

30 March 2020

Ms. Brianna Scharf  
Division of Environmental Remediation  
Remedial Bureau E  
New York State Department of Environmental Conservation  
625 Broadway, 12<sup>th</sup> Floor  
Albany, New York 12233-7017

**RE:** In Situ Biological Injection Field Activities Summary  
Clinton West Plaza  
Ithaca, New York  
Contract/WA No: D007624-25.03

Dear Ms. Scharf,

EA Engineering, P.C. and its affiliate EA Science and Technology (EA) were tasked by the New York State Department of Environmental Conservation (NYSDEC) under Work Assignment (WA) Number (No.) D007624-25.03 to perform site management activities at the Clinton West Plaza Superfund Site (**Figure 1**). EA completed a supplemental groundwater injection to meet the remedial goals and objectives outlined in the NYSDEC Record of Decision (ROD).<sup>1</sup> The supplemental injection was recommended in the 2018 Periodic Review Report<sup>2</sup> based on observations during annual groundwater monitoring and was performed in accordance with the Work Plan.<sup>3</sup> EA has prepared this letter report to summarize the in situ enhanced biological injection field activities.

## IN SITU BIOLOGICAL INJECTION

EA and its drilling subcontractor, North Star Drilling, were on site 24 to 28 February 2020 to perform the injection in the backyard of [REDACTED] and the parking lot to the west of the residential property (**Figure 2**). Injections were completed through 26 temporary injection points using direct-push technology and a pressurized grout pump and targeted a subsurface interval of 25 feet below ground surface (ft bgs) to 5 ft bgs. EA injected a combination of EOS Pro with supplemental Vitamin B12 and EOS Quick Release (QR) into the targeted subsurface treatment zone as described in the Work Plan. In total, 420 pounds (lbs) of EOS Pro, 570 lbs of EOS QR, 30 liters of BAC-9, and 55 lbs of ascorbic acid (vitamin C) were injected into the target area. The substrate mixture was mixed and diluted onsite with potable water, which was deoxygenated using the ascorbic acid. Additionally, the injection substrate included a BAC-9 *dehalococcoides* culture to augment appropriate bacteria populations. Actual dilution rates and quantities varied between injection points based on subsurface conditions and acceptance rates at each injection point. On average, approximately 30 gallons of the diluted substrate mixture were injected into points located

<sup>1</sup> NYSDEC. 2010. *ROD, Clinton West Plaza, Site Number 755015, City of Ithaca, New York*. May.

<sup>2</sup> EA. 2018. *Periodic Review Report No. 5 October 2017 – September 2018*. November.

<sup>3</sup> EA. 2019. *In Situ Biological Injection Work Plan*. November.

at [REDACTED] and approximately 60 gallons were injected into points located in the parking lot. Thirty injection points were planned; however, four injection point locations were not used due to surface obstructions. The residual substrate mixture was divided among the remaining points. Seven existing monitoring wells were also used for BAC-9 bioaugmentation injections as shown on Figure 2.

Following the injections, the substrate was allowed approximately 60 minutes for settling and the boreholes were backfilled as needed to surface. The last six inches of boreholes were finished with topsoil in the backyard of [REDACTED] and with quick-patch pavement in the parking lot.

Field activities described in this section were documented by an onsite EA geologist in daily field reports, provided in **Attachment 1**.

Please do not hesitate to contact me at 315-565-6565 with any questions you might have regarding this report.

