Clifton Associates

Memorandum

25 January 2019

Attention

Name: Greg Paliouras
Company: Sears Canada Inc.
Email: gpaliou@sears.ca

From

Name: Stephen d'Abadie, MEng PBiol
Email: stephen_dabadie@clifton.ca

PlumeStop™ Pilot Study 2
Hounsfield Heights Community
Calgary, Alberta

File CG2430.1 E31

Clifton Associates Ltd. is pleased to provide Sears Canada Inc. with the following summary of the PlumeStop™ Liquid Activated Carbon (PlumeStop™) pilot study completed in the southwestern corner of 11th Avenue and 16th Street NW in the community of Hounsfield Heights, Calgary, Alberta (Site). This pilot study represents the second application of PlumeStop™ along 11th Avenue NW. The initial pilot study was completed in March 2016 and is documented in the following report:

- *PlumeStop™ and Oxygen Release Compound Advanced, Pilot study, Hounsfield Heights, Calgary, Alberta (27 March 2017)*

A Site Location Map is provided for reference as Figure 1 of the attachments.

Background

In response to the Updated Site Management Plan (SMP) (Clifton, 2014) submitted to Alberta Environment and Parks (AEP) in 2014, Clifton contacted Regenesis Remediation Services to complete an application of PlumeStop™ along 11th Avenue NW. The initial PlumeStop™ pilot study, which was conducted in 2016, was completed in an area along 11th Avenue which contained some of the highest petroleum hydrocarbons (PHC) concentrations across the entire Site. The primary objective of the second pilot study, documented in this memorandum, was to determine if the technology could achieve PHC degradation to levels below the AEP Alberta Tier 1 Soil and Groundwater Remediation Guidelines (2019 AEP Tier 1 Guidelines). The area selected for application consisted of relatively lower PHC concentrations when compared to the wells adjacent to the initial pilot study injection locations.

Technology Description
PlumeStop™ is a colloidal activated carbon reagent. The activated carbon particles in PlumeStop™ have a diameter of 1 – 2 µm, which allows it to suspend in liquid form. Furthermore, research completed by Regenesis shows that the diameter of soil pore throats varies between 3 and 30 µm, which precludes other activated carbon particles (granular activated carbon and powdered activated carbon) from dispersing completely through the aquifer. PlumeStop™ can achieve wide spread, low pressure distribution through the soil matrix to provide a long-term barrier.

The activated carbon in PlumeStop™ is suspended in a colloidal biomatrix. The biomatrix is favorable for microbial colonization and growth. The contaminants of potential concern (COPCs) sorb to the activated carbon, and microbes are drawn to the source of nutrition provided by both the COPCs and the biomatrix. Digestion of COPCs by microbial activity reopens sorption sites on the activated carbon.

Scope of Work
In June 2018, Regenesis provided Clifton with a proposal to perform a second pilot study along the western extent of 11th Avenue NW. The technical basis of the pilot study is detailed and provided in the Regenesis proposal attached in Appendix A of this document. Upon approval to proceed with the pilot study, Regenesis and their preferred contractor, In-Situ Remediation Services Ltd. (ISRL) were retained by Clifton to perform the proposed scope of work.

In September 2018, representatives from Clifton and ISRL performed a 3-day injection program of the activated carbon barrier. The barrier was injected approximately 1.83 m up-gradient from performance monitoring well BH1929. A total of three injection points, spaced approximately 2.4 m apart, were used to inject a total of 2,173 kg of PlumeStop™ along with 32,760 L of water. The injections were made between a depth range of approximately 7.6 m to 14.9 m below ground surface. This injection zone coincides with the saturated portion of the screened interval of performance monitoring well BH1929.

The injection locations used during this pilot study are depicted in Figure 2 of the attachments.

A summary report, documenting the details of the injection program and prepared by ISRL, is provided in Appendix B of this document.

Performance monitoring of the activated barrier was conducted using monitoring well BH1929. At the recommendation of Regenesis, Clifton performed performance sampling of monitoring well BH1929 bi-weekly for the first month, followed by monthly sampling into December 2018. The next sampling event of this well will occur in March 2019. It is also important to note that a sampling event was conducted approximately 3 weeks prior to the completion of the injections to establish baseline concentrations of the PHCs.

Performance Monitoring Results
To measure the performance of the activated carbon barrier, the PHC parameters, benzene and 1,2-DCA were used as the primary markers for contaminant reduction based on their prevalence throughout the Site.

The results obtained during the performance monitoring program, following the injection, were used to compare to the results obtained prior to the installation of the activated carbon barrier.

Monitoring well BH1929, contained a concentration of 0.096 mg/L and 0.072 mg/L of benzene and 1,2-DCA, respectively, in the sampling event carried out immediately before the injection of the activated carbon barrier. The benzene concentration obtained during this sampling event was also the highest it had historically been in all sampling events completed prior to the pilot study. The concentration of 1,2-DCA had previously been as high as 0.099 mg/L. Table 1 of the attachments documents the sampling results for both benzene and 1,2-DCA both prior to, and post, application of the barrier. Two graphs, visually depicting the concentrations of benzene and 1,2- DCA, both prior to and post application of the barrier, have been attached to this document.

The most recent sampling results, obtained on 07 December 2018, contained a concentration of 0.052 mg/L and 0.034 mg/L of benzene and 1,2-DCA, respectively, corresponding to a 46% and 54% reduction when compared to the pre-injection sampling results.

The two sampling events carried out immediately after the injection both resulted in concentrations of benzene and 1,2-DCA at levels below the 2019 AEP Tier 1 Guidelines, however, these concentrations rebound in the subsequent sampling events (08 November 2018 and 07 December 2018). The observed rebound in concentrations is discussed in greater detail in the subsequent section.

