Assessing Vertical Microbial Transport in Bedrock Well Column

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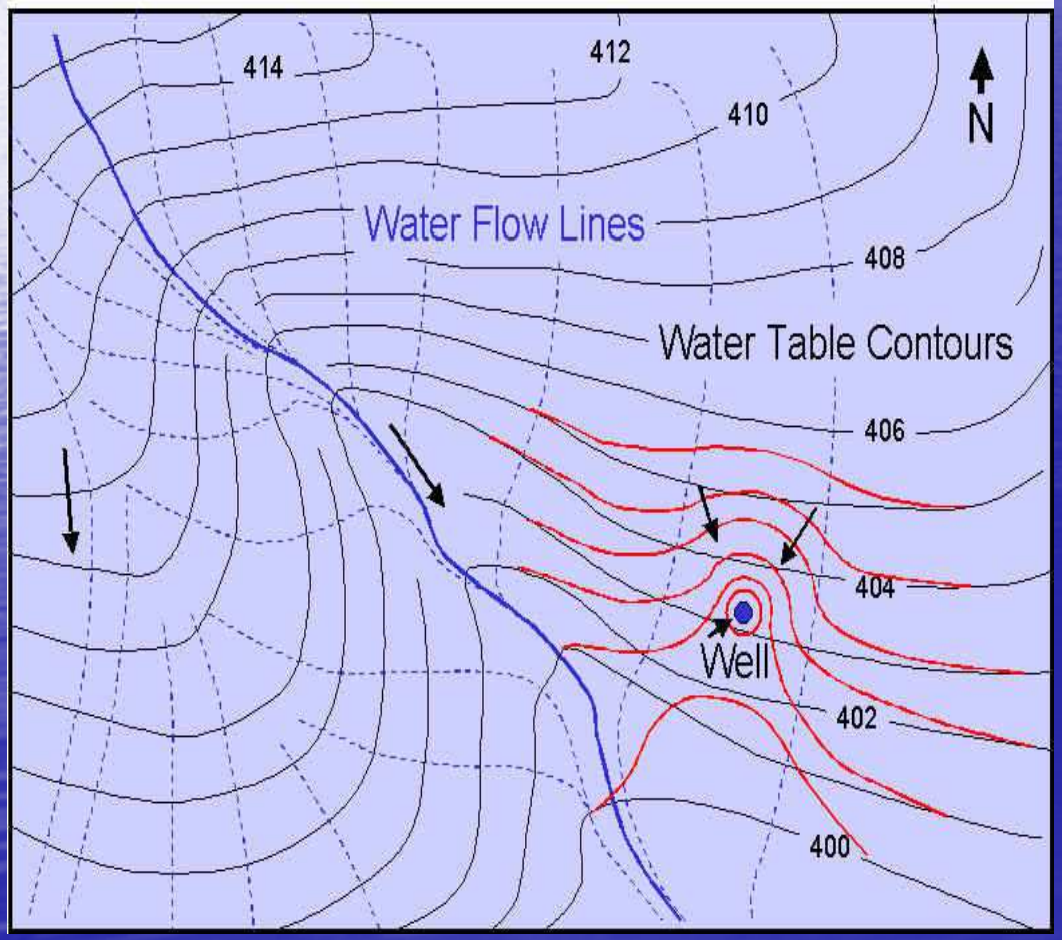
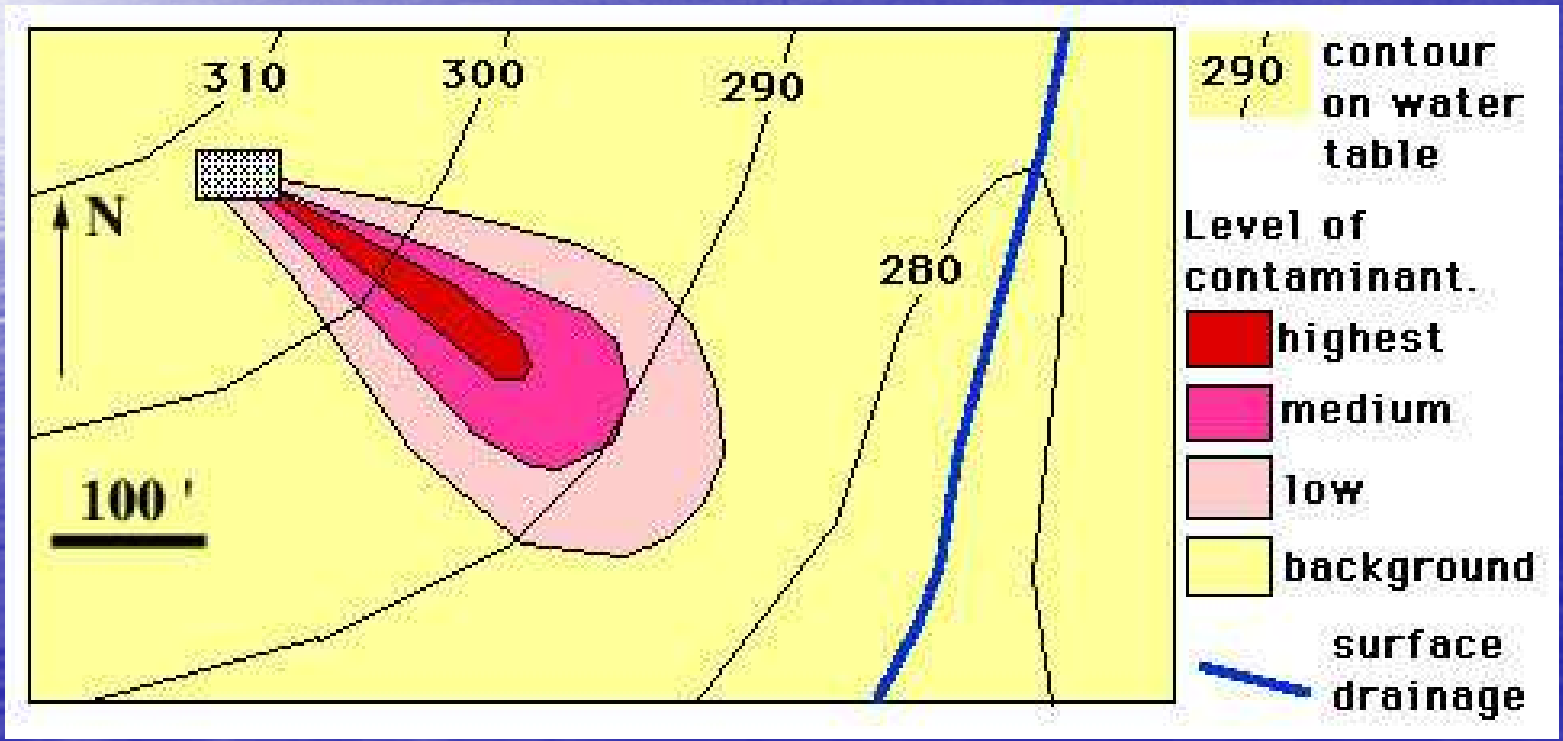
We know

- That Hydrologist Like to Draw Arrows



We know

That Chemist Like using Colors



But what do we know about microbial migration?

- Let's ask a friend.

