GROUNDWATER SCIENCES CORPORATION

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September 14, 2017

Ms. Jessica LaClair
Program Manager
New York State Department of
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Division of Environmental Remediation
Remedial Bureau D, 12th Floor
625 Broadway
Albany, New York 12233-7017

Mr. Henry Wilkie
Environmental Engineer 1
New York State Department of
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625 Broadway
Albany, New York 12233-7015

Re*:* *Extraction Well 628 Shutdown Test Findings*
Area B Remediation Area (Operable Unit 3)
Former IBM East Fishkill Facility, East Fishkill, New York

Dear Ms. LaClair and Mr. Wilkie:

On behalf of the IBM Corporation (IBM), Groundwater Sciences Corporation (GSC) has prepared this letter report describing the findings of a shutdown test of groundwater extraction well GW-628 located within the Area B Remediation Area of the former IBM East Fishkill Facility in East Fishkill, New York (Site). A 2015 review of groundwater monitoring results collected over more than three decades indicated significant improvements to groundwater quality had occurred in the area and the more recent decade of data also suggested continued operation of the Area B groundwater extraction and treatment system was no longer necessary. Based on the findings of that review, GSC submitted a request on behalf of IBM to the New York State Department of Environmental Conservation (NYSDEC) to perform a two-year long shutdown test consisting of discontinuing extraction well GW-628 withdrawals and monitoring of Area B groundwater[1]. The purpose of the test was to confirm that the operation of GW-628 groundwater extraction and treatment system could be discontinued without a meaningful change in Area B Remediation Area groundwater quality. The shutdown test was initiated in August 2015, shortly after IBM's receipt of approval for the shutdown test request in a letter from the NYSDEC[2].The shutdown test was performed as part of IBM's groundwater Corrective Action (CA) program which is regulated by the NYSDEC under the Site's New York State Part 373 permit[3].

[1] Groundwater Sciences Corporation, June 18, 2015, *Shutdown Test Request, Extraction Well 628, Area B Remediation Area (Operable Unit 3).*
[2] NYSDEC to IBM Corporate Environmental Affairs, July 9, 2015, *Shutdown Test Request – Extraction Well 628, Area B Remediation Area (OU-3*).
[3] New York State Department of Environmental Conservation, November 2, 2011, *6NYCRR Part 373 Hazardous Waste Management Permit, IBM Corporation East Fishkill Facility*.

BACKGROUND

The Site consists of a semiconductor manufacturing and development facility located in south-central Dutchess County within the Town of East Fishkill, New York. As shown on the Site Location Map (Figure 1), the Site is located between Interstate 84 to the south and New York State Route 52 to the north. Area B is located in the central portion of the eastern perimeter of the Site near Gate 4 and Lime Kiln Road. Remediation Area B is also referred to as Operable Unit #3 (OU3) in the Final Statement of Basis, dated September 2013 (effective date of April 16, 2014), that was developed by the NYSDEC in consultation with the New York State Department of Health (NYSDOH) under the authority of RCRA. On July 1, 2015, the Site was acquired by GLOBALFOUNDRIES U.S. 2LLC (GF). GF is listed as the facility owner under the current NYSDEC Part 373 Permit, with IBM maintaining responsibility for the CA program[4]. The Site was subsequently subdivided, with National Resources acquiring several parcels on September 1, 2017. Area B is located on a parcel owned by National Resources.

Area B is located in a portion of the Site consisting of dense glacial till overlying carbonate bedrock. Area B includes a former fire training area used in the late 1960s and the area of a former silica slurry lagoon. Area B investigation activities began in 1979 and continued into the early 1980s. The investigations identified the presence of volatile organic compounds (VOCs), principally tetrachlorethene (PCE) and methylene chloride, in near surface soils and in overburden and shallow bedrock groundwater. The fire training structures and contaminated surficial soils were removed and sent off-site to an approved landfill in the early 1980s.