Discussion

As stated within the introduction of this document, the primary objective of this second pilot study was to determine if the activated carbon barrier could achieve the 2019 AEP Tier 1 Guidelines. Based on the results obtained to date, this has not yet been achieved. However, the results do show that the barrier can achieve a degree of reduction of the total mass of the PHCs that flow through it. Whether or not the 2019 AEP Tier 1 Guidelines are achieved through the use of this barrier will be determined through subsequent sampling events.

As a result, Clifton would recommend the application of the barrier along the entire length of 11th Avenue NW as a method of plume expansion control with the potential to achieve the 2019 AEP Tier 1 Guidelines. The barrier has shown through both pilot studies the ability to reduce total PHC mass, which in turn would help to control the expansion of the plume to the south of the barrier.

It is also important to note that the second pilot study was not completed with the addition of an oxygen release amendment as was the case in the initial pilot study. This recommendation was based off the design provided by Regenesis. The rebound which was observed between the two sampling events immediately following the application of the barrier and the two later sampling events was most likely the result of overtopping the sorption capacity of the barrier. This is critical data which can be used in the development of a full-scale application which may also support the need for an oxygen amendment to promote more rapid degradation of the sorbed PHCs or additional activated carbon to provide greater sorption capacity.

Closure

We trust this document contains the information Sears Canada was seeking with respect to second PlumeStop™ pilot study completed within the Hounsfield Heights Community. Should you have any questions, comments or concerns, please contact Stephen d'Abadie at 403-701-8226 or Stephen_dabadie@clifton.ca

Yours truly,
Clifton Associates Ltd.

PROFESSIONAL GEOLOGIST ALBERTA
DAVID G. PRITCHARD

Stephen d'Abadie, PBiol MEng
Project Manager

David G. Pritchard, PGeol
Director, Environmental Services

Attachments

Figure 1 – Site Location Plan
Figure 2 – Injection Locations
Table 1 – Summary of Groundwater Laboratory Analyses
Graph 1 – Benzene vs. Time
Graph 2 – 1,2 DCA vs. Time

Appendix A

Regenesis – RE: PlumeStop Pilot Test Update and Work Scope, Sears Hounsfield Heights, Calgary, Alberta