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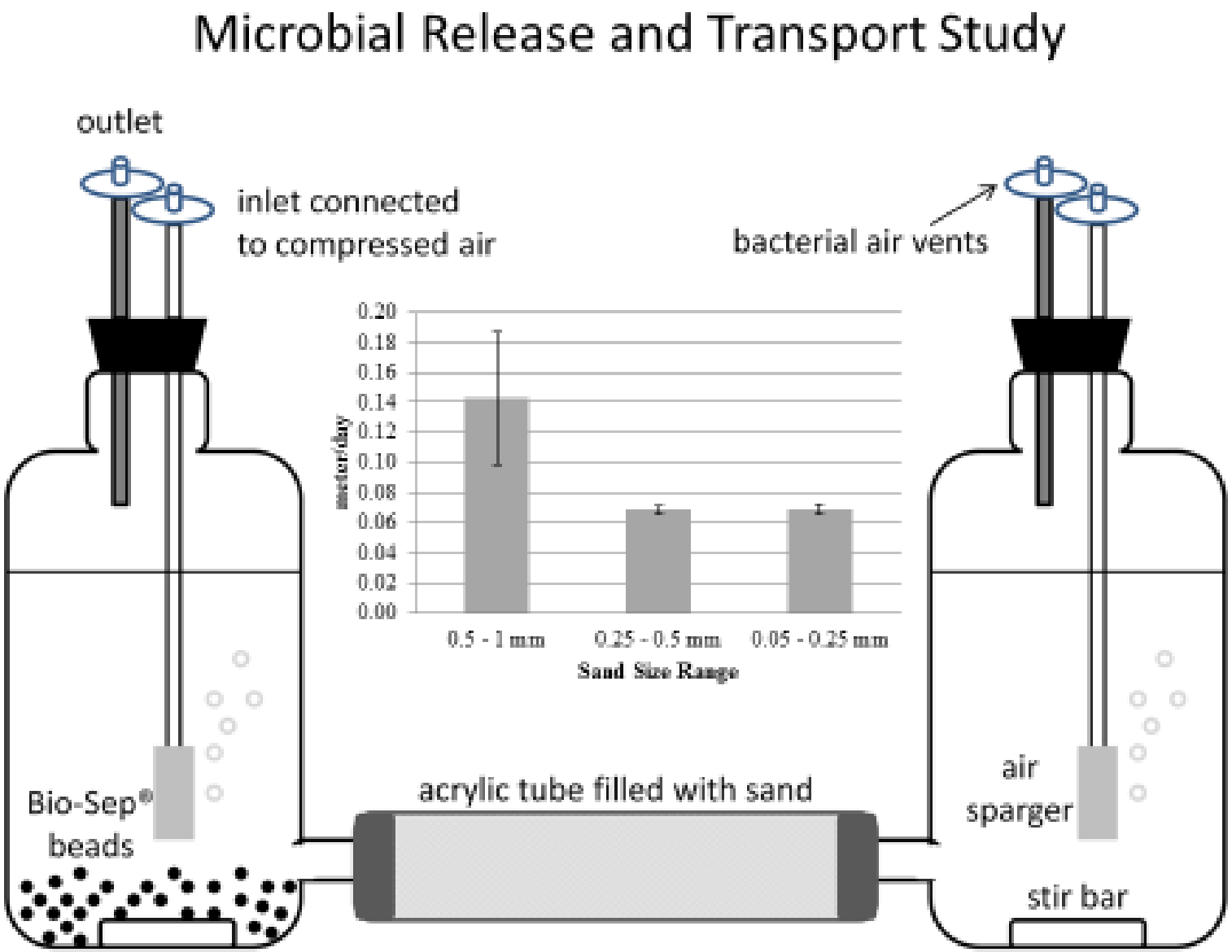
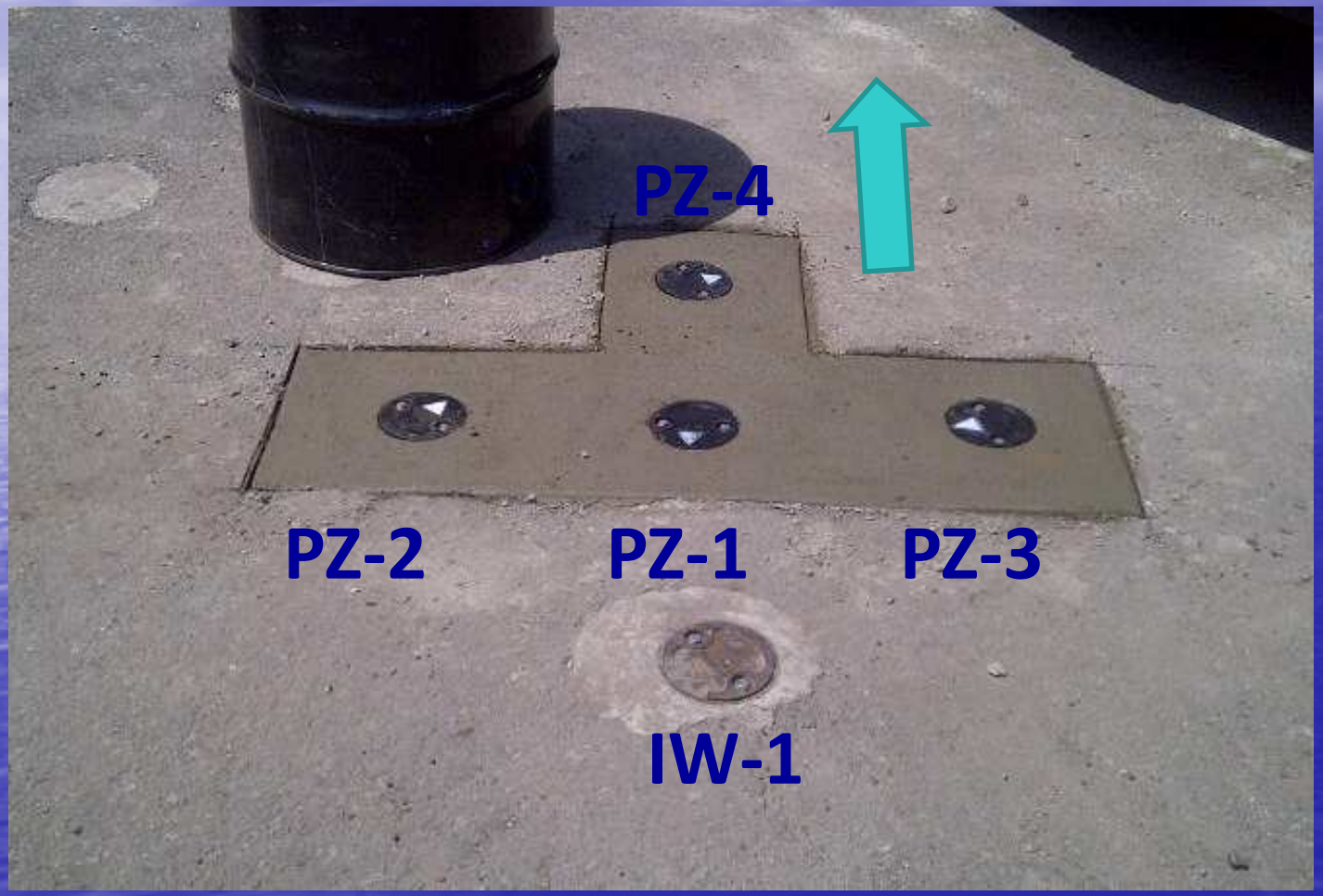
Let's ask a friend.

