

Mr. Patrick Van Rossem
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Date: October 11, 2022

Our Ref: 30004014.00002

Subject: September 2022 Post-Remediation DNAPL Monitoring Status Report
Former Citizens Gas Works Manufactured Gas Plant Site
Borough of Brooklyn, Kings County, New York
NYSDEC Site Nos. C224012 and C224012B

Dear Mr. Van Rossem,

This letter has been prepared by Arcadis of New York, Inc. (Arcadis), on behalf of National Grid, to present the September 2022 dense non-aqueous phase liquid (DNAPL) monitoring results for the former Citizens Gas Works manufactured gas plant (MGP) site (hereinafter, the "Site") in Brooklyn, New York (Figure 1). As shown on Figure 2, the DNAPL recovery well network includes a total of 25 wells, which are being used to monitor and remove recoverable DNAPL from intermediate and deep soils on Block 471, Lot 1 (hereinafter, "Parcel I"), Block 471, Lot 100 (hereinafter, "Parcel II"), and Block 471, Lot 200 (hereinafter, "Parcel III") of the Site. Recovery well construction details are summarized in Table 1. Table 2 summarizes the fluid level measurements collected on September 30, 2022 as well as the total estimated volume of fluids (DNAPL and groundwater) removed from the wells in September 2022.

As indicated in Table 2, approximately 1,601 gallons of fluids in total were recovered during this period from recovery wells CGRW-02 (Parcel I), CGRW-03 (Parcel II), CGRW-04 (Parcel II), CGRW-06I (Parcel III), CGRW-06D (Parcel III), CGRW-08 (Parcel I), CGRW-10 (Parcel I), CGRW-13 (Parcel II), CGRW-16 through CGRW-18 (Parcel II), CGRW-19I (Parcel III), CGRW-19D (Parcel III), CGRW-20I (Parcel III), CGRW-20D (Parcel III), CGRW-21I (Parcel III), CGRW-21D (Parcel III), CGRW-22I (Parcel III), CGRW-22D (Parcel III), CGRW-203 (Parcel I), and CGRW-206 (Parcel I). Since post-remediation DNAPL recovery operations were initiated on February 10, 2022, a total of approximately 5,989 gallons of fluids have been recovered at the Site.

The September 2022 field activities also included the following:

- Performance of bail-down tests at recovery wells CGRW-03 (Parcel II), CGRW-04 (Parcel II), and CGRW-16 (Parcel II);
- Collection and analysis of a DNAPL sample from recovery well CGRW-22D on September 16, 2022 for analysis of volatile organic compounds, semivolatile organic compounds, and specific gravity in accordance with United States Environmental Protection Agency (USEPA) SW-846 Method 8260D, USEPA SW-846 Method 8270E, and Standard Method 2710F; and
- Off-Site disposal of recovered fluids and used personal protective equipment/consumables on September 29, 2022 in accordance with applicable laws and regulations.

Mr. Patrick Van Rossem
National Grid
October 11, 2022

Post-remediation DNAPL monitoring and recovery operations will continue in October 2022 in accordance with the *Post-Remediation DNAPL Monitoring Status Report* (Arcadis 2022).

Please let me know if you have any questions regarding the information presented herein.

Sincerely,
Arcadis of New York, Inc.



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Principal Environmental Engineer

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John Alonzo, de maximis
Terry Young, PE, Arcadis

Enclosures:

Tables:

Table 1. Recovery Well Construction Summary

Table 2. Well Gauging and Product Recovery Summary for September 30, 2022

Figures:

Figure 1. Site Location Map

Figure 2. Site Plan

References:

Arcadis. 2022. *Post-Remediation DNAPL Monitoring Status Report*. Former Citizens Gas Works MGP Site, Brooklyn, New York. Prepared for National Grid. May 13.