Appendix B

In-Situ Remediation Services Ltd – Injection Summary

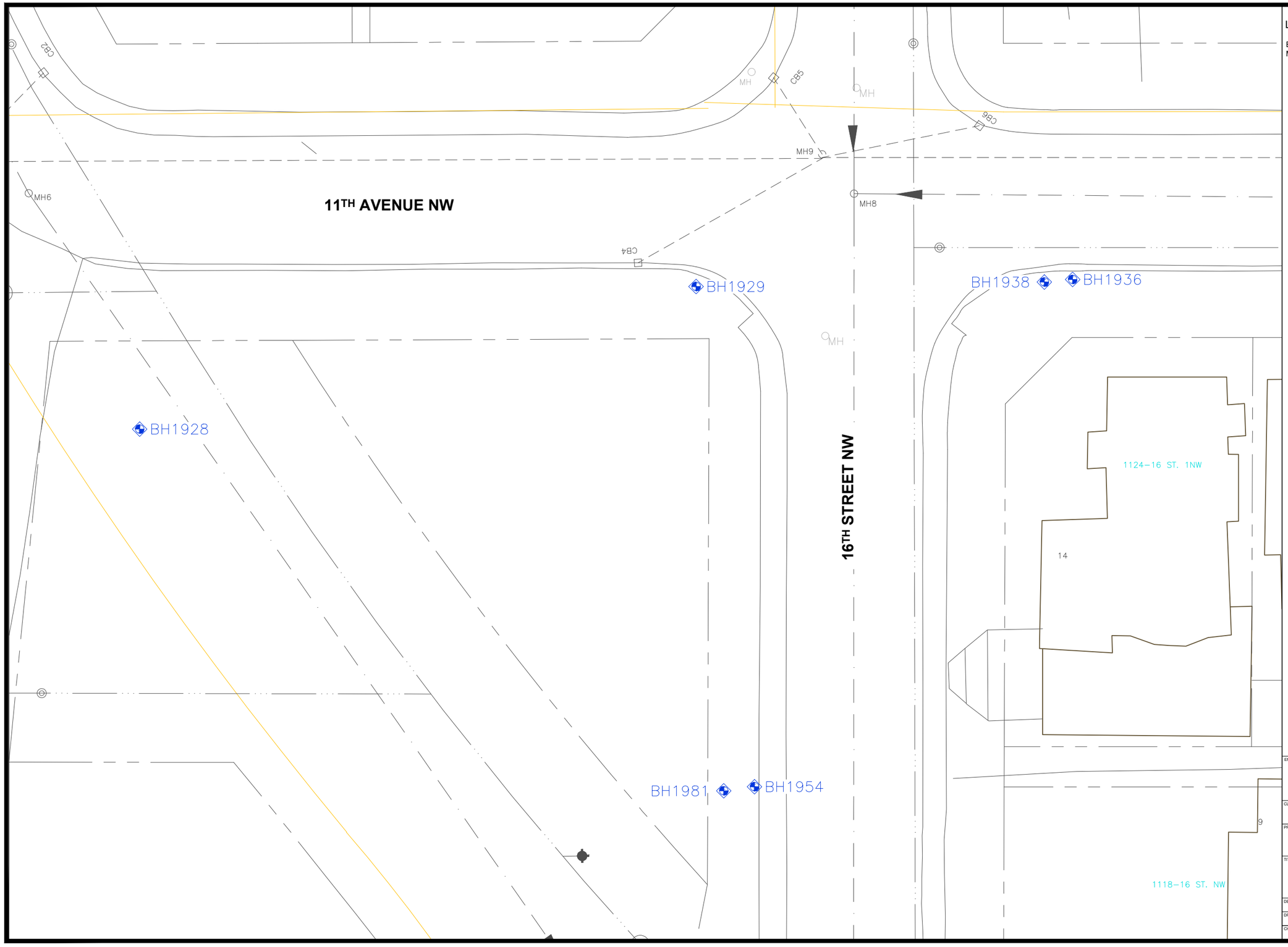
Attachments

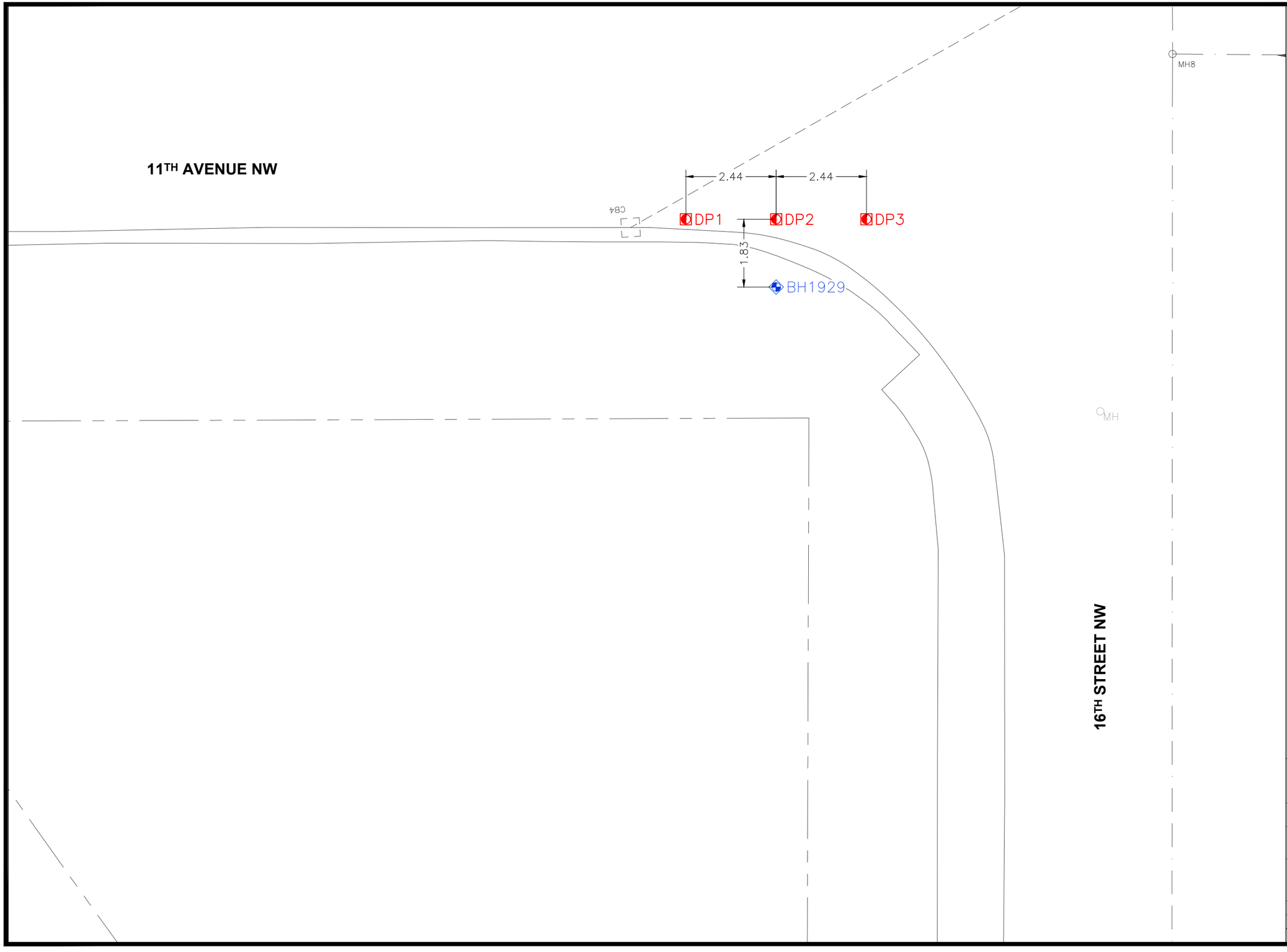
Clifton Associates

Calgary Office
2222 30th Avenue NE
Calgary, AB T2E 7K9

T (403) 263 2556
F (403) 234 9033

calgary@clifton.ca
www.clifton.ca


LEGEND:
EXISTING GROUNDWATER MONITORING WELL
11TH AVENUE NW
16TH STREET NW
MH6
MH
MH
MH9
MH8
MH
CB2
CB5
CB6
CB4
BH1928
BH1929
BH1938
BH1936
BH1981
BH1954
1124–16 ST. 1NW
1118–16 ST. NW
14
9
0
5
10m
SCALE 1:250
PLOT SIZE 11x17
ENGINEER
Clifton Associates
CLIENT
SEARS
PROJECT
PLUMESTOP PILOT STUDY 2
HOUNSFIELD HEIGHTS - BRIAR HILL COMMUNITY
CALGARY, ALBERTA
TITLE
SITE LOCATION PLAN
DESIGNED
DRAWN RD
CHECKED SD
SCALE 1:250
PROJECT NO. CG2430.1 E31
FILE NO. CG2430.1E31-02
DATE 2019-01-24
FIG. 1
W:\CG2430.1 SEARS\CURRENT\E31\CG2430.1E31-02.dwg, 01/24/2019 9:59:52 AM