Groundwater extraction and treatment operations were initiated in Area B in 1982, via pumping of shallow bedrock well GW-863. The groundwater withdrawals were treated using Granular Activated Carbon (GAC). Following treatment, the effluent was reinjected into a groundwater leachfield upgradient of the extraction well. In 2003, the Area B groundwater extraction and treatment system was upgraded as follows:

- A new extraction well, designated GW-628, was drilled and installed to replace GW-863;
- A new treatment building was installed proximate to well GW-628 to replace the original treatment system shed;
- New treatment equipment was installed in the treatment building, including two cartridge filters for suspended solids removal, and two GAC cylinders, each containing 200 pounds of GAC; and
- An instrumentation and control system was installed to provide for continuous operation and monitoring of the extraction system.

[4] NYSDEC, July 1, 2015, Facility Permit Transfer IBM Corporation to GLOBALFOUNDRIES U.S. 2LLC, East Fishkill Facility.

SHUTDOWN TEST FINDINGS

The shutdown test included a quarterly groundwater monitoring program consisting of the recording of water levels and the collection of groundwater samples at overburden well locations GW-046 and GW-064 and bedrock well locations GW-065 and GW-628. Results of the water level monitoring are summarized in Table 1. Results of laboratory analyses for the presence of VOCs in the Area B groundwater samples are summarized in Table 2.

Groundwater flow in the overburden and shallow bedrock in Area B is generally to the northeast from the vicinity of GW-628 towards GW-064 and GW-065. Prior to the shutdown test, GW-628 groundwater extraction created a localized depression in the potentiometric surface. Outside of the increase in groundwater elevations observed at GW-628, no significant changes in groundwater elevations or flow directions were observed as a result of the shutdown test.

Figure 2 provides a well location map with semi-logarithmic concentration versus time graphs for wells in Area B. The well location map includes postings of the total concentrations of PCE and its daughter products trichloroethene, cis-1,2-dichloroethene, and vinyl chloride (hereinafter collectively referred to as PCE-Series) detected in groundwater samples collected in the second quarter of 2017. As indicated by the postings, the PCE-Series concentrations for the four Area B wells (GW-046, GW-064, GW-628, and GW-065) are less than 1 microgram per liter (µg/L).

The semi-log graphs on Figure 2 depict concentrations of PCE and its associated breakdown products using a log scale versus time in an arithmetic scale, to assist in the identification of concentration trends. The graphs also include a timeline depicting the start of the shutdown test. As shown on the figure, PCE and TCE were the only PCE-Series parameters detected during the Area B shutdown test. TCE was not detected at a concentration above 0.5 µg/L during the test. PCE concentrations detected in samples collected during the shutdown test ranged from 0.1 µg/L to 1.0 µg/L for inactive extraction well GW-628, and ranged from 0.4 µg/L to 7.2 µg/L for nearby glacial till monitoring well GW-046. The maximum PCE concentration observed in GW-046 was the only value above the 6NYCRR Part 703 New York State Groundwater Quality Standard (NYSGQS) of 5 µg/L during the shutdown test. This sample was collected during the fourth quarter of 2016 during a relatively drier period with seasonally lower than average water level conditions. PCE detections in Area B Point of Compliance wells GW-064 and GW-065, located near the Site boundary in positions downgradient of extraction well GW-628, ranged from 0.1 µg/L to 2.0 µg/L. As shown on the Figure 2 graphs, PCE concentrations observed during the shutdown test do not appear to be significantly different than PCE concentrations observed prior to the shutdown.

CONCLUSIONS AND RECOMMENDATIONS

With the exception of the single GW-046 sample noted above, groundwater in the vicinity of glacial till monitoring well GW-046 and shallow bedrock groundwater extraction well GW-628 has not exceeded the PCE NYSGQS of 5 µg/L since startup of well GW-628 in the fall of 2003. An inspection of the time versus concentrations graphs of the Area B (OU3) wells suggests that concentrations have remained stable during the two year period of the GW-628 shutdown test. The shutdown test confirms that operation of the Area B groundwater extraction and treatment system can be discontinued without a meaningful change in Area B Remediation Area groundwater quality. The permanent shutdown of

extraction well GW-628 is expected to have no meaningful effects that would constitute a threat to human health and the environment.

Considering the above conclusions, GSC recommends termination of GW-628 groundwater extraction and treatment operations in Area B. We recommend that the water quality sampling frequency in the approved Groundwater Monitoring Plan (GMP)[5] be modified from monthly to quarterly for well GW-628 and from semiannual to quarterly for well GW-046. Point of Compliance wells GW-064 and GW-065 would continue to be sampled for VOCs on a quarterly basis as required by the GMP.