Tables

Table 1
Recovery Well Construction Summary
September 2022 Post-Remediation DNAPL Monitoring Status Report

National Grid
Former Citizens Gas Works Manufactured Gas Plant Site
Borough of Brooklyn, Kings County, New York
NYSDEC Site Nos. C224012 and C224012B

Well ID	Date Completed	Easting (feet NAD83)	Northing (feet NAD83)	Ground Surface Elevation (feet NAVD88)	Measuring Point Elevation (feet NAVD88)	Casing Type	Screen Type	Nominal Diameter (inches)	Screen Slot Size (inches)	Screen Length (feet)	Screened Interval				Sump Length (feet)	Total Depth of Well (feet bgs)		
											Depth (feet bgs)		Elevation (feet NAVD88)					
Parcel I																		
CGRW-02	8/27/2009	632130.95	671769.29	18.72	18.24	Sch. 10 SS	SS Vee-Wire	6.00	0.020	15.00	30.43	-	45.43	-11.71	-	-26.71	5.00	50.43
CGRW-08	10/24/2019	631902.84	671826.90	30.19	29.86	Sch. 40 PVC	Sch. 40 PVC	4.00	0.020	30.00	50.10	-	80.10	-19.91	-	-49.91	15.00	95.10
CGRW-09	10/23/2019	631945.16	671800.56	30.28	29.96	Sch. 40 PVC	Sch. 40 PVC	4.00	0.020	30.00	50.10	-	80.10	-19.82	-	-49.82	15.00	95.10
CGRW-10	10/23/2019	632029.75	671747.24	23.82	23.55	Sch. 40 PVC	Sch. 40 PVC	4.00	0.020	30.00	44.00	-	74.00	-20.18	-	-50.18	15.00	89.00
CGRW-12	10/21/2019	632105.42	671728.64	19.68	19.38	Sch. 40 PVC	Sch. 40 PVC	4.00	0.020	30.00	39.00	-	69.00	-19.32	-	-49.32	15.00	84.00
CGRW-203	5/23/2012	631987.35	671773.60	28.75	28.51	Sch. 40 PVC	Sch. 40 PVC	4.00	0.020	20.00	39.68	-	59.68	-10.93	-	-30.93	2.00	61.68
CGRW-206	7/12/2012	632156.81	671789.36	18.19	17.84	Sch. 40 PVC	Sch. 40 PVC	4.00	0.020	20.00	45.11	-	65.11	-26.92	-	-46.92	2.00	67.11
Parcel II																		
CGRW-03	8/30/2009	632341.72	671624.07	10.61	10.18	Sch. 10 SS	SS Vee-Wire	6.00	0.020	30.00	22.15	-	52.15	-11.54	-	-41.54	5.00	57.15
CGRW-04	8/28/2009	632271.48	671595.37	11.42	11.08	Sch. 10 SS	SS Vee-Wire	6.00	0.020	40.00	27.28	-	67.28	-15.86	-	-55.86	5.00	72.28
CGRW-13	12/29/2021	632648.03	671637.19	8.03	7.31	Sch. 10 SS	SS Vee-Wire	6.00	0.020	30.00	26.92	-	56.92	-18.89	-	-48.89	15.00	71.92