Sincerely,

EA SCIENCE AND TECHNOLOGY



Christopher Schroer  
Project Manager

## Figures

- 1 Site Location Map
- 2 Injection Points

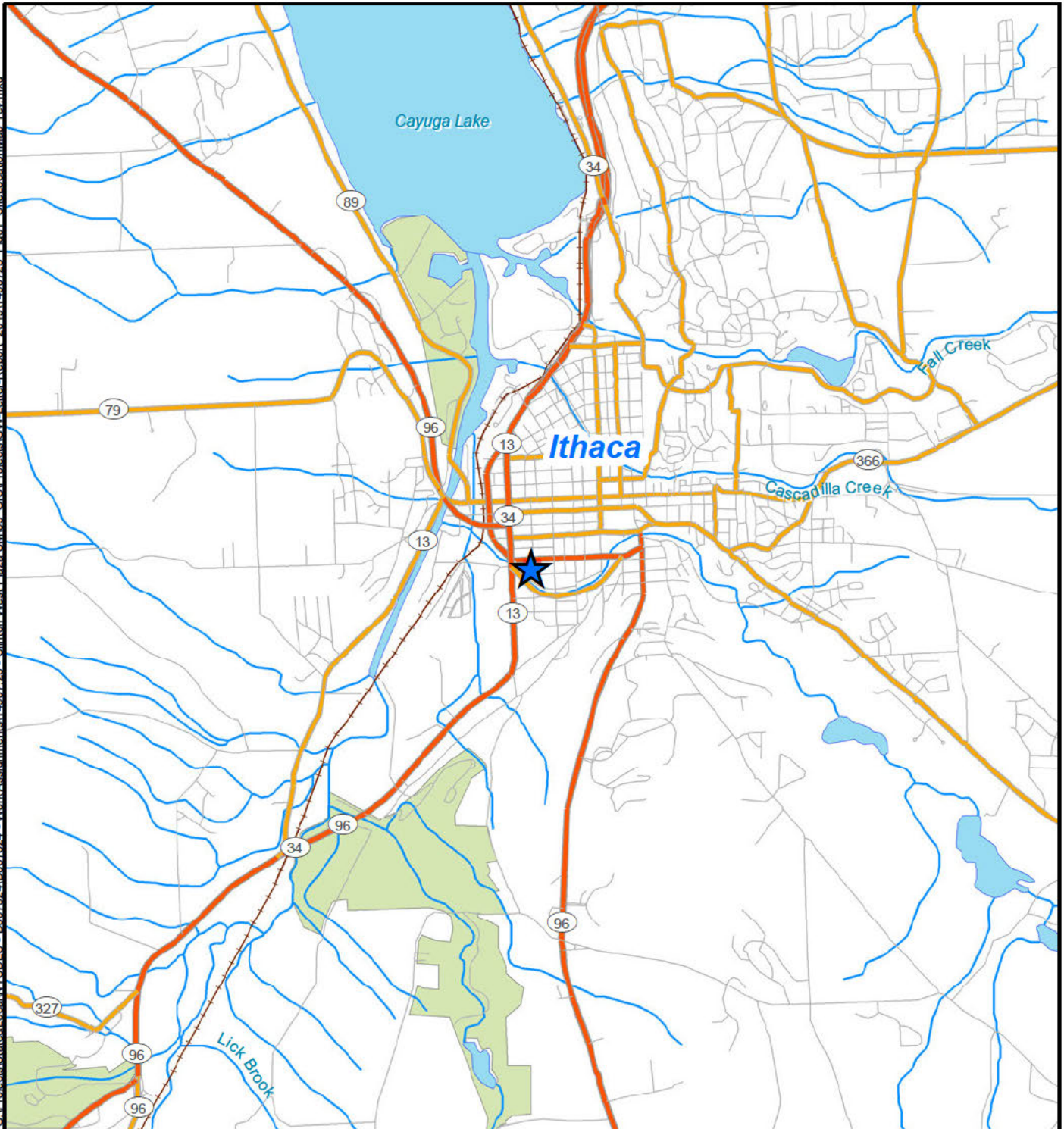
## Attachments

- 1 Daily Field Reports and Field Logbook

## Figures

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0 0.25 0.5 1  
Miles

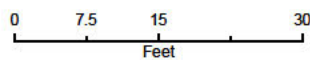
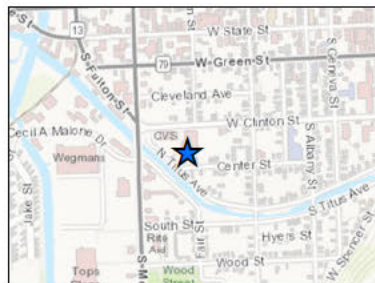
#### Legend

- Highway
- Major Road
- Local Road
- Park
- Rivers & Streams
- Surface Water Body
- Site Location

**Figure 1**  
**Site Location Map**  
Clinton West Plaza (755015)  
Ithaca, New York

Map Date: 3/18/2020





- ★ Site-Location
- Clinton West Plaza Site Boundary
- Property Boundary
- ◆ Monitoring Well
- ◆ Temporary Monitoring Point
- Completed Injection
- Location Not Used
- EOS Substrate and BAC-9 Injection Area
- EOS Substrate Injection Area

Note: Wells with highlighted labels received BAC-9 inoculation.