LEGEND:

EXISTING GROUNDWATER MONITORING WELL

DIRECTION POINT INJECTION POINT

0 1 2 3 4 5 m

SCALE 1:100 PLOT SIZE 11x17

ENGINEER

Clifton Associates

CLIENT

SEARS

PROJECT

PLUMESTOP PILOT STUDY 2
HOUNSFIELD HEIGHTS - BRIAR HILL COMMUNITY
CALGARY, ALBERTA

TITLE

INJECTION LOCATIONS

DESIGNED	SCALE 1:100	DATE 2019-01-24
DRAWN RD	PROJECT NO. CG2430.1 E31	FIG. 2
CHECKED SD	FILE NO. CG2430.1E31-03	

M:\CG2430.1 SEARS\GARDEN\E31\CG2430.1E31-03.dwg, 01/24/2019 9:09:19 AM

Table 1 - Summary of Groundwater Laboratory Analyses

Sample ID	Land Use[1]	Sample Date	Benzene	1,2-Dichloroethane
BH1929	R	4-May-15	**0.920**	**0.093**
	R	18-Jun-15	**0.681**	**0.075**
	R	3-Sep-15	**0.770**	**0.083**
	R	24-Nov-15	**0.664**	**0.090**
	R	13-May-16	**0.47**	**0.099**
	R	9-Nov-16	**0.31**	**0.084**
	R	15-May-17	**0.22**	**0.086**
	R	28-Mar-18	**0.10**	**0.048**
	R	20-Aug-18	**0.096**	**0.072**
	R	28-Sep-18	0.0002	0.00025
	R	12-Oct-18	0.0002	0.00082
	R	8-Nov-18	**0.013**	**0.021**
	R	7-Dec-18	**0.052**	**0.034**
2019 AEP Guideline			0.005	0.005

Notes:

1 Land Use abbreviations: C=Commercial; R=Residential; I=Industrial; N=Natural.

2 AEP 2019 Tier 1 Guidelines for coarse-grained soil

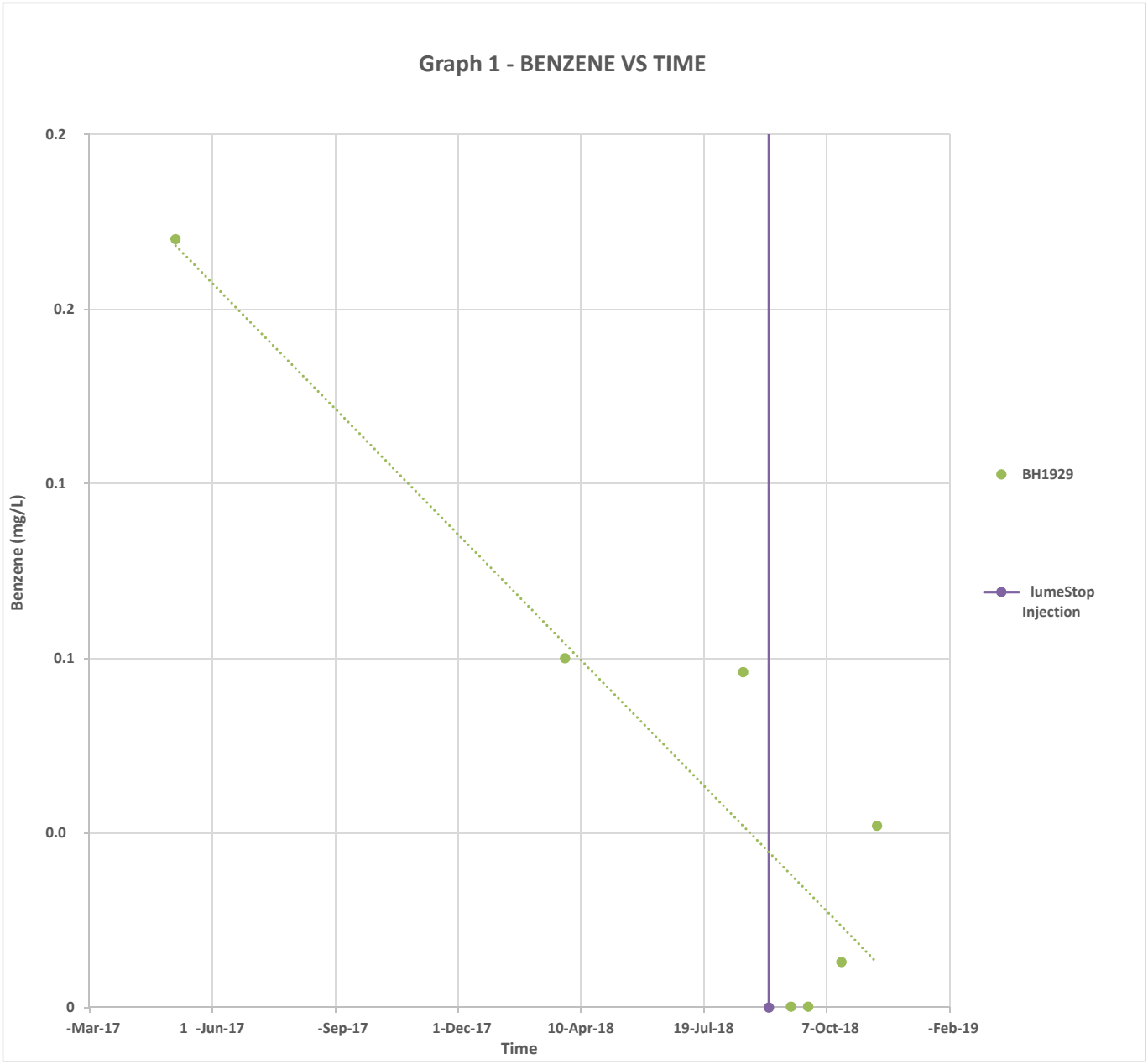
28-Sep-18 Post pilot study sampling event

