GROUNDWATER SCIENCES CORPORATION

560 Route 52, Suite 202
Beacon, NY 12508
(845) 896-0288
FAX (845) 896-7428

September 14, 2017

Ms. Jessica LaClair
Program Manager
New York State Department of
Environmental Conservation
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
Environmental Conservation
Division of Environmental Remediation
Remedial Bureau A, 11th Floor
625 Broadway
Albany, New York 12233-7015

Re: *Production Well PW-23 Shutdown Test Findings*
Southeast Quadrant Area of Concern (Operable Unit 9)
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 bedrock groundwater production well PW-23 located within the Southeast Quadrant (SEQ) Area of Concern (AOC) 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 improvements to groundwater quality had occurred in the area and the more recent data suggested continued operation of bedrock production well PW-23 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 of PW-23 withdrawals and monitoring of SEQ AOC groundwater[1]. The purpose of the test was to confirm that the operation of the PW-23 production well could be discontinued without a meaningful change in SEQ AOC 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, Production Well PW-23, Southeast Quadrant Area of Concern (Operable Unit 9).*
[2] NYSDEC to IBM Corporate Environmental Affairs, July 9, 2015, *Shutdown Test Request – Production Well PW-23, Southeast Quadrant Area of Concern (OU-9).*
[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. The SEQ AOC is located in the southeastern portion of the Site near Lime Kiln Road and South Drive. This AOC is also referred to as Operable Unit #9 (OU9) 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. The SEQ AOC is located on a parcel owned by National Resources.

The SEQ AOC is a former contractors' staging area which was used from the 1970s to the mid-1980s located in a filled area adjacent to a New York State Freshwater Wetland (HJ-52). The geologic conditions underlying the soil fill in the SEQ AOC consist of dense glacial till overlying carbonate bedrock. Post-glacial alluvium/colluvium and swamp deposits are also present in the area of the wetlands. Contamination in this area was first discovered in groundwater in 1980. The area was the subject of numerous investigations in the 1980s. Results of these initial investigations did not identify a potential source or sources in soil. In the mid- to late 1990s, a RCRA Facility Assessment (RFA) and RCRA Facility Investigation (RFI) for soil contamination were completed for this area. Based on the findings of the RFA and RFI, NYSDEC determined that No Further Action is required for soils in the SEQ[5]. The findings of these initial investigations indicated the groundwater contamination in this area is located in the soil fill, native soil and shallow fractured bedrock. Volatile organic compounds (VOCs), consisting of PCE and its breakdown products are the principal chemicals of concern in SEQ AOC groundwater.

In 1999, IBM initiated a review of the findings of the previous investigations and selected a shallow bedrock monitoring well (GW-552) to become a new bedrock production well (this well became designated as PW-23). The conversion of GW-552 to production well PW-23 required construction of a pump house building and about 1,100 feet of 4-inch diameter ductile iron water line to convey the PW-23 water to an existing 10-inch production well main located west of PW-23. The PW-23 pumping system, pump house, and conveyance piping were installed in 2001 and startup occurred in early 2002. When operating, thePW-23 production well groundwater withdrawals are treated at the B316 Central Carbon Treatment System, located in the north-central portion of the Site, and then used in manufacturing processes.

[4] NYSDEC, July 1, 2015, Facility Permit Transfer IBM Corporation to GLOBALFOUNDRIES U.S. 2LLC, East Fishkill Facility.
[5] Valaitis, V., New York State Department of Environmental Conservation to J. Hogan, IBM, August 13, 1998, *IBM East Fishkill: Final Report*.

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 ten well locations including:

- Bedrock production well PW-23;
- Overburden monitoring wells GW-048, GW-520, GW-543, GW545, and GW-990; and
- Bedrock monitoring wells GW-521, GW-857, GW-858, and GW-987.

Results of the water level monitoring are summarized in Table 1. Results of laboratory analyses for the presence of VOCs in the SEQ AOC groundwater samples are summarized in Table 2.