CGRW-14	1/3/2022	632585.34	671638.65	7.93	7.39	Sch. 10 SS	SS Vee-Wire	6.00	0.020	30.00	27.44	-	57.44	-19.51	-	-49.51	15.00	72.44
CGRW-15	1/5/2022	632509.28	671632.75	7.86	7.48	Sch. 10 SS	SS Vee-Wire	6.00	0.020	30.00	38.50	-	68.50	-30.64	-	-60.64	15.00	83.50
CGRW-16	1/7/2022	632414.49	671627.33	10.13	9.85	Sch. 10 SS	SS Vee-Wire	6.00	0.020	40.00	30.54	-	70.54	-20.41	-	-60.41	15.00	85.54
CGRW-17	2/10/2022	632260.34	671567.13	11.65	11.12	Sch. 10 SS	SS Vee-Wire	6.00	0.020	30.00	32.00	-	62.00	-20.35	-	-50.35	15.00	77.00
CGRW-18	2/15/2022	632227.16	671548.68	11.79	11.54	Sch. 10 SS	SS Vee-Wire	6.00	0.020	30.00	32.00	-	62.00	-20.21	-	-50.21	15.00	77.00
Parcel III																		
CGRW-06I	6/11/2009	631945.95	671273.58	9.38	9.19	Sch. 10 SS	SS Vee-Wire	6.00	0.020	30.00	31.56	-	61.56	-22.18	-	-52.18	5.00	66.56
CGRW-06D	7/9/2009	631952.12	671284.41	9.35	9.63	Sch. 10 SS	SS Vee-Wire	6.00	0.030	10.00	79.45	-	89.45	-70.10	-	-80.10	5.00	94.45
CGRW-19I	12/27/2021	632140.38	671472.64	9.89	9.19	Sch. 10 SS	SS Vee-Wire	6.00	0.020	40.00	34.29	-	74.29	-24.40	-	-64.40	15.00	89.29
CGRW-19D	12/21/2021	632136.11	671467.64	9.98	9.55	Sch. 10 SS	SS Vee-Wire	6.00	0.020	30.00	73.45	-	103.45	-63.47	-	-93.47	15.00	118.45
CGRW-20I	12/14/2021	632064.28	671391.12	9.90	9.30	Sch. 10 SS	SS Vee-Wire	6.00	0.020	30.00	43.00	-	73.00	-33.10	-	-63.10	15.00	88.00
CGRW-20D	12/10/2022	632060.61	671385.05	9.97	9.25	Sch. 10 SS	SS Vee-Wire	6.00	0.030	30.00	73.21	-	103.21	-63.24	-	-93.24	15.00	118.21
CGRW-21I	12/1/2021	632008.62	671308.14	9.19	9.73	Sch. 10 SS	SS Vee-Wire	6.00	0.020	30.00	41.42	-	71.42	-32.23	-	-62.23	15.00	86.42
CGRW-21D	12/2/2022	632004.49	671302.25	9.32	9.49	Sch. 10 SS	SS Vee-Wire	6.00	0.030	30.00	72.71	-	102.71	-63.39	-	-93.39	15.00	117.71
CGRW-22I	12/7/2022	631952.18	671227.89	8.86	9.45	Sch. 10 SS	SS Vee-Wire	6.00	0.020	40.00	30.67	-	70.67	-21.81	-	-61.81	15.00	85.67
CGRW-22D	11/29/2021	631948.96	671222.22	8.97	9.43	Sch. 10 SS	SS Vee-Wire	6.00	0.030	30.00	72.62	-	102.62	-63.65	-	-93.65	15.00	117.62