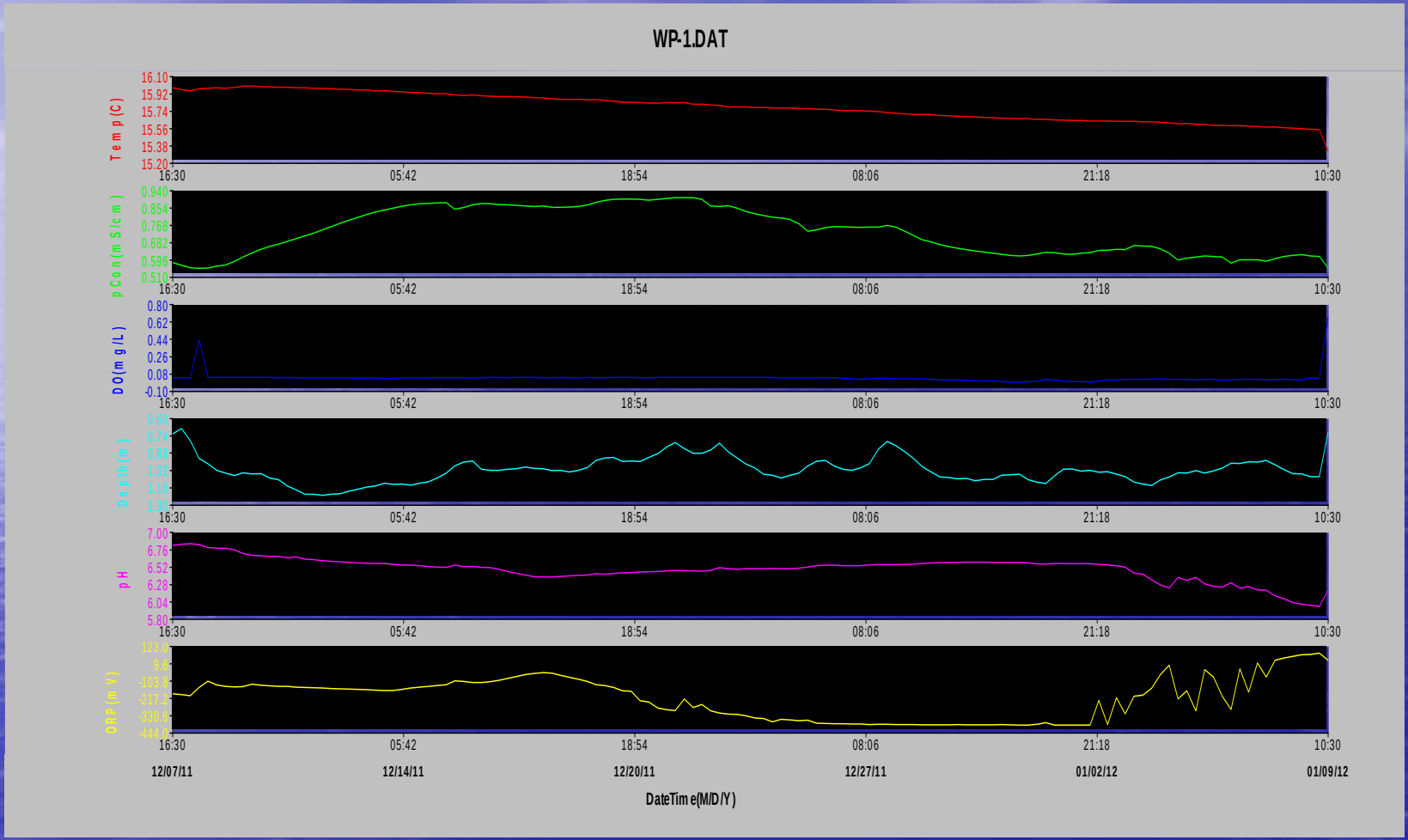
Microbial Release and Transport Study



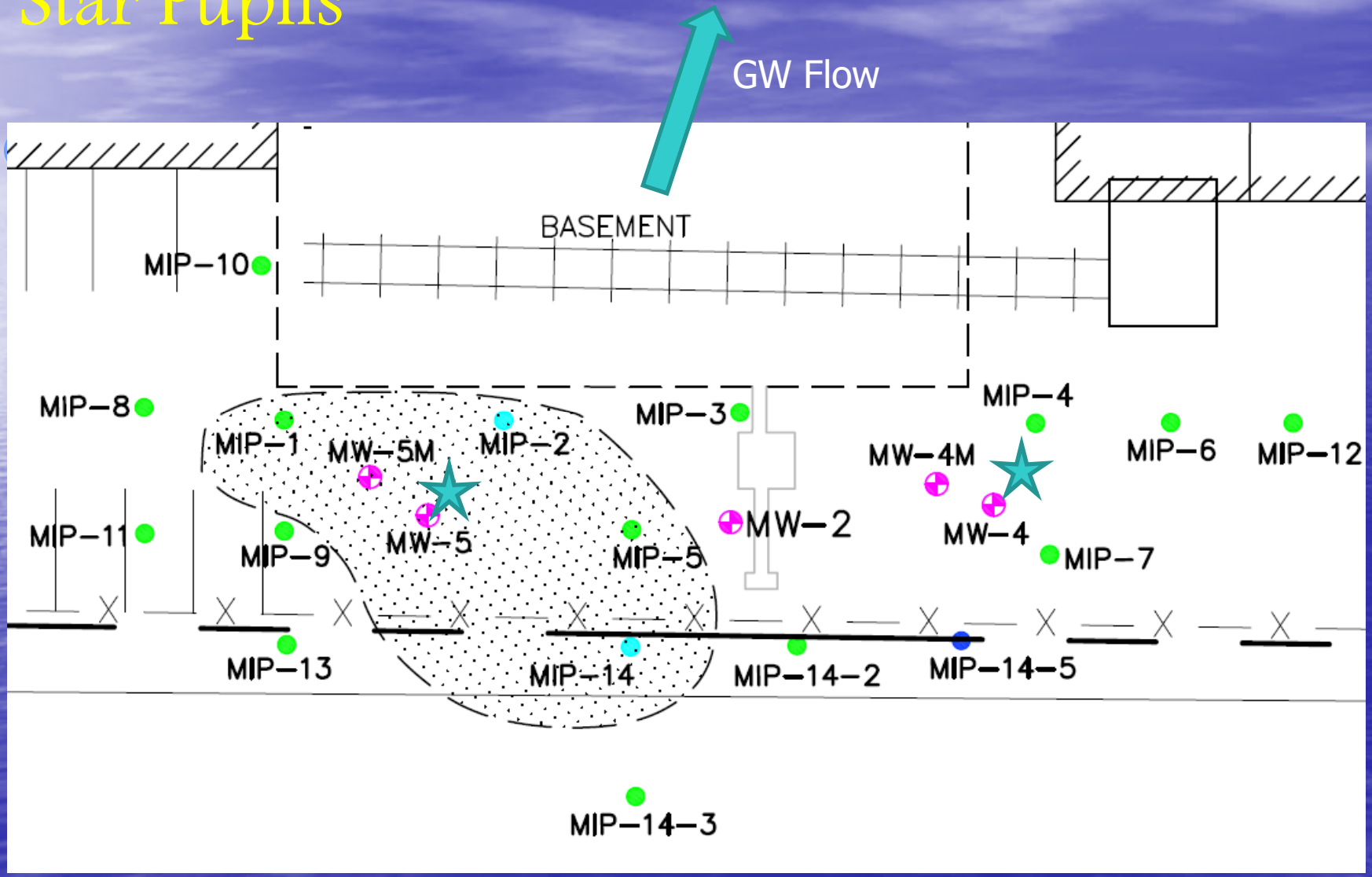
Pilot Study Results - IW-1 and Piezometers