**Figure 2**  
**Injection Points**  
Clinton West Plaza (755015)  
Ithaca, New York

Map Date: 3/30/2020



Department of  
Environmental  
Conservation



## **Attachment 1**

### **Daily Field Report**

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**DAILY OBSERVATION REPORT****Date: Monday, February 24, 2020**

NYSDEC

Temperature: (F) 40F (am) 55F (pm)

Wind Direction: Calm (am) Calm (pm)

Weather: (am) sun

(pm) sun

**Project Name: Clinton West Plaza****NYSDEC Site # 755015****Contract #**

Arrive at site 0800 (am)

**Ithaca, New York**

Leave site: 1800 (pm)

**HEALTH & SAFETY:**Are there any changes to the Health & Safety Plan?  
(If yes, list the deviation under items for concern)

Yes ( ) No ( x )

Are monitoring results at acceptable levels?

Soil

Yes ( ) n/a ( x ) \* No ( )

Waters

Yes ( ) n/a ( x ) \* No ( )

Air

Yes ( ) n/a ( x ) \* No ( )

- If No, provide comments

**OTHER ITEMS:**

Site Sketch Attached: Yes ( ) No ( x )

Photos Taken: Yes ( x ) No ( )

**DESCRIPTION OF DAILY WORK PERFORMED:**

Enock Bunyon (EB) onsite at 0800. NorthStar Drilling onsite at 0815. Sarah Nelson (SN) onsite at 0830. The team reviewed project details and discussed health and safety, as well as any outstanding concerns. EB and SN marked out injection locations. Set up injection equipment and mixing tanks in the parking lot and moved additional equipment into the back yard of [REDACTED]. Placed polyethylene sheeting on the ground to capture any residue from the injection process. Installed Injection points 01, 02 and 03. Mixed injection mixture in a clean steel tub. The procedure was to inject a mixture of EOS Pro (13.75 gallons), EOS QR (3.4 gallons), and water (55 gallons or 4:1) combined with BAC-9 microbial augmentation culture (0.5 L) and 1.5 pounds ascorbic acid (to removed dissolved oxygen from the mixture) per injection point and push to 25' bgs. Injection point 01 accepted all materials, Injection point 02 accepted materials to approximately 7' bgs when mixture began to surface around the direct push rod from bore hole. Injection point 03 accepted materials to approximately 12' bgs when mixture began to surface from the borehole.

Three injection were completed:

**INJ-01**

Start push: 1333 Complete Injection: 1424

**INJ-02**

Start push: 1510 Complete Injection: 1545

**INJ-03**

Start push: 1625 Complete Injection: 1700

Upon completion of Injection for the day NorthStar Drilling continued with rod cleaning and site clean-up.