Groundwater flow in the overburden and shallow bedrock in the SEQ is generally to the northeast from the vicinity of PW-23 towards Lime Kiln Road. Prior to the shutdown test, PW-23 groundwater extraction created a localized depression in the potentiometric surface. Outside of the increase in groundwater elevations observed at PW-23, 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 the SEQ AOC. The well location map includes postings of the total concentrations of PCE and its daughter products trichloroethene (TCE), cis-1,2-dichloroethene (cis-1,2-DCE), and vinyl chloride (VC) (hereinafter collectively referred to as PCE-Series) detected in groundwater samples collected during the second quarter of 2017. The apparent PCE-Series presence in the glacial till is depicted by the purple 1 microrgram per liter (µg/L) contour and apparent PCE-Series presence in shallow bedrock is depicted by the light blue 1 µg/L contour. As indicated by the contours, the presence of PCE-Series constituents is inferred to be limited to a narrow zone that extends northeasterly from the area of PW-23 towards the Site property boundary and Lime Kiln Road.

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 PW-23 shutdown test. As shown on the figure, concentrations of PCE in glacial till well GW-048 and PW-23 did not exceed 3 µg/L during the test. PCE concentrations exceeded 90 µg/L at these locations during the initial investigation phase, the highest concentrations observed in the SEQ AOC. As shown on Figure 2, PCE concentrations observed in PW-23 during the shutdown test are comparable to concentrations observed in the roughly five year period before the start of the shutdown test. During the shutdown test, PCE concentrations in downgradient soil monitoring wells GW-543, GW-545 and GW-520 were less than 1 µg/L, and PCE concentrations in soil well GW-990 were less than 2 µg/L. TCE and cis-1,2-DCE were detected infrequently in SEQ AOC soil monitoring wells at concentrations less than 0.5 µg/L, and VC was not detected in any soil monitoring well. PCE was detected infrequently at concentrations less than

0.5 µg/L in downgradient bedrock wells GW-521, GW-857, and GW-987, with no other PCE-series detections. There were no detections of PCE-Series constituents in downgradient bedrock well GW-858.

CONCLUSIONS AND RECOMMENDATIONS

Groundwater in the SEQ AOC has not exceeded the NYSGQS for more than ten years, including the two-year long shutdown test. During the two-year long shutdown test the highest VOC concentrations detected in the former contractors' staging area were detected in samples collected from inactive bedrock production well PW-23. Review of the time versus PCE-Series constituent concentration graph for PW-23 suggests the concentrations have stabilized. The shutdown test confirms that operation of bedrock production well PW-23 can be discontinued without a meaningful change in Southeast Quadrant AOC groundwater quality. The permanent shutdown of production well PW-23 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 PW-23 bedrock groundwater withdrawals. We recommend that the water quality sampling frequency in the approved Groundwater Monitoring Plan (GMP)[6] for well PW-23 be converted from monthly to quarterly, while all other sampling and hydraulic effectiveness frequencies in SEQ AOC GMP wells remain unchanged.

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, PW-23 Shutdown Test Groundwater Monitoring
Table 2 – Volatile Organic Compound Data, PW-23 Shutdown Test Groundwater Sampling
Figure 1 – Site Location Map
Figure 2 – Southeast Quadrant (SEQ) (OU9), Well Location Map and Time vs. Concentration Graphs, Soil/Bedrock

[6] 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, PW-23 Shutdown Test Groundwater Monitoring
Southeast Quadrant Area of Concern (Operable Unit 9)
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)
048	264.31	10/6/2015	7.49	256.82	1/5/2016	6.00	258.31	4/4/2016	5.86	258.45	7/5/2016	6.11	258.20
520	262.28	10/6/2015	6.80	255.48	1/4/2016	5.78	256.50	4/4/2016	5.89	256.39	8/2/2016	5.94	256.34
521	262.24	10/6/2015	6.55	255.69	1/4/2016	4.85	257.39	4/4/2016	5.00	257.24	8/2/2016	5.39	256.85
543	263.07	10/6/2015	7.57	255.50	1/5/2016	6.04	257.03	4/4/2016	5.64	257.43	7/5/2016	6.43	256.64
545	264.96	10/6/2015	9.32	255.64	1/5/2016	7.86	257.10	4/4/2016	7.61	257.35	7/5/2016	8.33	256.63
857	261.41	10/6/2015	6.64	254.77	1/4/2016	ARTESIAN	ARTESIAN	4/4/2016	ARTESIAN	ARTESIAN	8/2/2016	0.78	260.63
858	260.85	10/6/2015	6.77	254.08	1/4/2016	1.69	259.16	4/4/2016	ARTESIAN	ARTESIAN	8/2/2016	3.69	257.16
987	260.20	10/6/2015	4.99	255.21	1/4/2016	3.60	256.60	4/4/2016	3.46	256.74	8/2/2016	3.94	256.26
990	260.08	10/6/2015	4.99	255.09	1/4/2016	3.82	256.26	4/4/2016	3.70	256.38	8/2/2016	3.98	256.10
PW-23	267.03	10/6/2015	10.57	256.46	1/5/2016	9.14	257.89	4/4/2016	8.67	258.36	7/5/2016	9.50	257.53

