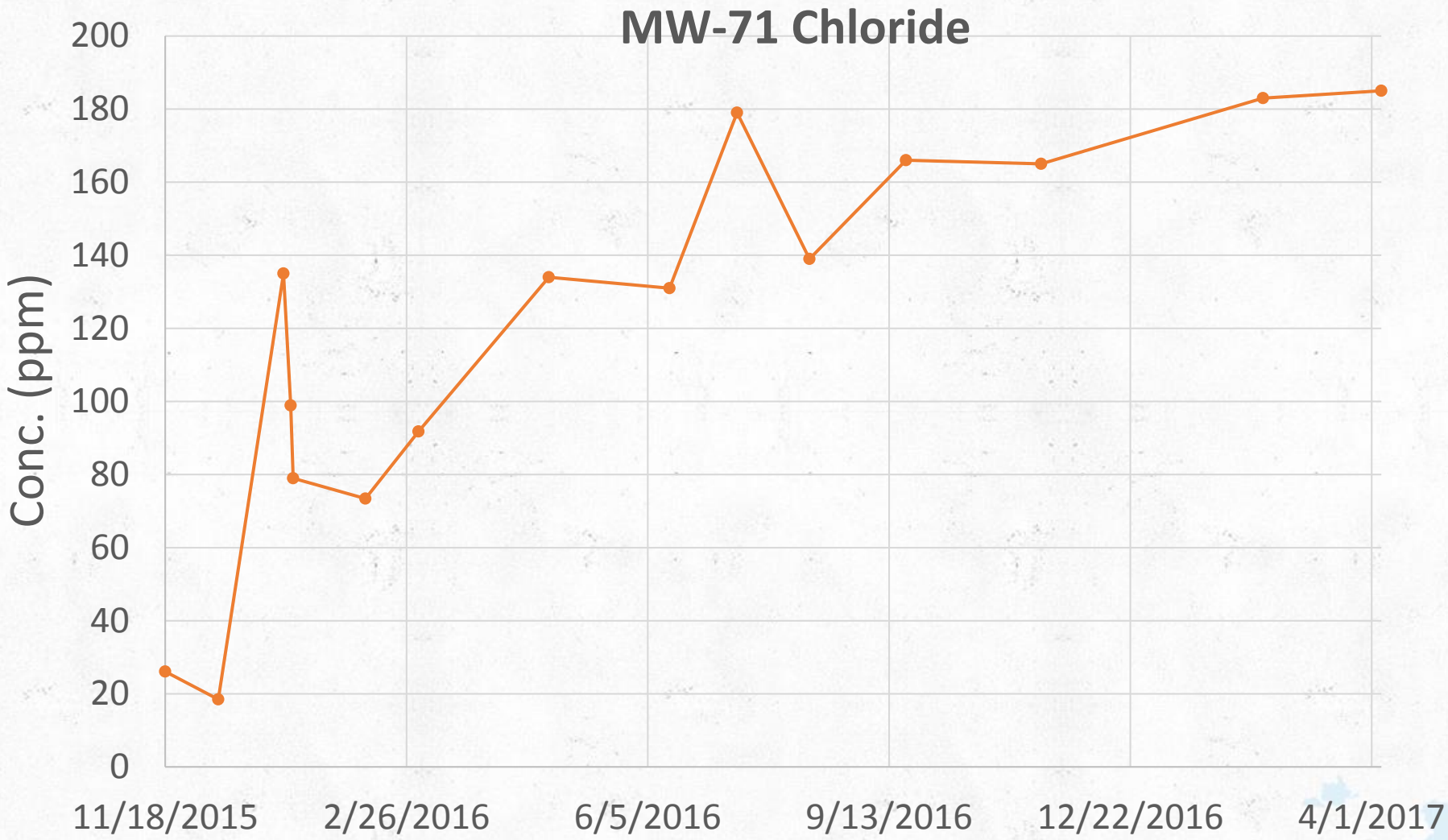
(BOS 100® + Halo Culture + Poly Culture + Complex Carb.)