Should you have any questions concerning this shutdown test letter report, please contact Dean Chartrand of IBM at (703) 257-2583.

Very truly yours,
GROUNDWATER SCIENCES CORPORATION

C. Edward Stoner, P.G.
Project Manager

Attachments:
Table 1 – Groundwater Elevation Data, GW-628 Shutdown Test Groundwater Monitoring
Table 2 – Volatile Organic Compound Data, GW-628 Shutdown Test Groundwater Sampling
Figure 1 – Site Location Map
Figure 2 – Area B (OU3), Well Location Map and Time vs. Concentration Graphs, Soil/Bedrock

[5] IBM to NYSDEC via e-mail, Groundwater Sciences Corporation, September 17, 2015, *Groundwater Monitoring Plan, Former IBM East Fishkill Facility.*

Table 1
Groundwater Elevation Data, GW-628 Shutdown Test Groundwater Monitoring
Area B Remediation Area (Operable Unit 3)
Former IBM East Fishkill Facility, East Fishkill, New York

Well ID	TOC Elev. (ft. amsl)	Date	Depth to Water Below TOC (ft)	Groundwater Elevation (ft)	Date	Depth to Water Below TOC (ft)	Groundwater Elevation (ft)	Date	Depth to Water Below TOC (ft)	Groundwater Elevation (ft)	Date	Depth to Water Below TOC (ft)	Groundwater Elevation (ft)
046	267.59	10/6/2015	17.21	250.38	1/5/2016	10.46	257.13	4/5/2016	8.52	259.07	7/5/2016	12.14	255.45
064	259.23	10/6/2015	9.50	249.73	1/4/2016	4.41	254.82	4/4/2016	4.26	254.97	8/2/2016	4.43	254.80
065	258.76	10/6/2015	9.04	249.72	1/4/2016	3.93	254.83	4/4/2016	3.80	254.96	8/2/2016	4.08	254.68
628	267.42	10/6/2015	17.09	250.33	1/5/2016	10.00	257.42	4/5/2016	8.17	259.25	7/5/2016	11.92	255.50

Well ID	TOC Elev. (ft. amsl)	Date	Depth to Water Below TOC (ft)	Groundwater Elevation (ft)	Date	Depth to Water Below TOC (ft)	Groundwater Elevation (ft)	Date	Depth to Water Below TOC (ft)	Groundwater Elevation (ft)	Date	Depth to Water Below TOC (ft)	Groundwater Elevation (ft)
046	267.59	10/6/2016	18.73	248.86	1/4/2017	8.82	258.77	4/24/2017	5.69	261.90	7/11/2017	12.52	255.07
064	259.23	10/5/2016	9.51	249.72	1/9/2017	4.29	254.94	4/24/2017	3.73	255.50	7/10/2017	6.01	253.22
065	258.76	10/5/2016	9.13	249.63	1/9/2017	3.81	254.95	4/24/2017	3.25	255.51	7/10/2017	5.62	253.14
628	267.42	10/6/2016	18.50	248.92	1/4/2017	8.41	259.01	4/24/2017	5.42	262.00	7/11/2017	12.32	255.10

Table 2
Volatile Organic Compound Data, GW-628 Shutdown Test Groundwater Sampling
Area B Remediation Area (Operable Unit 3)
Former IBM East Fishkill Facility, East Fishkill, New York