Off-site at 1800

## DAILY OBSERVATION REPORT

Date: Monday, February 24, 2020

### **CONTRACTOR/SUBCONTRACTOR EQUIPMENT AND PERSONNEL ON SITE:**

*(Name of contractor) personnel:* Enock Bunyon, Sarah Nelson - EA

*(Name of Subcontractor) personnel:* Steven Laramée – NorthStar Drilling

*(Name of contractor) equipment:* Geoprobe® Model 420M

*(\*Indicates active equipment)*

*Other Subcontractors:* NA

### **VISITORS TO SITE:**

None

### **ITEMS OF CONCERN:**

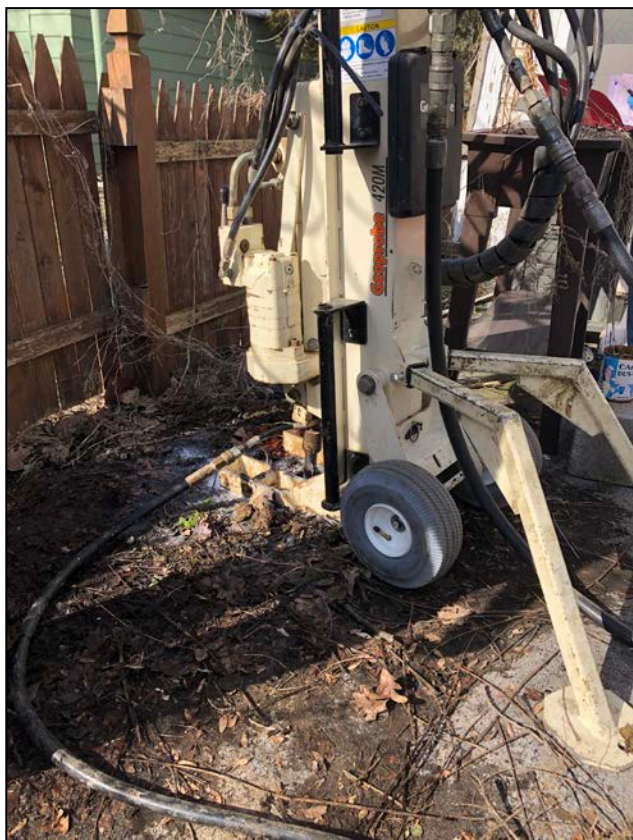
Substrate mixture was resurfacing at the borehole at several locations. Proposed solution is to reduce the quantity of water provided the pump can still throughput the material.

### **SITE REPRESENTATIVE:**

Name: Enock Bunyon

cc: Sarah Nelson

Site Photographs



Geoprobe® 420M



Setting up injection equipment at [REDACTED]



Injection substrate mixing tank.



Injection pump and injection substrate mixture.



## DAILY OBSERVATION REPORT

Date: Tuesday, February 25, 2020



NYSDEC

Temperature: (F) 38F (am) 41F (pm)

Wind Direction: Calm (am) Calm (pm)

Weather: (am) cloudy  
(pm) cloudy

**Project Name: Clinton West Plaza**

**NYSDEC Site # 755015**

**Contract #**

Arrive at site 0808 (am)

**Ithaca, New York**

Leave site: 1625 (pm)

### HEALTH & SAFETY:

Are there any changes to the Health & Safety Plan?  
(If yes, list the deviation under items for concern)

Yes ( ) No ( x )

Are monitoring results at acceptable levels?

Soil

Yes ( ) n/a ( x ) \* No ( )

Waters

Yes ( ) n/a ( x ) \* No ( )

Air

Yes ( ) n/a ( x ) \* No ( )

- If No, provide comments

### OTHER ITEMS:

Site Sketch Attached: Yes ( ) No ( x )

Photos Taken: Yes ( x ) No ( )

### DESCRIPTION OF DAILY WORK PERFORMED:

Enock Bunyon (EB) on-site at 0808. Sarah Nelson (SN) arrived on-site at 0825. Steven Laramie and Michael Warner (NorthStar Drilling) arrived on-site at 0840 to continue with EOS injections.

The Geoprobe® Model 420M was set-up to inject the injection substrate from 25 to 5 ft bgs. EB and SN set-up BAC-9 delivery equipment (nitrogen gas and regulator) to proceed with bioaugmentation injection. 0.8L of concentrated culture of BAC-9 was injected into the mixture of injection substrate. EOS mixture containing BAC-9 culture was injected at INJ-04 and INJ-05. EOS substrate mixture was pushed to 13' bgs for INJ-04 and INJ-05 respectively.

The 1 ¼" to 1 ½" adapter for the 100-psi injection point broke prior to the start of injection at the next injection point. HRC injection ended for the day.

EB and SN introduced a total volume of 6.35L of BAC-9 culture into seven groundwater monitoring wells and chased it with water after injection.