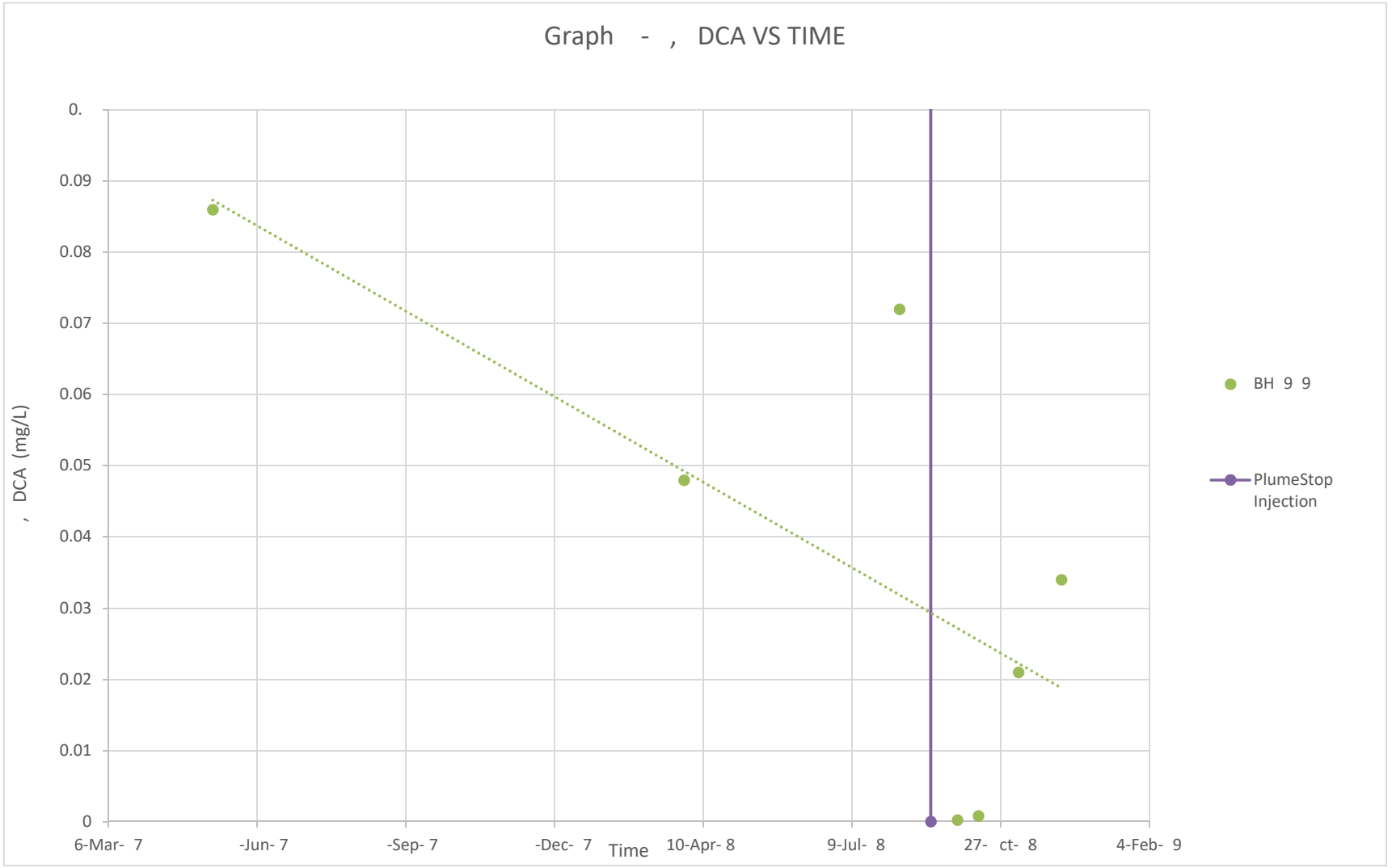
Bold Indicates that the concentration did not meet the applicable guideline.

All results in mg/L unless otherwise noted.

Only compounds with detectable concentrations in at least one sample are presented.

Testing was conducted by Maxxam Analytics, Calgary, Alberta in 2016 - 2018 and by AGAT Laboratories, Calgary, Alberta in 2015.


Graph 1 - BENZENE VS TIME
0.2
0.2
0.1
0.1
0.0
0
Benzene (mg/L)
-Mar-17
1 -Jun-17
-Sep-17
1-Dec-17
10-Apr-18
19-Jul-18
7-Oct-18
-Feb-19
Time
BH1929
lumeStop Injection


Graph - , DCA VS TIME
0.
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
, DCA (mg/L)
6-Mar- 7
-Jun- 7
-Sep- 7
-Dec- 7
10-Apr- 8
9-Jul- 8
27- ct- 8
4-Feb- 9
Time
BH 9 9
PlumeStop Injection

Appendix A

Clifton Associates

Calgary Office
2222 30th Avenue NE
Calgary, AB T2E 7K9

T (403) 263 2556
F (403) 234 9033

calgary@clifton.ca
www.clifton.ca

REGENESIS
Technology-Based Solutions for the Environment

June 18, 2018

To: Ashley Cedzo/Todd Herrington

From: Craig Sandefur VP|Technical Services

RE: PlumeStop Pilot Test Update and Work Scope, Sears Hounsfield Heights Calgary Alberta, CAN

Ashley,

To follow up on our recent discussions I have provided a general work scope for performing a second pilot test of PlumeStop at the Sears Project Plume. This 2nd Pilot Test is the result of the slow progress pace of the prior Pilot Test. Although there are indications of that this Pilot Test has started a turn to the good Regenesis is prepared to perform a 2nd test at the Sears site.