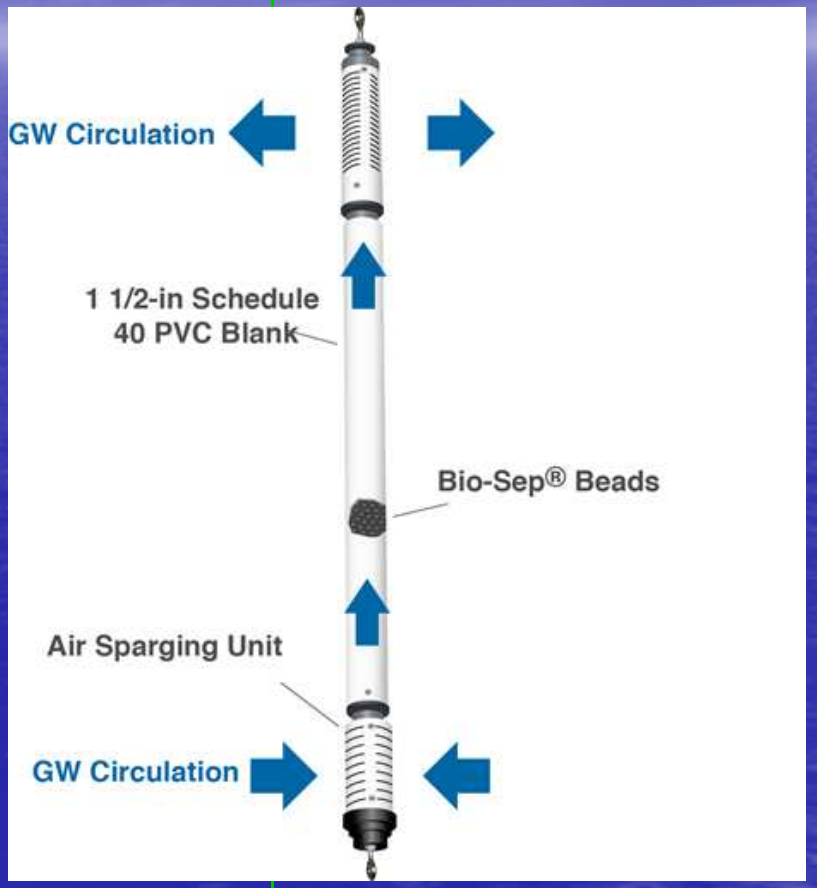
Radius of Influence?

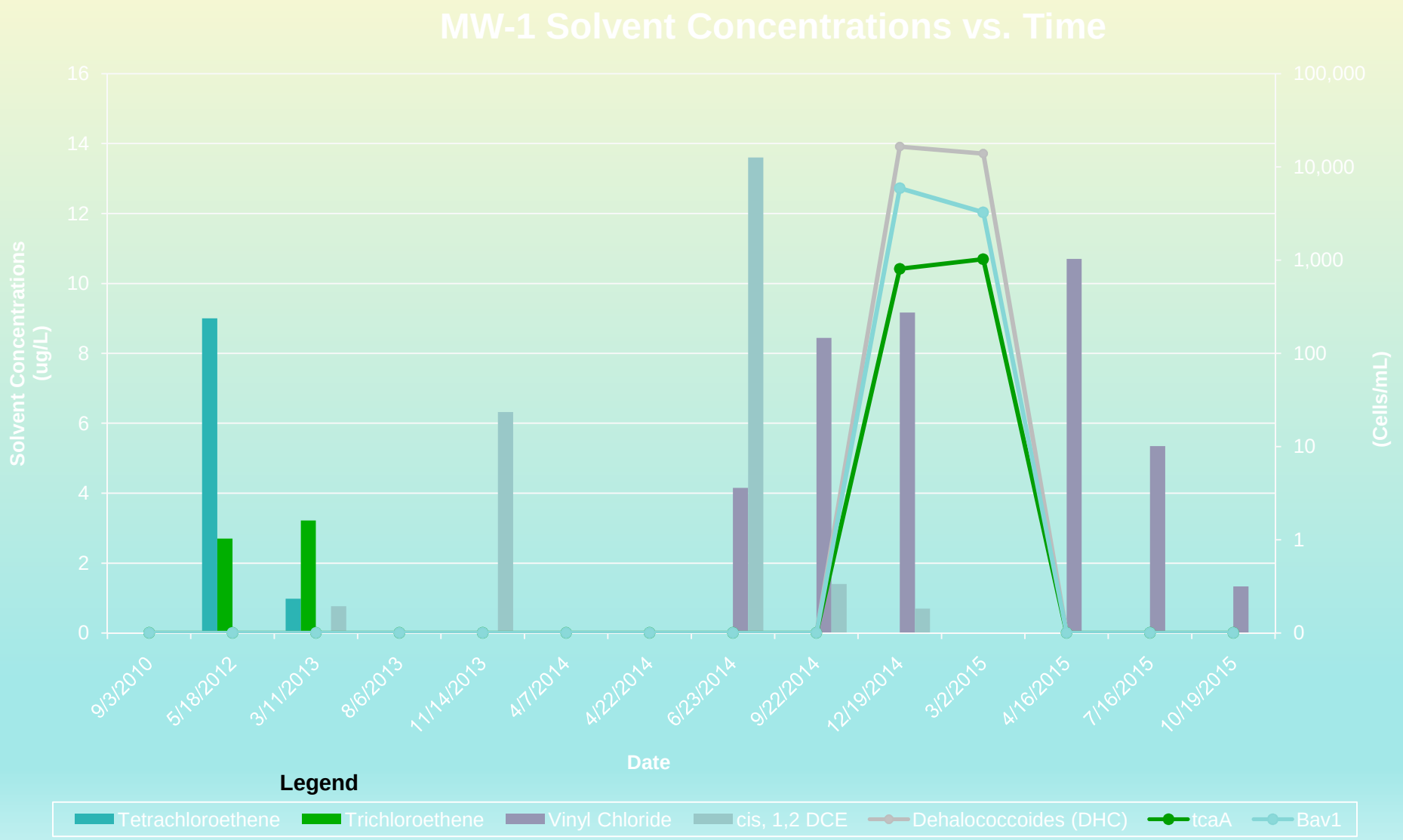


Star Pupils


GW Flow
BASEMENT
MIP-10
MIP-8
MIP-1
MW-5M
MIP-2
MIP-3
MIP-4
MW-4M
MIP-6
MIP-12
MIP-11
MIP-9
MW-5
MIP-5
MW-2
MW-4
MIP-7
MIP-13
MIP-14
MIP-14-2
MIP-14-5
MIP-14-3