Table 1
Recovery Well Construction Summary
September 2022 Post-Remediation DNAPL Monitoring Status Report

National Grid
Former Citizens Gas Works Manufactured Gas Plant Site
Borough of Brooklyn, Kings County, New York
NYSDEC Site Nos. C224012 and C224012B

Notes:

1. Horizontal reference datum is the North American Datum of 1983 (NAD83), New York State Plane East Zone.
2. Vertical reference datum is the North American Vertical Datum of 1988 (NAVD88).
3. The horizontal locations, ground surface elevations, and measuring point elevations listed in this table reflect surveys conducted by Louis J. Weber & Associates, Inc. on November 11, 2019, March 1, 2022, March 31, 2022, and April 18, 2022. Screened intervals and well depths for pre-existing recovery wells CGRW-02, CGRW-03, CGRW-04, CGRW-06I, CGRW-06D, CGRW-203, and CGRW-206 have been adjusted based on the ground surface elevations recorded during those surveys.
4. bgs: below ground surface.
5. PVC: polyvinyl chloride.
6. Sch.: Schedule.
7. SS: stainless steel.

Table 2
Well Gauging and Product Recovery Summary for September 30, 2022
September 2022 Post-Remediation DNAPL Monitoring Status Report

National Grid
Former Citizens Gas Works Manufactured Gas Plant Site
Borough of Brooklyn, Kings County, New York
NYSDEC Site Nos. C224012 and C224012B

Well ID	Screened Interval (feet bmp)	Sump Length (feet)	Total Depth of Well (feet bmp)	September 30, 2022					Notes	September 2022		Total Estimated Volume of Fluids Recovered to Date (gallons)	
				Depth to Groundwater (feet bmp)	Depth to Product (feet bmp)	Depth to Bottom of Well (feet bmp)	Measured Product Thickness (feet)	Total Number of Recovery Events		Total Estimated Volume of Fluids Recovered (gallons)			
Parcel I													
CGMW-51I	33.69 - 43.69	2.00	45.69	10.14	45.30	45.63	0.33		--	--	--	1	
CGRW-02	29.95 - 44.95	5.00	49.95	15.88	48.00	50.69	2.69		--	1	11	28	
CGRW-08	49.77 - 79.77	15.00	94.77	26.91	87.95	88.94	0.99		--	1	5	23	
CGRW-09	49.79 - 79.79	15.00	94.79	26.88	92.21	93.39	1.18		--	--	--	26	
CGRW-10	43.73 - 73.73	15.00	88.73	21.14	ND	87.83	0.00	Trace product observed on probe.		1	5	27	
CGRW-12	38.69 - 68.69	15.00	83.69	16.86	ND	84.71	0.00	Trace product observed on probe.		--	--	2	
CGRW-203	39.44 - 59.44	2.00	61.44	26.20	ND	64.00	0.00		--	1	4	25	
CGRW-206	44.76 - 64.76	2.00	66.76	15.50	ND	65.40	0.00		--	1	9	25	
Parcel I Subtotal										5	33	156	
Parcel II													
CGRW-03	21.72 - 51.72	5.00	56.72	8.24	51.30	54.71	3.41		--	2	18	157	
CGRW-04	26.94 - 66.94	5.00	71.94	8.76	68.65	71.01	2.36		--	2	16	143	
CGRW-13	26.20 - 56.20	15.00	71.20	5.13	69.92	73.45	3.53		--	1	15	102	
CGRW-14	26.90 - 56.90	15.00	71.90	5.11	ND	74.38	0.00		--	--	--	0	
CGRW-15	38.13 - 68.13	15.00	83.13	5.10	ND	83.76	0.00	Trace product observed on probe.		--	--	0	
CGRW-16	30.26 - 70.26	15.00	85.26	7.76	72.19	82.08	9.89		--	5	122	763	
CGRW-17	31.47 - 61.47	15.00	76.47	8.85	ND	73.98	0.00	Trace product observed on probe.		2	45	169	
CGRW-18	31.75 - 61.75	15.00	76.75	9.28	66.07	71.52	5.45		--	5	56	371	
Parcel II Subtotal										17	272	1,704	
Parcel III													
CGMW-42I	36.84 - 46.84	2.00	48.84	15.83	48.37	48.79	0.42		--	--	--	5	
CGRW-06I	31.37 - 61.37	5.00	66.37	7.01	60.99	63.89	2.90		--	10	141	416	
CGRW-06D	79.73 - 89.73	5.00	94.73	6.82	62.68	94.29	31.61		--	10	233	599	
CGRW-19I	33.60 - 73.60	15.00	88.60	6.59	ND	86.16	0.00		--	1	12	12	
CGRW-19D	73.02 - 103.02	15.00	118.02	6.82	106.79	113.32	6.53		--	2	62	550	
CGRW-20I	42.40 - 72.40	15.00	87.40	6.72	82.96	83.49	0.53		--	1	6	39	
CGRW-20D	72.49 - 102.49	15.00	117.49	6.58	ND	107.68	0.00		--	1	13	203	
CGRW-21I	41.97 - 71.97	15.00	86.97	7.82	80.24	84.96	4.72		--	7	91	345	
CGRW-21D	72.89 - 102.89	15.00	117.89	7.30	98.18	113.86	15.68		--	7	221	574	
CGRW-22I	31.26 - 71.26	15.00	86.26	6.93	76.64	91.62	14.98		--	9	126	326	
CGRW-22D	73.08 - 103.08	15.00	118.08	6.57	97.92	119.62	21.70		--	9	390	1,061	
Parcel III Subtotal										57	1,295	4,129	
SITE TOTAL										79	1,601	5,989	

Table 2

**Well Gauging and Product Recovery Summary for September 30, 2022
September 2022 Post-Remediation DNAPL Monitoring Status Report**