Pilot Test General Work Scope

It is our understanding that Clifton has selected Monitoring Well MW1929 as the performance monitoring well. This well is completed with approximately 30 feet of screen of which 24 feet is presently saturated. This well is completed across 4 saturated sand units and 3 laterally continuous clay/silt units See the figure below for details of this wells completion and associated lithologic variables.

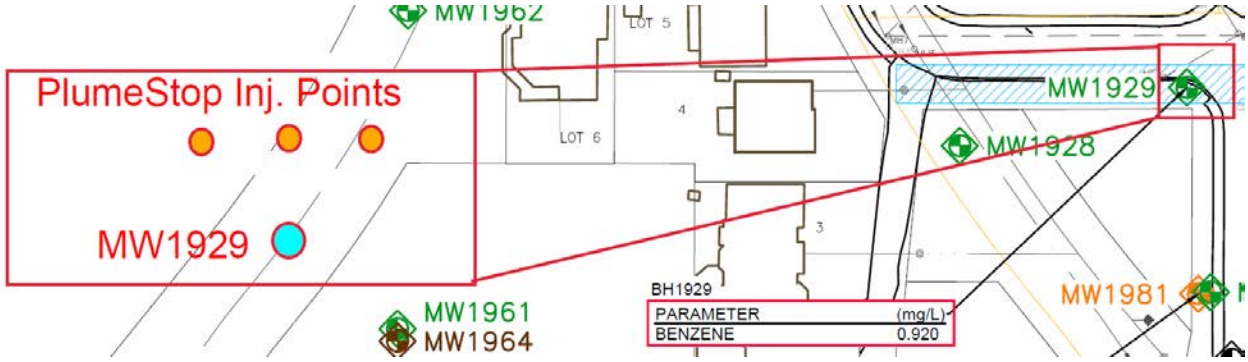
From the data provided we have assumed that the only COCs present in this well are benzene and DCA so we have designed the pilot test on the concentrations of only these contaminants. Based on the vertical profile of GW in this well it appears that concentrations present are relatively homogenously distributed within the 2-3 sand units present across this well's saturated zone. This isn't unexpected given this locations distance from the source area. Based on the saturated interval in this well (24 feet) and the lithologic variables present it appears that application of PlumeStop will be a significant contribution to the overall performance of the pilot test as defined by this performance well. These issues will be discussed later in this memo/proposal.

Pilot Test Array

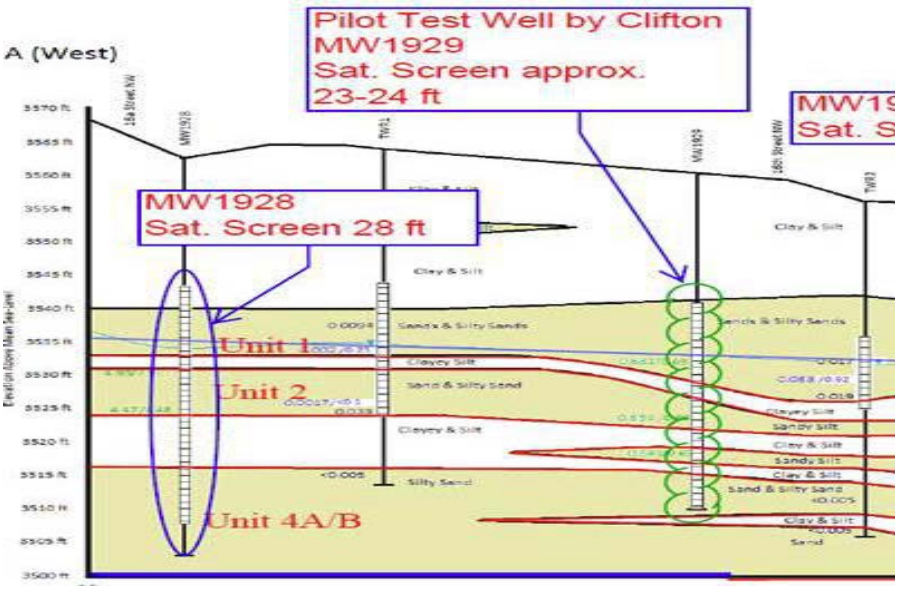
The area plume selected by Clifton for implementation of the second pilot test of PlumeStop as a reactive barrier is geographically located in the mid-plume section of a large dissolved phase plume that extends over several city blocks. The PlumeStop pilot test will be approximately 25 feet wide (perpendicular to groundwater flow) and is oriented near the western cross gradient edge of the plume. Based on the previous pilot test the Design Verification results and previous assessment work Regenesis had identified 4 laterally continuous sandy zones spanning a vertical thickness of approximately 11 meters (33 ft.) in this section of the plume. These sandy units are vertically positioned in between continuous fine grain units. One of these fine-grained units pinch out in the western section of the barrier. Thus, the Western most section of the reactive barrier has 4 sandy Units labelled Units 1-4A/B

and the Central and Eastern Sections of the barrier have 5 units labelled Units 1-3 and Units 4A and 4B. See the Barrier Location Map and X-Section (below) for details.