Anaerobic Bioreactors, the same but different

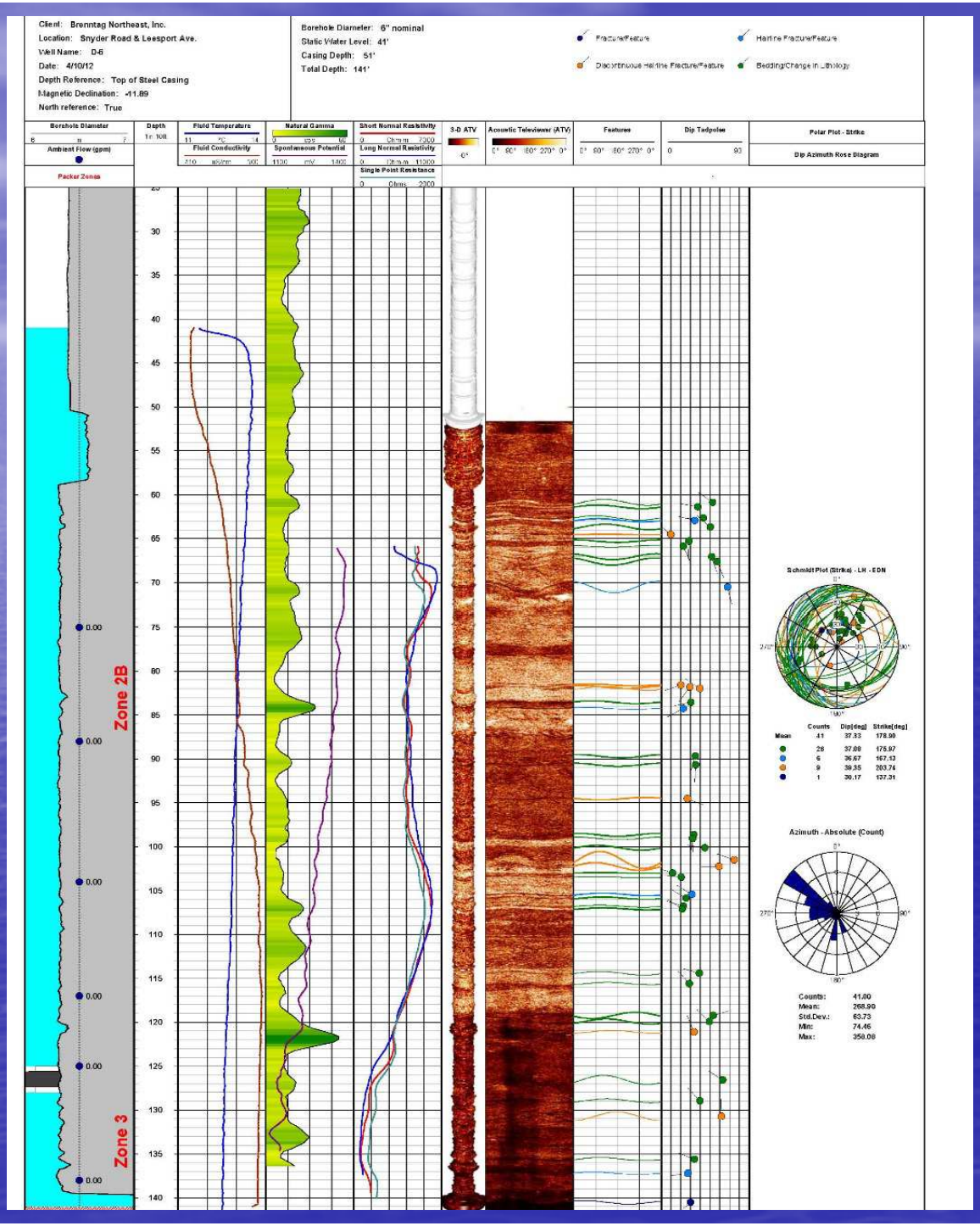



MW-1 Solvent Concentrations vs. Time
Solvent Concentrations (ug/L)
(Cells/mL)
16
14
12
10
8
6
4
2
0
100,000
10,000
1,000
100
10
1
0
9/3/2010
5/18/2012
3/11/2013
8/6/2013
11/14/2013
4/7/2014
4/22/2014
6/23/2014
9/22/2014
12/19/2014
3/2/2015
4/16/2015
7/16/2015
10/19/2015
Date
Legend
Tetrachloroethene
Trichloroethene
Vinyl Chloride
cis, 1,2 DCE
Dehalococcoides (DHC)
tcaA
Bav1

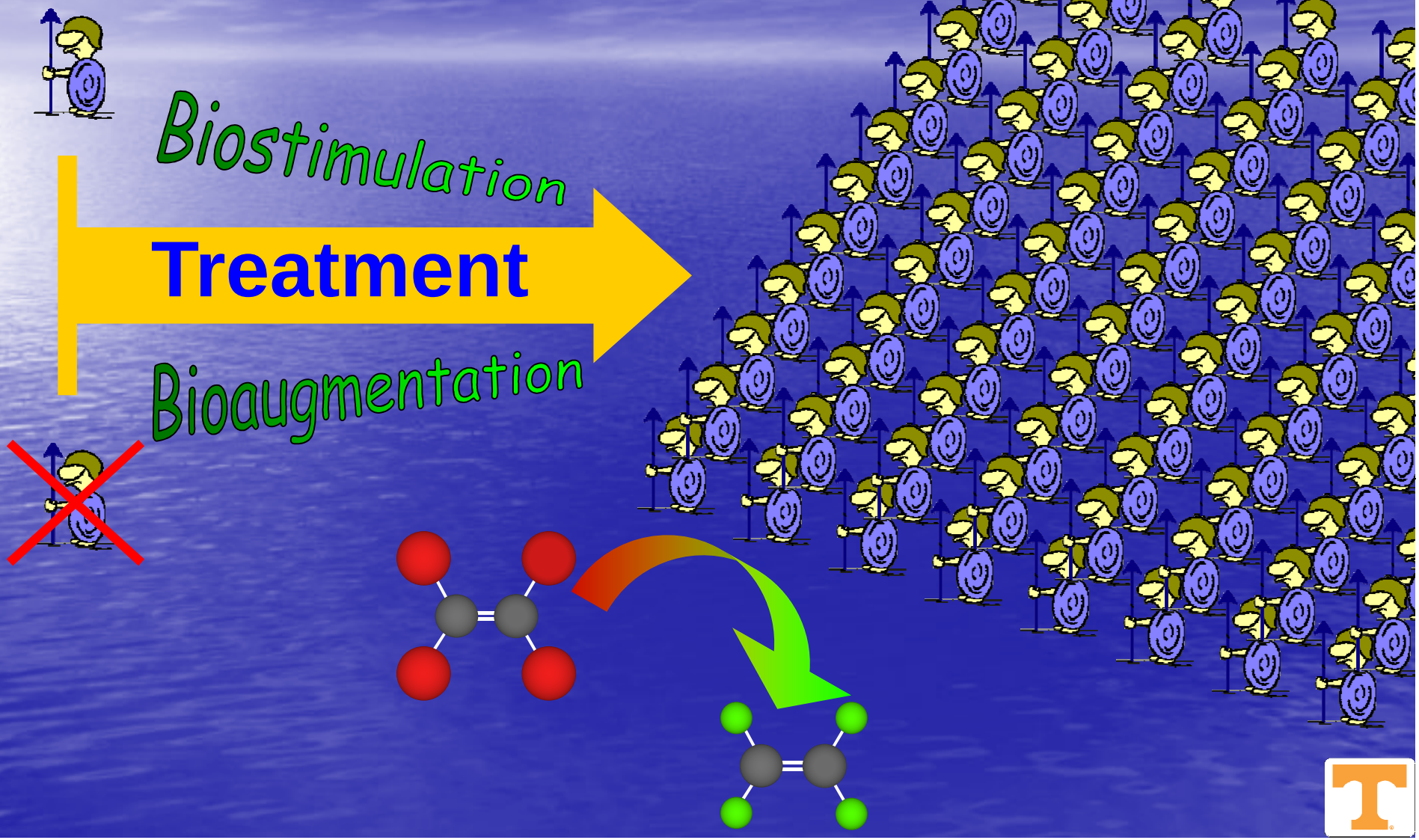
Vertical Migration Assessment

- Chlorinated Solvents
- Deep water column with multiple fractures
- Non cooperative geo-chemical conditions