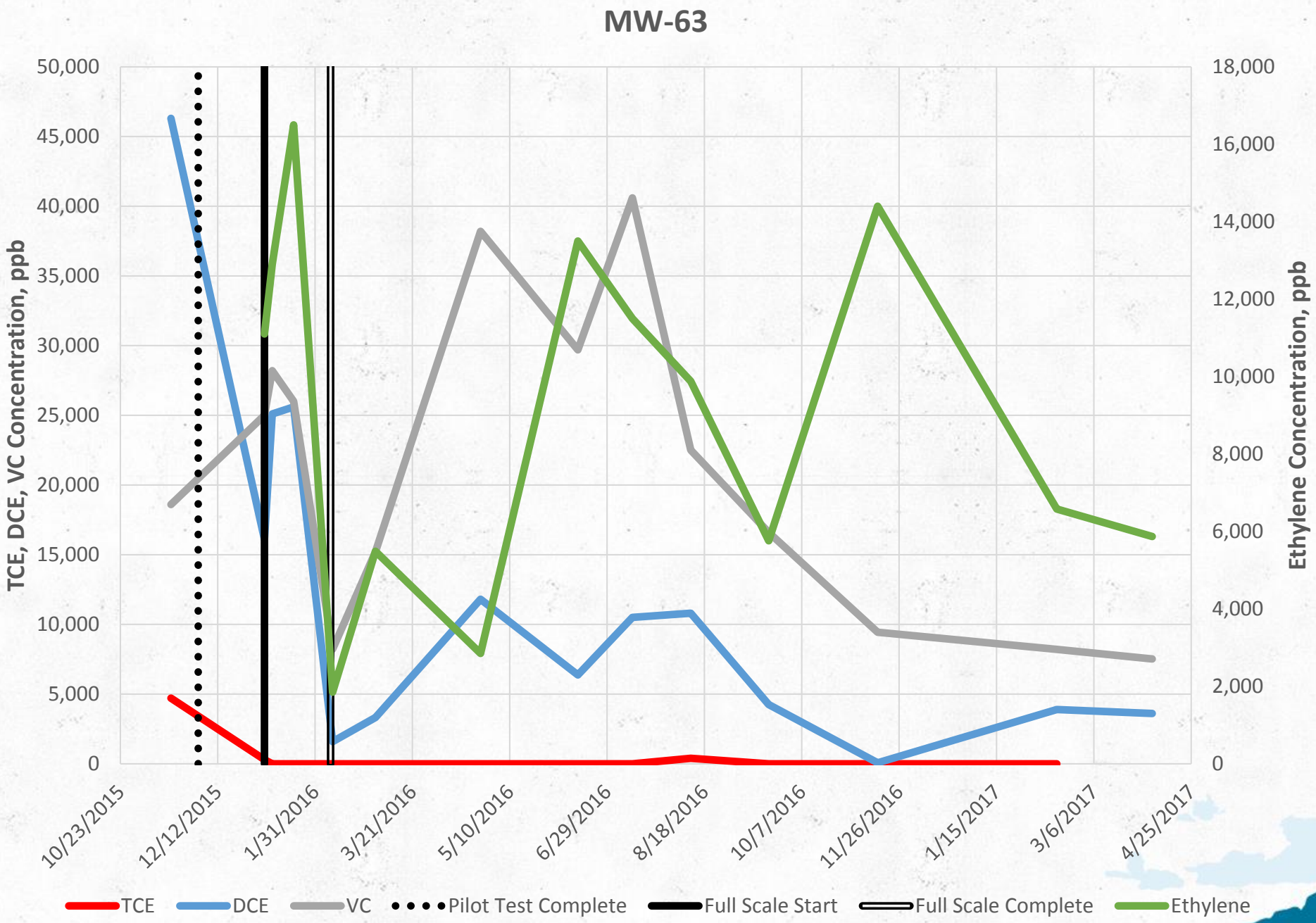



MW-71
TCE, DCE, VC Concentration, ppb
Ethylene Concentration, ppb
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
10/23/2015
12/12/2015
1/31/2016
3/21/2016
5/10/2016
6/29/2016
8/18/2016
10/7/2016
11/26/2016
1/15/2017
3/6/2017
4/25/2017
TCE
DCE
VC
Full Scale Start
Full Scale Complete
Ethylene