Two injection were completed:

#### **INJ-04**

Start push: 0945 Complete Injection: 1050

#### **INJ-05**

Start push: 1330 Complete Injection: 1417

Upon completion of Injection for the day NorthStar Drilling continued with rod cleaning and site clean-up.

Off-site at 1625

**CONTRACTOR/SUBCONTRACTOR EQUIPMENT AND PERSONNEL ON SITE:**

*(Name of contractor) personnel:* Enock Bunyon, Sarah Nelson - EA

*(Name of Subcontractor) personnel:* Steven Laramée, Michael Warner – NorthStar Drilling

*(Name of contractor) equipment:* Geoprobe® Model 420M

*(\*Indicates active equipment)*

*Other Subcontractors:* NA

**VISITORS TO SITE:**

None

**ITEMS OF CONCERN:**

Substrate mixture was resurfacing at the borehole at several locations. Proposed solution is to adjust quantity of water provided the pump can still throughput the material.

**ATTACHMENT(S) TO THIS REPORT:**

**SITE REPRESENTATIVE:**

Name: Enock Bunyon

cc: Sarah Nelson



Site Photographs

**BAC-9 culture Injection at TPM-01**



# DAILY OBSERVATION REPORT

Date: Wednesday, February 26, 2020



NYSDEC

Temperature: (F) 36F (am) 44F (pm)

Wind Direction: Calm (am) Calm (pm)

Weather: (am) cloudy  
(pm) cloudy

**Project Name: Clinton West Plaza**

**NYSDEC Site # 755015**

**Contract #**

Arrive at site 0810 (am)

**Ithaca, New York**

Leave site: 1730 (pm)

## HEALTH & SAFETY:

Are there any changes to the Health & Safety Plan?  
(If yes, list the deviation under items for concern)

Yes ( ) No ( x )

Are monitoring results at acceptable levels?

Soil

Yes ( ) n/a ( x ) \* No ( )

Waters

Yes ( ) n/a ( x ) \* No ( )

Air

Yes ( ) n/a ( x ) \* No ( )

- If No, provide comments

## OTHER ITEMS:

Site Sketch Attached: Yes ( ) No ( x )

Photos Taken: Yes ( x ) No ( )

## DESCRIPTION OF DAILY WORK PERFORMED:

Enock Bunyon (EB) and Donald Howe (DH) on-site at 0810. Steven Laramie and Michael Warner (NorthStar Drilling) arrived on-site at 0805 to continue with EOS substrate injections.

Geoprobe® Model 420M was set-up to complete injection at INJ-06 and INJ-07 ( ). Geoprobe® Model 6620DT was then set-up to inject EOS substrate mixture from 25 to 5 ft bgs at INJ-08, INJ-09, INJ-10 and INJ-11. EB and DH set-up BAC-9 to continue with bioaugmentation Injection. A total of 3.5L concentrated culture of BAC-9 was injected into the injection substrate prior to injection at INJ 08-11.

EOS substrate was pushed from 25 ft bgs to 13 ft bgs at INJ-06 and INJ-07, respectively. The EOS Substrate mix pushed from 25 to 20 ft bgs for INJ-08, INJ-09 and INJ-11. INJ-10 allowed substrate injection to 15 ft bgs. Additional substrate was injected at intervals where the formation accepted more of the mixture.

Six injection points were completed:

### **INJ-06**

Start push: 0846 Complete Injection: 0920

### **INJ-07**

Start push: 1004 Complete Injection: 1048

### **INJ-08**

Start push: 1315 Complete Injection: 1406

### **INJ-09**

Start push: 1415 Complete Injection: 1456

### **INJ-10**

Start push: 1503 Complete Injection: 1554

### **INJ-11**

Start push: 1602 Complete Injection: 1641

## DAILY OBSERVATION REPORT

Date: Wednesday, February 26, 2020

Upon completion of Injection for the day NorthStar Drilling completed rod cleaning and site clean-up.