Multiple Fractures



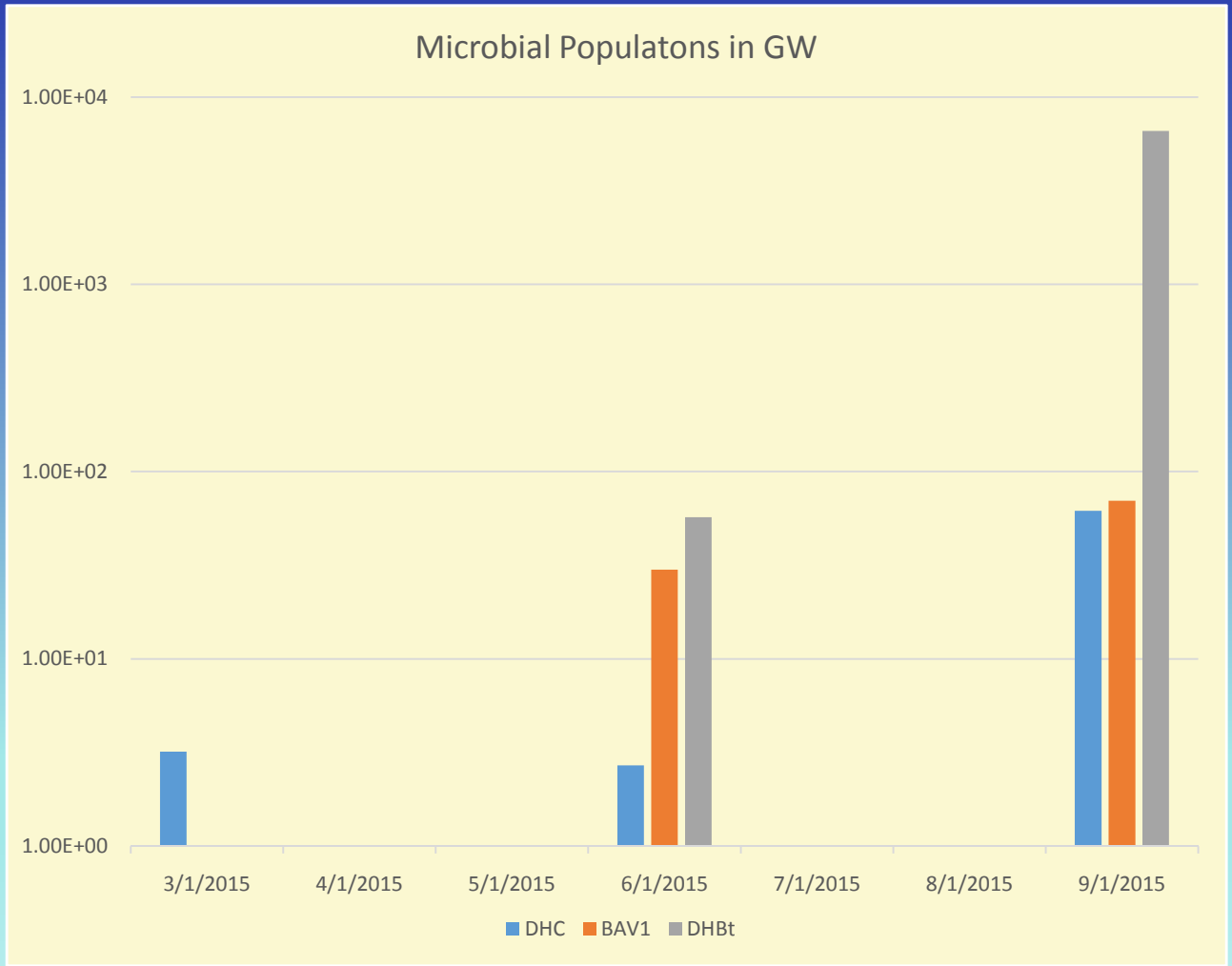
Implementation



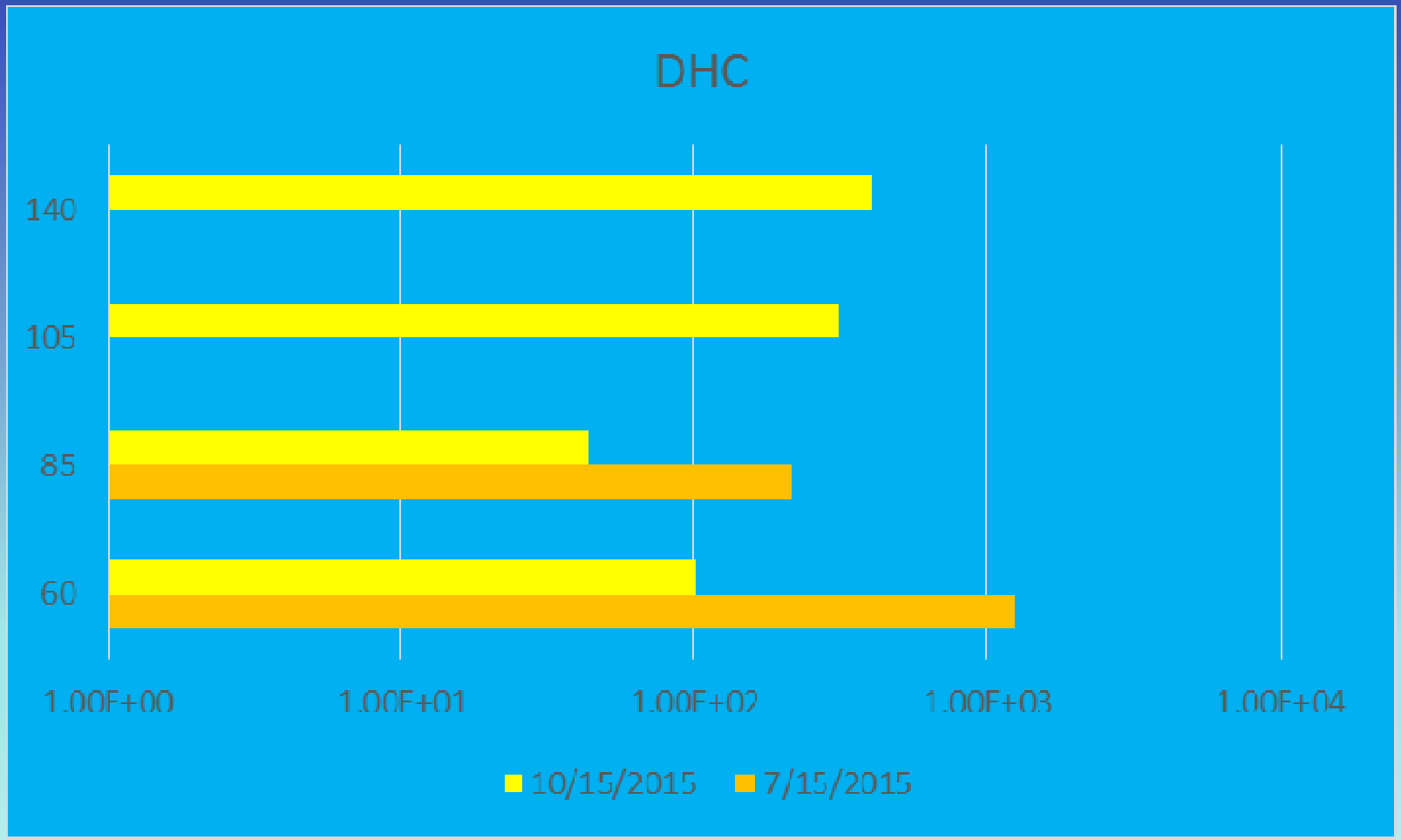
Chemical and Geo-Chemical Trends

	3/18/2015	6/22/2015	9/17/2015
PCE	28.7	18.6	1.7
TCE	1230	676	7.5
cDCE	133	23.2	61.5
VC	0	0	1.9
Ethane	0	0	0
iron	316	103	8260
SO4	51.4	46.2	19.6
Methane	0	0.34	2040