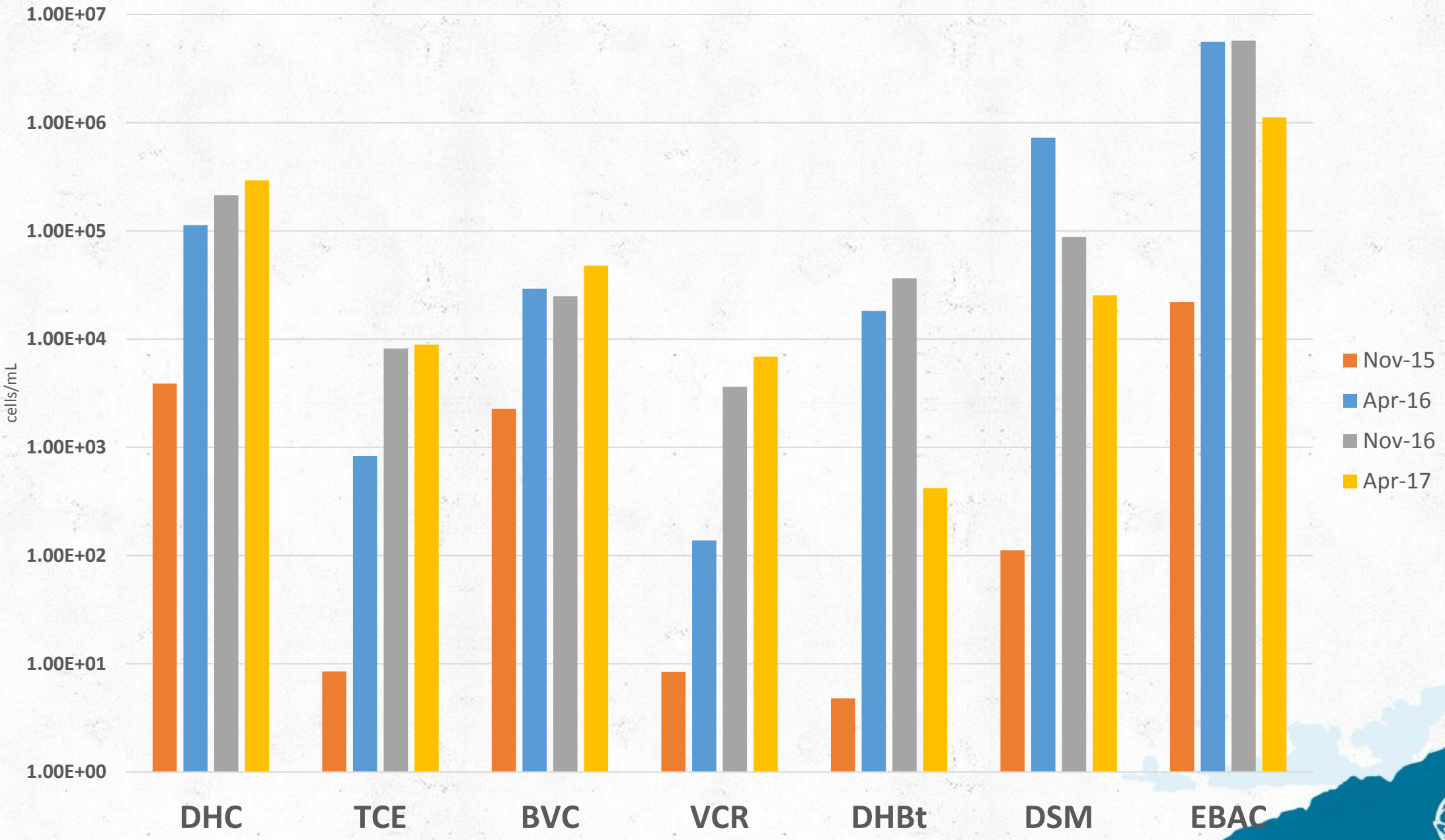

MW-71
1.00E+07
1.00E+06
1.00E+05
1.00E+04
1.00E+03
1.00E+02
1.00E+01
1.00E+00
1.00E-01
cells/mL
DHC
TCE
BVC
VCR
DHBt
DSM
EBAC
Nov-15
Apr-16
Nov-16
Apr-17


Sulfate (ppm) - VS - Methane (ppb)
MW-71
Fullscale Injections
Sulfate (ppm)
Methane (ppb)
Date Sampled
400
350
300
250
200
150
100
50
0
25000
20000
15000
10000
5000
0
11/18/2015
12/18/2015
1/18/2016
2/18/2016
3/18/2016
4/18/2016
5/18/2016
6/18/2016
7/18/2016
8/18/2016
9/18/2016
10/18/2016
11/18/2016
12/18/2016
1/18/2017