Localized View of Pilot Test Area with Pilot Test Array Configuration



Cross-Section Oriented Perpendicular to GW Flow Direction in the Area of the Pilot Test



It is our understanding that Clifton wishes Regenesis to perform this work using Well MW1929 as the downgradient performance well. The Pilot test will consist of the following elements:

- Three direct push injection (DPI) points oriented approximately 6 feet directly upgradient of performance well MW1929
  - These 3 DPI points are to be spaced at 8 ft. center spacing perpendicular to GW flow direction
  - Each Point to receive a PlumeStop solution consisting of
    - 1,600 lbs. of PlumeStop (192 gals)
    - 2,877 gallons of Water
    - 128 gallons/vert. ft.

    - Each DPI will span a vertical thickness of approximately 24 ft. (25-49 ft. bgs.)
- Total Quantities of PlumeStop and Water for this Pilot Test
    - 4,800 lbs. of PlumeStop
    - 8,631 gals mix water
    - 9,206 gals Total Volume

Technical Note: Based on the estimated mass flux PlumeStop overall pilot test performance will more likely be the result of application/ distribution of PlumeStop within the TTZ rather than the material mass delivered. The length of the Target Treatment Zone (TTZ) and stratigraphy present within the TTZ create application/distribution challenges. Due consideration of tooling and application methods should be considered and planned for based on the previous DVT and Pilot Test application.

Of significant technical importance is the flux rate/GW velocity present in this section of the aquifer. Documentation of Localized GW flow direction and gradient (GW velocity) for the area of MW1929 is valuable and necessary to properly position the PlumeStop injection points at an appropriate distance upgradient of the performance monitoring well. Based on the slower than anticipated GW velocity in the first Pilot Test it is our opinion that the injection points should be placed 6 feet directly upgradient of MW1929. This is based on the assumed GW velocity of approximately 14 ft./year. The desire to see results in less than 1 month after application. Regenesis has designed the pilot test with an estimated ROI of approximately 6-8 feet.

PlumeStop® Application Design Summary	
BH1929 Pilot Scale Barrier	
PlumeStop	
Barrier Length (ft)	**25**
Spacing Within Barrier (ft)	8
Number of Lines	1
Application Points	**3**
Application Method	**Direct Push**
Top Application Depth (ft bgs)	25
Bottom Application Depth (ft bgs)	49
Total PlumeStop to be Applied (lbs)	**4,800**
PlumeStop per point (lbs)	1600
PlumeStop per point (gals)	192
Mixing Water (gal)	**8,631**
Mixing Water per point (gals)	2,877
Total Application Volume (gals)	**9,206**
Injection Volume per Point (gals)	3069

FIELD APPLICATION DESIGN		
Parameter	**Unit**	**Value**
PlumeStop Spacing within barrier	ft	**8.0**
Number of Rows	ft	**1.0**
Spacing Between Rows	ft	
Injection Points	**pts**	3
Injection Concentration	**mg/L**	**2,500**
Injection Percentage	%	0.3%
Solution Mass to be Injected	kgs	34,846
Solution Density	g/cm3	1
Solution Volume to be Injected	L	34,846
Solution Volume to be Injected	gals	9,206
Volume per Point	gal/pt	3,069
Volume per Vertical Ft	**gal/ft**	**128**
Pore Volume Occupancy		
Total Pore Volume Occupancy	%	41%
Effective Pore Volume Occ	%	55%

The estimated ROI is the result several technical variables the most critical being the PlumeStop as applied concentration vs. PlumeStop Solution Volume and aquifer accommodation of same. Embedded in this issue is the actual injection/effective porosity of each of the TTZ sand units. For this pilot test an injection porosity of 10% was used. This is based on experience and results of the previous DVT and Pilot Test Application. The calculated ROI is approximately 8 feet; it should be noted that it is very common to have significant variability in the injection/effective porosity within individual sand units. Thus, designing for precise application of PlumeStop laterally from an injection point is difficult. Further, based on our direct experience the actual presence of PlumeStop in a well is more likely to be the result of a narrow zone with a lower than anticipated injection porosity rather than arrival across a thicker TTZ zone.

To mitigate PlumeStop's presence in performance well MW1929, Regenesis will intentionally "park" PlumeStop by applying a diatomic cation solution, in this case $CaCl_2$. Upon confirming the presence of PlumeStop in MW1929 immediately after application, Regenesis will flush the well with clear water followed by application of a solution of $CaCl_2$ + water followed by another clear water flush. The flush and "parking" solution will be targeted into each of the four sand zones into which PlumeStop is being applied. The actual concentration and volume of the $CaCl_2$ solution is yet to be determined.

Mode of action, the $CaCl_2$ solution has been documented to rapidly destabilize the PlumeStop colloid causing the PlumeStop to adhere to the surfaces of aquifer soil grains as well as the gravel pack surrounding the well. Upon "parking" the PlumeStop the well and gravel pack will be flushed with clear water to further remove any residual PlumeStop that may have entered the well/gravel pack during application.