National Grid

Former Citizens Gas Works Manufactured Gas Plant Site

Borough of Brooklyn, Kings County, New York

NYSDEC Site Nos. C224012 and C224012B

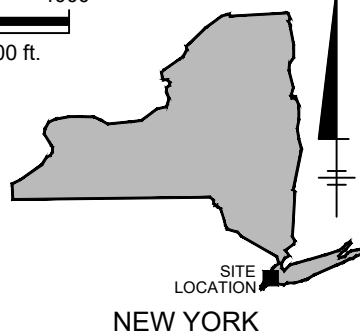
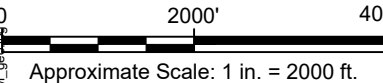
Notes:

1. bmp: below measuring point.
2. ND: not detected.

Figures



REFERENCE: BASE MAP USGS 7.5. MIN. TOPO. QUAD., BROOKLYN, NY, 2013, AND JERSEY CITY, NY-NJ, 2014.



NATIONAL GRID
 FORMER CITIZENS GAS WORKS MANUFACTURED GAS PLANT SITE
 BOROUGH OF BROOKLYN, KINGS COUNTY, NEW YORK
**SEPTEMBER 2022 POST-REMEDATION DNAPL
 MONITORING STATUS REPORT**

SITE LOCATION MAP



FIGURE

1

LEGEND:

- — — — — LIMIT OF BROWNFIELD CLEANUP PROGRAM SITE NO. C224012 (PARCELS I AND II)
- — — — — LIMIT OF BROWNFIELD CLEANUP PROGRAM SITE NO. C224012B (PARCEL III)
- — — — — LIMIT OF STATE SUPERFUND SITE NO. 224012 (PARCEL IV)
- — — — — PROPERTY LINE (APPROXIMATE)
- · — · — · — EASEMENT LINE (APPROXIMATE)
- · — · — · — 21' — TOPOGRAPHIC CONTOUR (1-FOOT INTERVAL)
- · — · — · — 5' — BATHYMETRIC CONTOUR (1-FOOT INTERVAL)
- · — · — · — EDGE OF WATER
- * ○ ◊ ◈ TREE
- ~~~~~ EDGE OF VEGETATION
- ===== EDGE OF PAVEMENT/CONCRETE
- · — · — · — EDGE OF GRAVEL
- — — — — EDGE OF SOIL/AGGREGATE PILE (APPROXIMATE)
- — — — — EDGE OF BULKHEAD
- x — x — x — CHAIN-LINK FENCE
- [Hatched Box] BUILDING
- + — + — MTA RAILROAD TRACK
- ===== CONCRETE WALL
- BOLLARD
- q SIGN
- φ ○ ◊ ◈ UTILITY POLE
- ⌒ HYDRANT
- ⊙ SANITARY SEWER MANHOLE
- ⊙ STORM SEWER MANHOLE
- ⊙ WATER MANHOLE
- ⊙ GAS MANHOLE
- ⊙ TELECOMMUNICATIONS MANHOLE
- ⊙ ELECTRICAL MANHOLE
- ⊙ MANHOLE (TYPE UNKNOWN)
- CB ⊙ CATCH BASIN
- E ⊙ ELECTRICAL BOX
- W ⊙ WATER VALVE
- G ⊙ GAS VALVE
- MH-1 ⊙ HYDRAULIC RELIEF SYSTEM MANHOLE
- CO-1A ⊙ HYDRAULIC RELIEF SYSTEM CLEANOUT
- ~~~~~ SEALED BULKHEAD BARRIER WALL
- CGPZ-07 ⊙ PIEZOMETER
- CGMW-01S ⊙ MONITORING WELL
- CGRW-02 ⊙ RECOVERY WELL

GRAPHIC SCALE

0 50' 100'

NATIONAL GRID

**FORMER CITIZENS GAS WORKS MANUFACTURED GAS PLANT SITE
BOROUGH OF BROOKLYN, KINGS COUNTY, NEW YORK
SEPTEMBER 2022 POST-REMEDIATION DNAPL
MONITORING STATUS REPORT**

SITE PLAN