Parameter	Sample Location	046	046	046	046	046	046	046	046	046	046	064	064	064	064
	Sample Description	GW	GW	GW	REP	GW	GW	GW	REP	GW	GW	GW	GW	GW	GW
	Sample Date	10/15/2015	01/12/2016	04/07/2016	04/07/2016	07/11/2016	12/02/2016	01/10/2017	01/10/2017	04/19/2017	07/06/2017	10/15/2015	01/13/2016	04/07/2016	08/03/2016
	Laboratory Sample I.D.	8092463	8204558	8326629	8326630	8473080	8727266	8785327	8785328	8952415	9092394	8092466	8208359	8326638	8508597
1,1,1-TRICHLOROETHANE		ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE (Freon®TF)		ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,2-DICHLORO-1,2,2-TRIFLUOROETHANE (Freon®123a)		ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,2-DICHLOROBENZENE		ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
ACETONE		ND@5.0	ND@5.0	ND@5.0	ND@5.0	ND@5.0	ND@5.0	ND@5.0	ND@5.0	ND@5.0	ND@5.0	ND@5.0	ND@5.0	ND@5.0	ND@5.0
CHLOROBENZENE		ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CIS-1,2-DICHLOROETHYLENE		ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
DICHLORODIFLUOROMETHANE (Freon®12)		ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
ETHYLBENZENE		ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
M,P-XYLENE		ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
O-XYLENE		ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TETRACHLOROETHYLENE		2.2	1.6	0.4J	0.4J	1.0	7.2	1.5	1.6	0.9	0.5J	0.8	0.6	0.5J	2.0
TRICHLOROETHYLENE		0.1J	ND@0.5	ND@0.5	ND@0.5	ND@0.5	0.3J	ND@0.5	ND@0.5	ND@0.5	ND@0.5	0.2J	0.1J	0.1J	0.4J
TRICHLOROFLUOROMETHANE		ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
VINYL CHLORIDE		ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5

All Results reported in micrograms per liter (ug/L)

Parameter	Sample Location	064	064	064	064	064	065	065	065	065	065	065	065	065	065
	Sample Description	REP	GW	GW	GW	GW	GW	REP	GW	GW	GW	GW	GW	GW	GW
	Sample Date	08/03/2016	10/10/2016	01/11/2017	04/05/2017	07/06/2017	10/15/2015	10/15/2015	01/12/2016	04/07/2016	08/03/2016	10/10/2016	01/10/2017	04/05/2017	07/06/2017
	Laboratory Sample I.D.	8508598	8642515	8785331	8925540	9092415	8092467	8092468	8204559	8326639	8508599	8642516	8785330	8925541	9092416
1,1,1-TRICHLOROETHANE		ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE (Freon®TF)		ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,2-DICHLORO-1,2,2-TRIFLUOROETHANE (Freon®123a)		ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,2-DICHLOROBENZENE		ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
ACETONE		ND@5.0	ND@5.0	ND@5.0	ND@5.0	ND@5.0	ND@5.0	ND@5.0	ND@5.0	ND@5.0	ND@5.0	ND@5.0	ND@5.0	ND@5.0	ND@5.0
CHLOROBENZENE		ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CIS-1,2-DICHLOROETHYLENE		ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
DICHLORODIFLUOROMETHANE (Freon®12)		ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
ETHYLBENZENE		ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
M,P-XYLENE		ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
O-XYLENE		ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TETRACHLOROETHYLENE		1.8	1.8	0.2J	0.1J	0.1J	0.5J	0.5J	0.2J	0.1J	0.8	1.3	0.3J	0.1J	0.1J
TRICHLOROETHYLENE		0.4J	0.4J	ND@0.5	ND@0.5	ND@0.5	0.2J	0.2J	0.1J	ND@0.5	0.2J	0.4J	0.2J	0.1J	0.1J
TRICHLOROFLUOROMETHANE		ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
VINYL CHLORIDE		ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5

All Results reported in micrograms per liter (ug/L)

Key:

GW Groundwater
REP Replicate
ND@X Not Detected at Detection Limit X
J Estimated Value