Off-site at 1730

### **CONTRACTOR/SUBCONTRACTOR EQUIPMENT AND PERSONNEL ON SITE:**

*(Name of contractor) personnel:* Enock Bunyon, Donald Howe - EA

*(Name of Subcontractor) personnel:* Steven Laramée, Michael Warner – NorthStar Drilling

*(Name of contractor) equipment:* Geoprobe® Model 420M and Geoprobe® Model 6620DT

*(\*Indicates active equipment)*

*Other Subcontractors:* NA

### **VISITORS TO SITE:**

None

### **ITEMS OF CONCERN:**

None

### **ATTACHMENT(S) TO THIS REPORT:**

### **SITE REPRESENTATIVE:**

Name: Enock Bunyon

cc: Sarah Nelson

bcc: Donald Howe



Site Photographs

EOS Substrate Injection taking place at INJ-08



Geoprobe® Model 420M and Geoprobe® Model 6620DT



EOS Injection Mixture



## DAILY OBSERVATION REPORT

Date: Thursday, February 27, 2020



NYSDEC

Temperature: (F) 27F (am) 29F (pm)

Wind Direction: windy (am) windy (pm)

Weather: (am) snow showers  
(pm) cloudy

**Project Name: Clinton West Plaza**

**NYSDEC Site # 755015**

**Contract #**

Arrive at site 0835 (am)

**Ithaca, New York**

Leave site: 1615 (pm)

### HEALTH & SAFETY:

Are there any changes to the Health & Safety Plan?  
(If yes, list the deviation under items for concern)

Yes ( ) No ( x )

Are monitoring results at acceptable levels?

Soil

Yes ( ) n/a ( x ) \* No ( )

Waters

Yes ( ) n/a ( x ) \* No ( )

Air

Yes ( ) n/a ( x ) \* No ( )

- If No, provide comments

### OTHER ITEMS:

Site Sketch Attached: Yes ( ) No ( x )

Photos Taken: Yes ( ) No ( x )

### DESCRIPTION OF DAILY WORK PERFORMED:

Enock Bunyon (EB) arrived on-site at 0835. Steven Laramie and Michael Warner (NorthStar Drilling) arrived on-site at 0815 to continue with EOS substrate injections.

Geoprobe® Model 6610 was set-up to inject the EOS substrate mixture from 25 to 5 ft bgs. EB set-up BAC-9 to continue with bioaugmentation Injection. A total of 4.3L concentrated culture of BAC-9 was incorporated into the injection substrate mixture. Of the remaining 4.3L of BAC-9 culture, a total of 2L was injected at INJ-12, INJ-13 and INJ-1; a total of 1.3L was injected at INJ-18 and INJ-19; and the remaining 1L was injected at INJ-15, INJ-16 and INJ-17.

EOS substrate mixture was injected from 25 ft to 5 ft bgs at INJ-13, INJ-14 and INJ-17. The EOS mixture was pushed from 25 ft to 15 ft bgs at INJ-12, INJ-16, INJ-18, and INJ-19. Injection point INJ-15 accepted the EOS substrate from 25 ft to 10 ft bgs.

Eight injection were completed:

#### **INJ-12**

Start push: 0848 Complete Injection: 0947

#### **INJ-13**

Start push: 1003 Complete Injection: 1128

#### **INJ-14**

Start push: 1142 Complete Injection: 1208

#### **INJ-15**

Start push: 1238 Complete Injection: 1316

#### **INJ-16**

Start push: 1323 Complete Injection: 1351

#### **INJ-17**

Start push: 1357 Complete Injection: 1432

#### **INJ-18**

Start push: 1452 Complete Injection: 1521

#### **INJ-19**

Start push: 1527 Complete Injection: 1603



## DAILY OBSERVATION REPORT

Date: Thursday, February 27, 2020

Upon completion of Injection for the day NorthStar Drilling completed rod cleaning rod cleaning and site clean-up.