Based on the notion of "painting the aquifer" with a thin coating of PlumeStop the presence of PlumeStop in the gravel pack surrounding a well is not a negative. By performing a clear water flush of the performance well followed by PlumeStop parking agent and another round of clear water flushing, this process removes excess PlumeStop that may have accumulated. This methodology will not create the over-application of PlumeStop in the well gravel pack. This is because the size and stability of the PlumeStop colloid during application. Injection of PlumeStop is performed at low injection pressures and does not induce or propagate fracturing. Fracturing of Powdered Activated Carbon (PAC) typically results in thin fractures that when connected to a well's gravel pack over fills well filter pack rather than evenly distributed in the native aquifer material. In contrast, application of 2 micron-sized PlumeStop in a stabilized colloid format under low pressure results in PlumeStop distribution via semi-plug flow. In this type of application, the small size of the PlumeStop particles combined with the of the colloid allows Regenesis to apply PlumeStop at low pressures. This prevents fracturing and thus PlumeStop distribution is via movement via Target Treatment Zones effective porosity. Thus, the presence of PlumeStop in the gravel pack will mimic that the surround native aquifer. More specifically, a thin coating of PlumeStop will be left in the gravel pack rather than a bolus of carbon as is the case when powder activated carbon is applied via high pressure "fracking".

To further mitigate the presence of PlumeStop in the performance monitoring well, Regenesis will apply $CaCl_2$ parking agent via the following process:

- Monitoring for PlumeStop during application, upon completing the application of PlumeStop and the presence of PlumeStop in the well;
- Perform clear water flush with a volume equivalent to 3x the saturated zone's well pore volume + well borehole pore volume;
- Apply the Parking Agent ($CaCl_2$) at volume equivalent to 2x the saturated zone's well pore volume + well borehole volume;
- Follow with a 2nd clear water flush volume equivalent to 3x the saturated zone's well pore volume + well borehole volume.

Monitoring Program

Regenesis suggests collection of TPH-G Benzene and DCA analysis of GW samples on the following monitoring schedule:

- Pre-Application
  - 1 week
- Post-Application
  - 2 weeks
  - 1 month
  - 2 months
  - 3 months

Appendix B

Clifton Associates

Calgary Office
2222 30th Avenue NE
Calgary, AB T2E 7K9

T (403) 263 2556
F (403) 234 9033

calgary@clifton.ca
www.clifton.ca

September 16, 2018

Stephen d'Abadie, P. Biol., M. Eng.
Clifton Associates
2222-30th Avenue NE
Calgary, Alberta
T2E 7K9

SUBJECT: INJECTION SUMMARY
SEARS HOUNSFIELD HEIGHTS, CALGARY, ALBERTA

Dear Stephen:

InSitu Remediation Services Ltd. (IRSL) is pleased to provide this letter summarizing the injection event completed at the above site from September 10 to 13, 2018. The injection program involved the following:

- *Number of Injection Locations*: Three (3)
- *Method of Injection*: Injection wells
- *Reagents*: PlumeStop, PlumeStop
- *Solution Strength*: PlumeStop ~ 6.3 wt. %
- *Injection Pressures:* up to 50 psi
- *Injection Flow Rates:* up to 25.6 lpm
- *Water Source*: On-site municipal water supply

Table 1 provides the volume of PlumeStop solution injected at each location as well as the mass of reagents, flow rates and injection pressures. A total of 2,173 kg of PlumeStop were injected within 32,760 L of water during this event.

Measurements of the air quality prior to, during and post-injection indicated that the total organic vapour concentrations were below the background concentration. If you have any questions, please feel free to contact myself. Thank you for using IRSL, we value your business.

Sincerely

Rick McGregor, M.Sc., MBA, P. Geo.

Limitations

The information, approach and discussion provided in this document are based on information and observations recorded by IRSL at select observation and sampling locations at the Site. Conditions observed on the site or noted in documents may differ from time to time and may become apparent during future investigations. Observations are made for select sampling/observation points only and thus conditions between and beyond these points may be different. As a result, some conditions may not have been detected or anticipated at the time of this work and as such IRSL cannot be held responsible for environmental conditions at the Site.

The scope of this document is limited to the matters expressly covered. This letter is prepared for the sole benefit of Clifton Associates and may not be relied upon by any other person or entity without the written authorization of IRSL. Any use or reuse of this document including opinions, findings or conclusions represented herein by parties other than Clifton Associates is at the sole risk of those parties.

Table 1 - Injection Summary
Sears Hounsfield Heights, Calgary, Alberta

Date	Injection Location	Interval (mbgs)	PlumeStop (kg)	Water (L)	Flow Rate (lpm)	Pump Presssure (psi)
Sept 10, 2018	IP1	13.9-14.9	103.5	1,560	14.1	50
		12.9-13.9	103.5	1,560	19.3	50
		11.9-12.9	103.5	1,560	25.6	50
Sept 11, 2018		10.9-11.9	103.5	1,560	24.5	30
		9.8-10.9	103.5	1,560	25.6	30
		8.7-9.8	103.5	1,560	21.0	30
		7.6-8.7	103.5	1,560	23.4	30
Sept 11, 2018	IP2	13.9-14.9	103.5	1,560	16.1	40
		12.9-13.9	103.5	1,560	21.0	40
		11.9-12.9*	53.0	860	16.7	40
Sept 12, 2018		11.9-12.9	50.5	700	13.9	30
		10.9-11.9	103.5	1,560	12.5	30
		9.8-10.9	103.5	1,560	12.5	25
		8.9-9.9	103.5	1,560	12.3	25
Sept 13, 2018		7.6-8.7	103.5	1,560	20.5	40
Sept 12, 2018	IP3	13.9-14.9*	103.5	1,560	12.1	15
Sept 13, 2018		12.9-13.9	103.5	1,560	6.7	30
		11.9-12.9	103.5	1,560	15.1	25
		10.9-11.9	103.5	1,560	10.9	30
		9.8-10.9	103.5	1,560	12.9	30
		8.7-9.8	103.5	1,560	25.1	40
		7.6-8.7	103.5	1,560	10.8	40
Total			2173.5	32,760		

*: indicates minor daylighting of solution