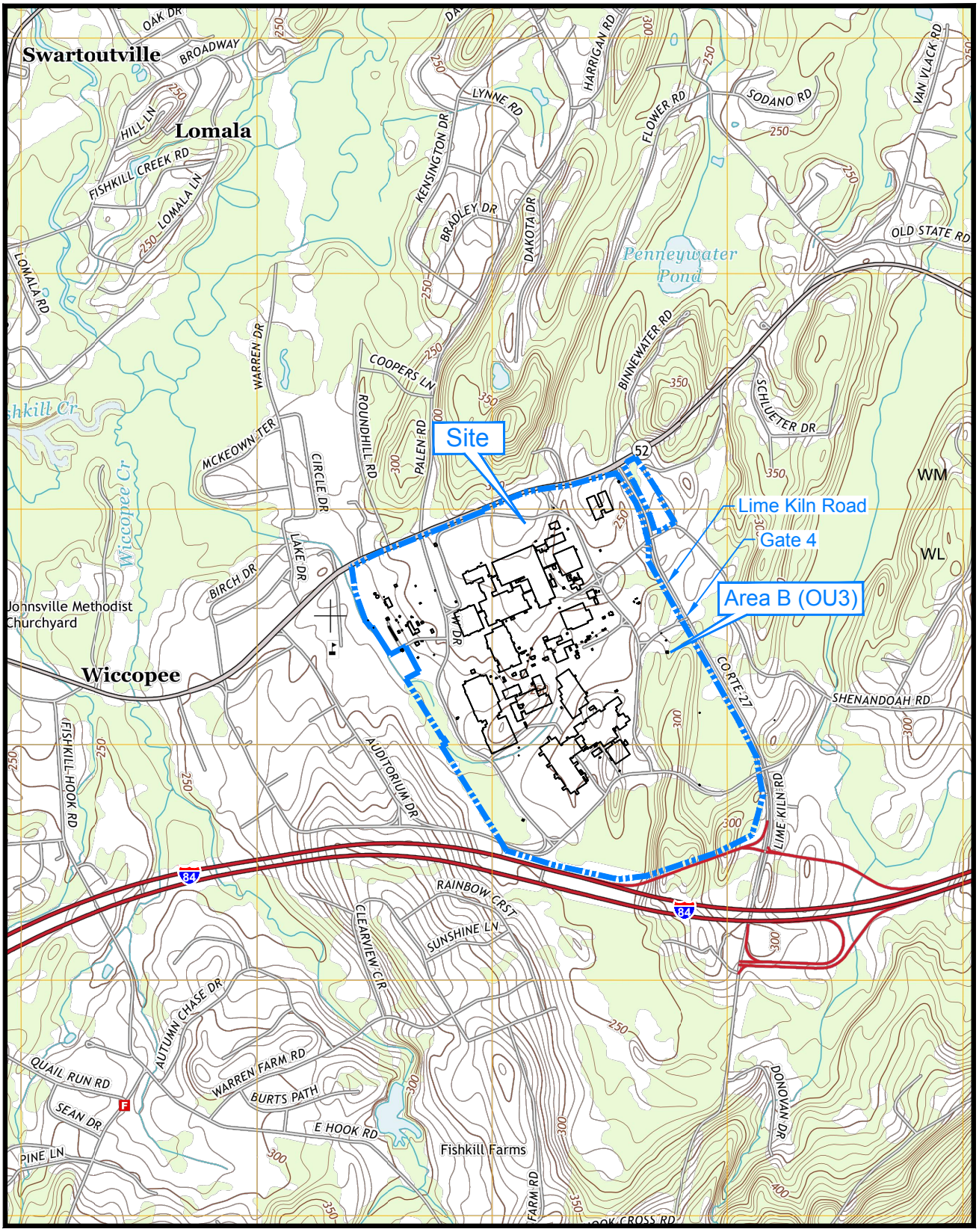
Table 2
Volatile Organic Compound Data, GW-628 Shutdown Test Groundwater Sampling
Area B Remediation Area (Operable Unit 3)
Former IBM East Fishkill Facility, East Fishkill, New York

	Sample Location	065	628	628	628	628	628	628	628	628	628
	Sample Description	REP	GW	GW	GW	GW	GW	REP	GW	GW	GW
	Sample Date	07/06/2017	10/15/2015	01/12/2016	04/07/2016	07/11/2016	10/10/2016	10/10/2016	01/10/2017	04/05/2017	07/06/2017
Parameter	**Laboratory Sample I.D.**	9092417	8092464	8204557	8326631	8473081	8642536	8642537	8785343	8925551	9092395
1,1,1-TRICHLOROETHANE		ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE (Freon®TF)		ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,2-DICHLORO-1,2,2-TRIFLUOROETHANE (Freon®123a)		ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
1,2-DICHLOROBENZENE		ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
ACETONE		ND@5.0	ND@5.0	ND@5.0	ND@5.0	ND@5.0	ND@5.0	ND@5.0	ND@5.0	ND@5.0	ND@5.0
CHLOROBENZENE		ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
CIS-1,2-DICHLOROETHYLENE		ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
DICHLORODIFLUOROMETHANE (Freon®12)		ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
ETHYLBENZENE		ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
M,P-XYLENE		ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
O-XYLENE		ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TETRACHLOROETHYLENE		0.1J	0.8	0.6	0.2J	0.2J	1	1	0.3J	0.7	0.1J
TRICHLOROETHYLENE		0.1J	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	0.1J	ND@0.5	ND@0.5	ND@0.5
TRICHLOROFLUOROMETHANE		ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
VINYL CHLORIDE		ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5