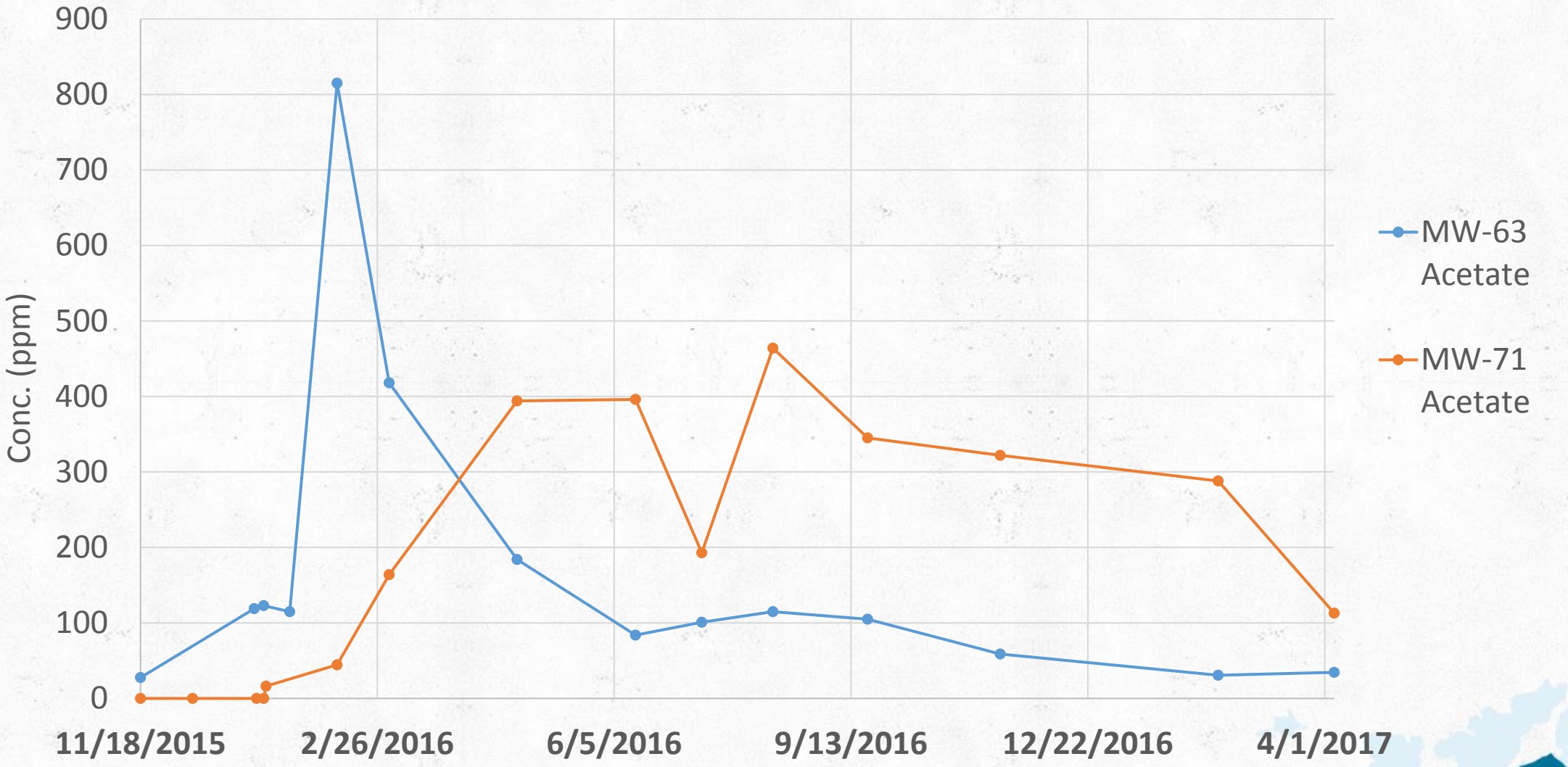

MW-71 Chloride
Conc. (ppm)
200
180
160
140
120
100
80
60
40
20
0
11/18/2015
2/26/2016
6/5/2016
9/13/2016
12/22/2016
4/1/2017


MW-63
TCE, DCE, VC Concentration, ppb
Ethylene Concentration, ppb
50,000
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
10/23/2015
12/12/2015
1/31/2016
3/21/2016
5/10/2016
6/29/2016
8/18/2016
10/7/2016
11/26/2016
1/15/2017
3/6/2017
4/25/2017
TCE
DCE
VC
Pilot Test Complete
Full Scale Start
Full Scale Complete
Ethylene

MW-63


1.00E+07
1.00E+06
1.00E+05
1.00E+04
1.00E+03
1.00E+02
1.00E+01
1.00E+00
cells/mL
DHC
TCE
BVC
VCR
DHBt
DSM
EBAC
Nov-15
Apr-16
Nov-16
Apr-17

Acetate Generation



ACTIVATED CARBON

- Simple Phase Change
- Not Bioavailable – the bugs are to big
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Thanks for Attending

- Send Questions to:

- Bob@trapandtreat.com
- (or stop by the Booth)