Off-site at 1615

### **CONTRACTOR/SUBCONTRACTOR EQUIPMENT AND PERSONNEL ON SITE:**

*(Name of contractor) personnel:* Enock Bunyon, - EA

*(Name of Subcontractor) personnel:* Steven Laramée, Michael Warner – NorthStar Drilling

*(Name of contractor) equipment:* Geoprobe® Model 6620DT

*(\*Indicates active equipment)*

*Other Subcontractors:* NA

### **VISITORS TO SITE:**

None

### **ITEMS OF CONCERN:**

None

**ATTACHMENT(S) TO THIS REPORT:** None.

### **SITE REPRESENTATIVE:**

Name: Enock Bunyon

cc: Sarah Nelson

EOS substrate mixture forced upward at INJ-16



Ongoing EOS substrate Injection at INJ-15



INJ-19 exposed borehole after injection



# DAILY OBSERVATION REPORT

Date: Friday, February 28, 2020



NYSDEC

Temperature: (F) 25F (am) 30F (pm)

Wind Direction: windy (am) windy (pm)

Weather: (am) cloudy  
(pm) cloudy

**Project Name: Clinton West Plaza**

**NYSDEC Site # 755015**

**Contract #**

Arrive at site 0815 (am)

**Ithaca, New York**

Leave site: 1618 (pm)

## HEALTH & SAFETY:

Are there any changes to the Health & Safety Plan?  
(If yes, list the deviation under items for concern)

Yes ( ) No ( x )

Are monitoring results at acceptable levels?

Soil

Yes ( ) n/a ( x ) \* No ( )

Waters

Yes ( ) n/a ( x ) \* No ( )

Air

Yes ( ) n/a ( x ) \* No ( )

- If No, provide comments

## OTHER ITEMS:

Site Sketch Attached: Yes ( ) No ( x )

Photos Taken: Yes ( x ) No ( )

## DESCRIPTION OF DAILY WORK PERFORMED:

Enock Bunyon (EB) arrived on-site at 0815. Steven Laramée and Michael Warner (NorthStar Drilling) arrived on-site at 0820 to continue with EOS substrate injections.

Geoprobe® Model 6620 was set-up to inject the EOS substrate mixture at a rate from 25 to 5 ft bgs. EOS substrate mixture was injected from 25 ft to 15 ft bgs at INJ-21. The EOS mixture was pushed from 25 to 5 ft bgs at INJ-20, INJ-22, INJ-23, INJ-24, INJ-25 and INJ-26. Approximately about 80 gallons of the EOS substrate mixture was injected at INJ-20, INJ-22, INJ-23, INJ-24, INJ-25 and INJ-26. The amount of EOS substrate forced upward varied with different injection points.

NorthStar Drilling backfilled exposed borehole Injection points at the parking lot (609 West Clinton) with quality pavement repairs. Resident's dog at [REDACTED] came on site for about 10 minutes and found its way back home.

Seven injection were completed:

### **INJ-20**

Start push: 0851 Complete Injection: 0922

### **INJ-21**

Start push: 0928 Complete Injection: 0944

### **INJ-22**

Start push: 1005 Complete Injection: 1210

### **INJ-23**

Start push: 1221 Complete Injection: 1302

### **INJ-24**

Start push: 1305 Complete Injection: 1342

### **INJ-25**

Start push: 1352 Complete Injection: 1421

### **INJ-26**

Start push: 1433 Complete Injection: 1514

## DAILY OBSERVATION REPORT

Date: Friday, February 28, 2020

Upon completion of Injection for the day NorthStar Drilling continued with final rod cleaning and site clean-up.

Off-site at 1618

### **CONTRACTOR/SUBCONTRACTOR EQUIPMENT AND PERSONNEL ON SITE:**

*(Name of contractor) personnel:* Enock Bunyon, - EA

*(Name of Subcontractor) personnel:* Steven Laramée, Michael Warner – NorthStar Drilling

*(Name of contractor) equipment:* Geoprobe® Model 6620DT

*(\*Indicates active equipment)*

*Other Subcontractors:* NA

### **VISITORS TO SITE:**

None

### **ITEMS OF CONCERN:**

None

### **ATTACHMENT(S) TO THIS REPORT:**

### **SITE REPRESENTATIVE:**

Name: Enock Bunyon

cc: Sarah Nelson



Geoprobe 6620 set-up at INJ-25



Borehole restored with sand and QPR