All Results reported in micrograms per liter (ug/L)

Key:

GW Groundwater
REP Replicate
ND@X Not Detected at Detection Limit X
J Estimated Value



Portion of the Hopewell Junction, NY
7.5-minute USGS Quadrangle
(The National Map US Topo, 2013)
Latitude/Longitude: 41°32'27"N, 73°49'28"W (41.540714, -73.824185)

N

Scale
0 1000' 2000'

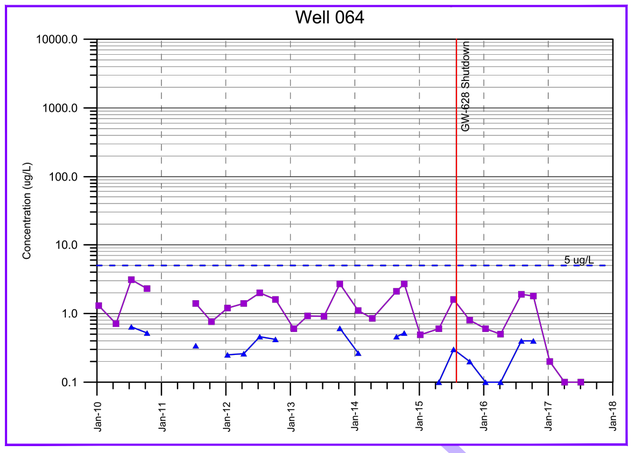
Figure 1

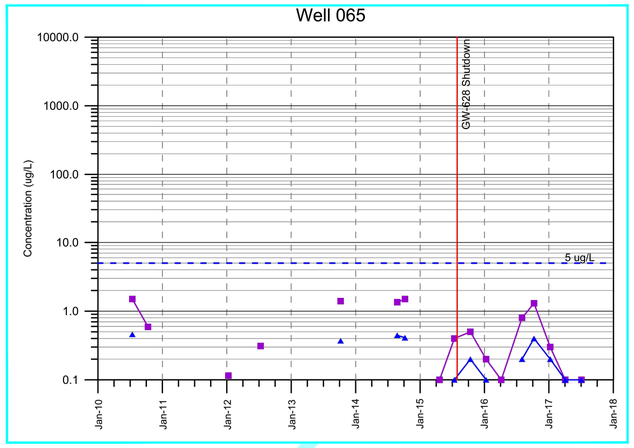
Former IBM East Fishkill Facility

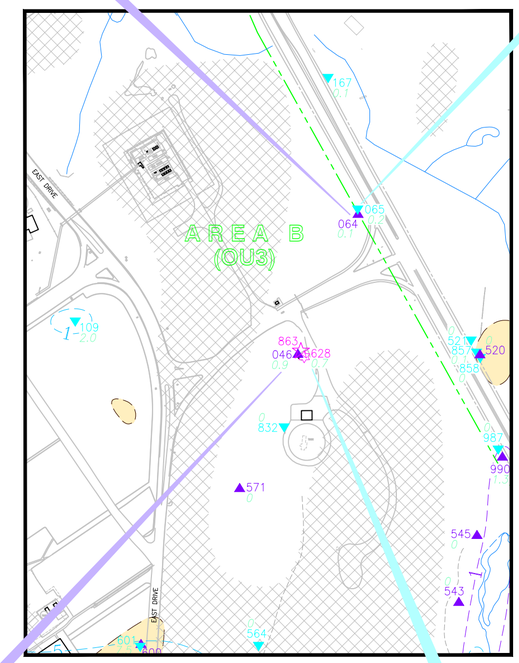
Site Location Map

GROUNDWATER SCIENCES CORPORATION

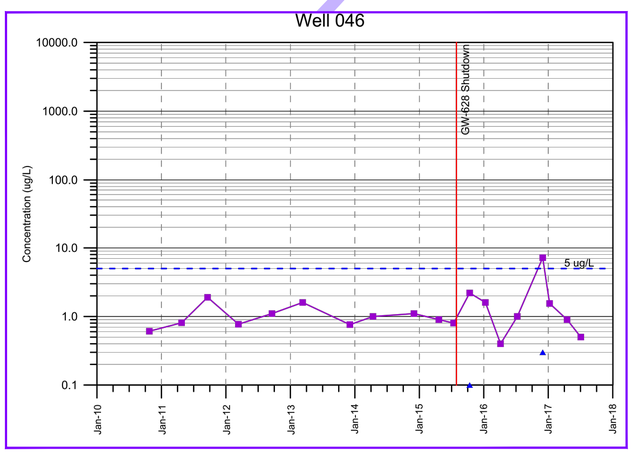
95007-044-E1 / 1-21-16

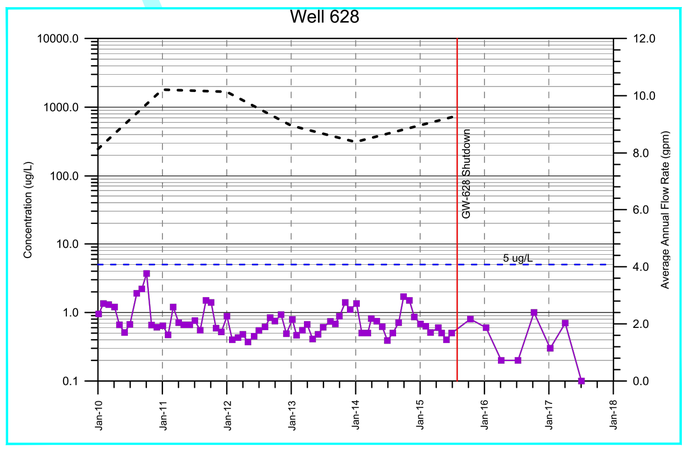






Area B (OU3)





PCE - Tetrachloroethene
TCE - Trichloroethene
CIS12-DCE - cis-1,2-Dichlorothene
VC - Vinyl Chloride*
Average Annual Flow Rate (gpm)
Sampling for Vinyl Chloride began in 1990.

LEGEND

- Former IBM East Fishkill Facility Property Line
- GMP Bedrock Monitoring Well
- GMP Soil Monitoring Well
- Inactive Bedrock Extraction Well
- Inactive Soil Extraction Well
- OU - Operable Unit
- 2.0 - PCE-Series Concentration (ug/l; April 4-May 12, 2017)
- Extent of Glaciolacustrine Clay (East Complex only)
- Inferred Areas of No Saturated Soil (approximate)