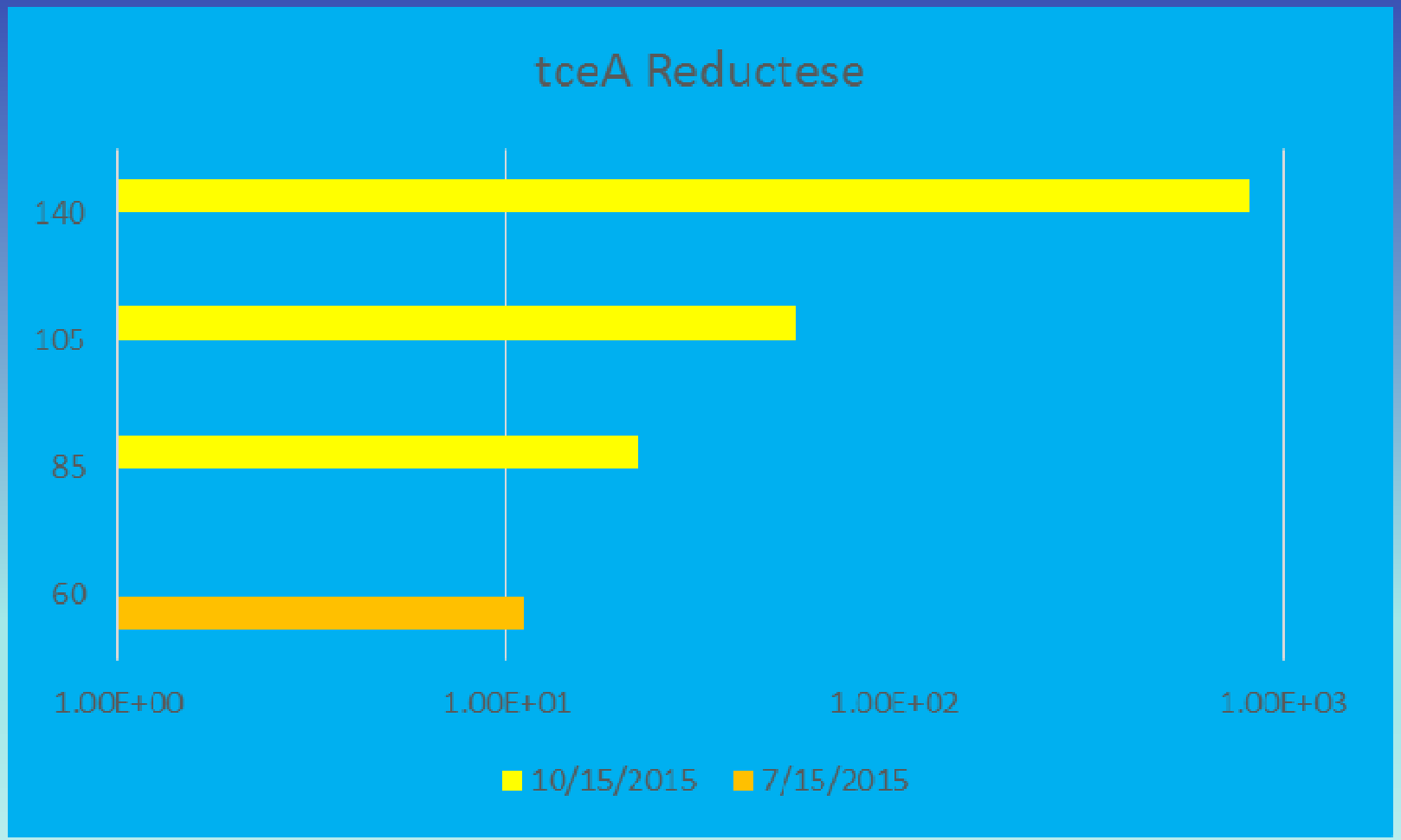
Microbial Ground Water Results



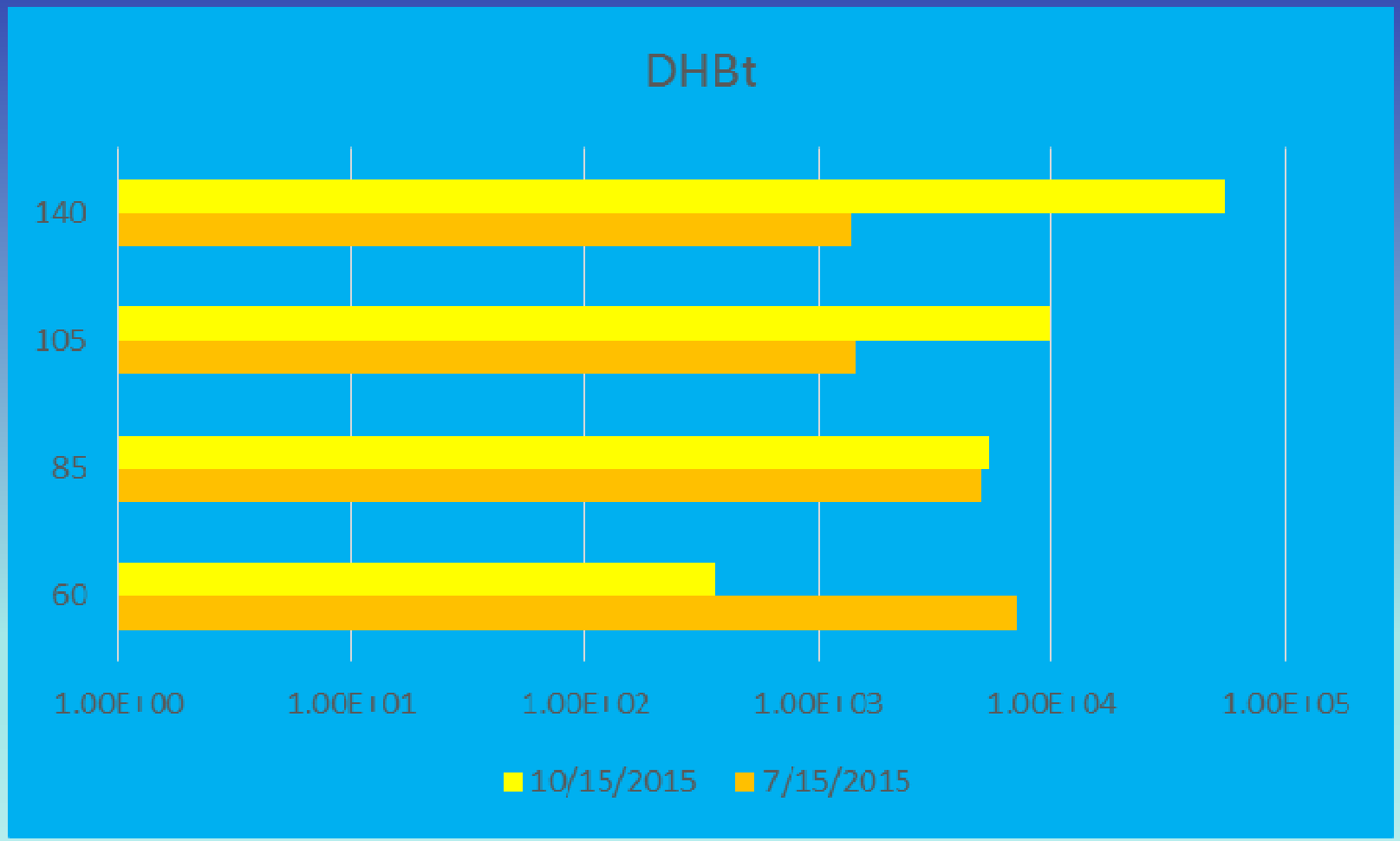
DHC vs Depth


DHC
140
105
85
60
1.00E+00
1.00E+01
1.00E+02
1.00E+03
1.00E+04
10/15/2015