- Limit of Overburden PCE-Series Plume (ug/l, April-May 2017)
- Limit of Bedrock PCE-Series Plume (ug/l, April-May 2017)

Note: All concentrations have been rounded to a maximum of two significant figures. "0" means not detected.

Concentrations greater than the MDL but less than the RL (which is 0.5 ug/l x DF for most compounds) are also reported by the laboratory (MDL=Method Detection Limit, RL=Reporting Limit, and DF=Dilution Factor). Values greater than the MDL but less than the RL should be considered estimates that would typically be flagged with a "J" qualifier.

The PCE-series concentration is a calculated concentration that uses the weighted sum of four constituent VOC concentrations. In performing this calculation, compounds that were "not detected" are treated as zeroes, and the resulting PCE-series concentration is shown as "0" if none of the four PCE-series constituents was detected.

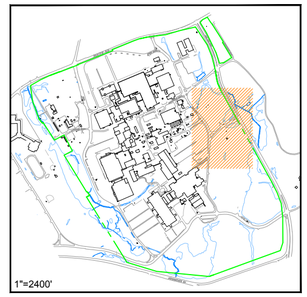


Figure 2

N

Scale
0 200' 300'

Former IBM East Fishkill Facility

Area B (OU3)
Well Location Map and
Time vs. Concentration Graphs
Soil/Bedrock

DRAWN BY: MHM	DATE: 8/31/17	DRAWING NO. 95007-089-H1
CHECKED & APPROVED BY: CES/RCW		

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