7/15/2015

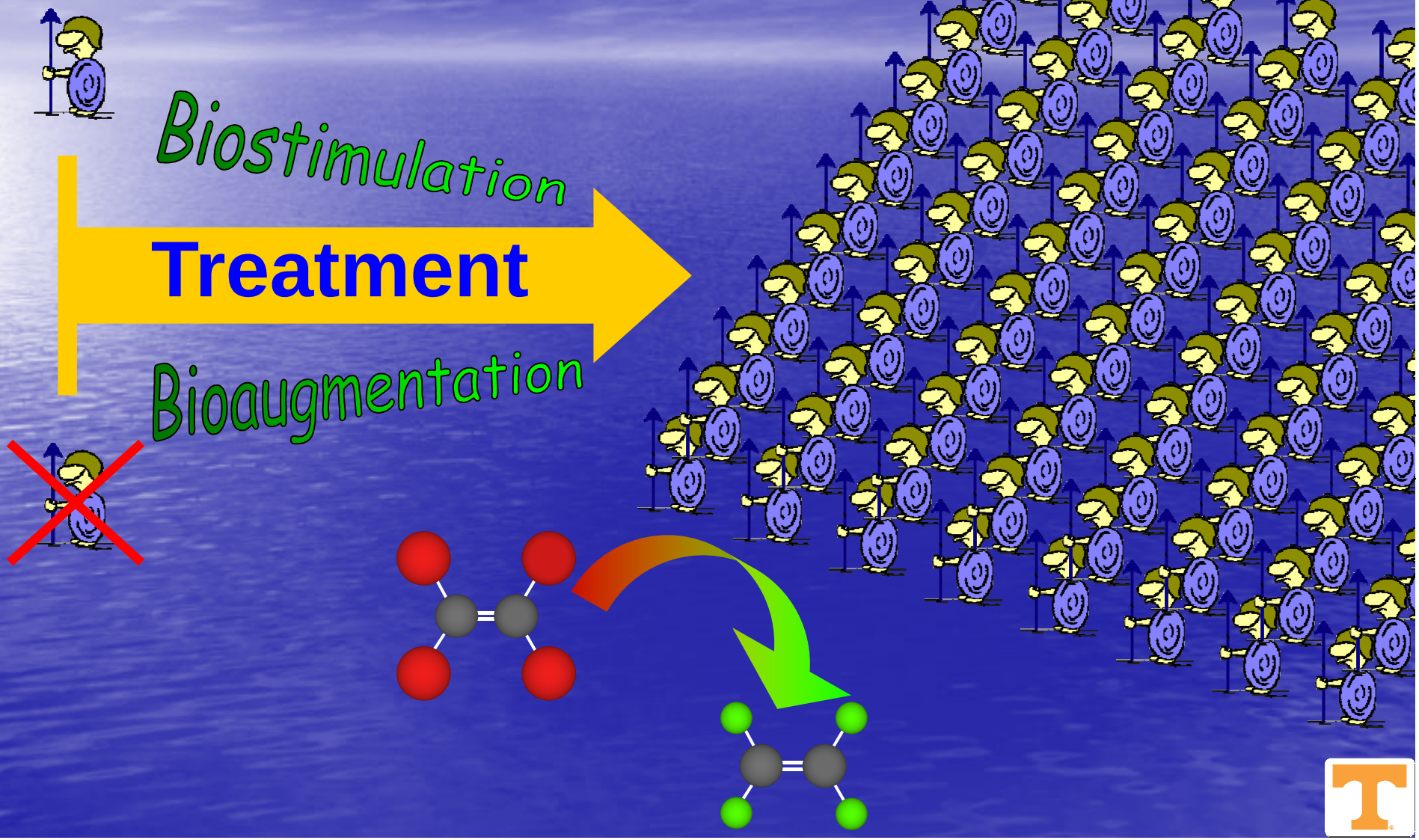
Chemical and Geo-Chemical Trends



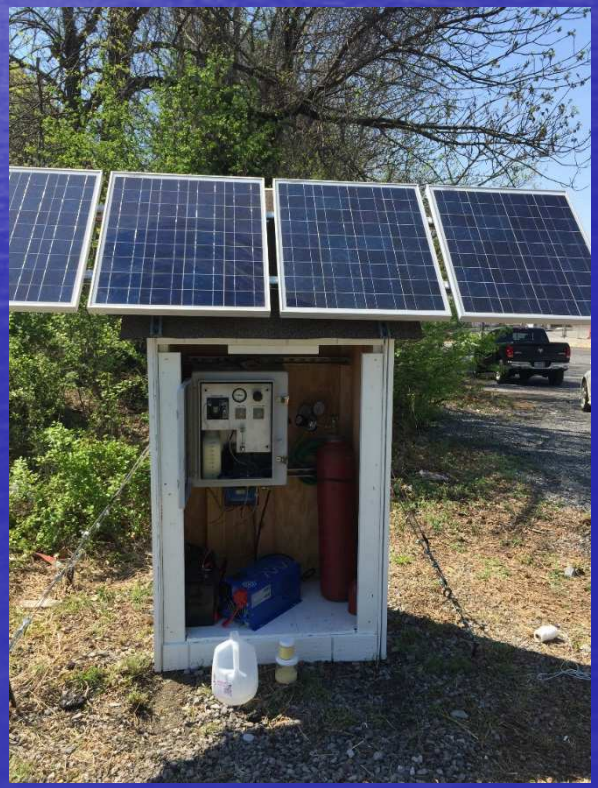
Chemical and Geo-Chemical Trends



Implementation



Donor Wars



Questions?