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)
048	264.31	10/6/2016	8.06	256.25	1/3/2017	5.88	258.43	4/24/2017	5.70	258.61	7/10/2017	6.95	257.36
520	262.28	10/5/2016	7.58	254.70	1/9/2017	5.82	256.46	4/24/2017	5.50	256.78	7/10/2017	6.60	255.68
521	262.24	10/5/2016	7.69	254.55	1/9/2017	5.12	257.12	4/24/2017	3.78	258.46	7/10/2017	6.51	255.73
543	263.07	10/6/2016	8.20	254.87	1/3/2017	5.68	257.39	4/24/2017	4.59	258.48	7/10/2017	7.01	256.06
545	264.96	10/6/2016	9.92	255.04	1/3/2017	7.53	257.43	4/24/2017	6.73	258.23	7/10/2017	8.77	256.19
857	261.41	10/5/2016	7.90	253.51	1/9/2017	ARTESIAN	ARTESIAN	4/24/2017	ARTESIAN	ARTESIAN	7/10/2017	ARTESIAN	ARTESIAN
858	260.85	10/5/2016	7.48	253.37	1/9/2017	ARTESIAN	ARTESIAN	4/24/2017	ARTESIAN	ARTESIAN	7/10/2017	2.47	258.38
987	260.20	10/5/2016	5.59	254.61	1/9/2017	3.48	256.72	4/24/2017	2.85	257.35	7/10/2017	4.70	255.50
990	260.08	10/5/2016	5.54	254.54	1/9/2017	3.74	256.34	4/24/2017	3.31	256.77	7/10/2017	4.79	255.29
PW-23	267.03	10/6/2016	10.66	256.37	1/3/2017	8.34	258.69	4/24/2017	7.72	259.31	7/10/2017	9.28	257.75

Table 2
Volatile Organic Compound Data, PW-23 Shutdown Test Groundwater Sampling
Southeast Quadrant Area of Concern (Operable Unit 9)
Former IBM East Fishkill Facility, East Fishkill, New York

	Sample Location	048	048	048	048	048	048	048	048	048	048	520	520	520	520
	Sample Description	GW	GW	REP	GW	REP	GW	GW	GW	GW	GW	GW	GW	GW	GW
	Sample Date	10/15/2015	01/18/2016	01/18/2016	04/11/2016	04/11/2016	07/11/2016	10/10/2016	01/10/2017	04/05/2017	07/06/2017	10/16/2015	01/18/2016	04/08/2016	08/02/2016
Parameter	Laboratory Sample I.D.	8092469	8212523	8212524	8331034	8331035	8473061	8642517	8785326	8925545	9092418	8094229	8212825	8326635	8508592
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		0.2J	ND@0.5	ND@0.5	ND@0.5	ND@0.5	0.1J	0.2J	ND@0.5	ND@0.5	0.2J	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		0.1J	0.1J	0.1J	0.5J	0.4J	0.2J	0.3J	0.2J	1.4	1.5	ND@0.5	0.1J	ND@0.5	0.1J
TRICHLOROETHYLENE		0.1J	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	0.4J	ND@0.5	ND@0.5	0.2J	ND@0.5	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	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)

	Sample Location	520	520	520	520	521	521	521	521	521	521	521	521	521	521
	Sample Description	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	REP	GW	GW	GW
	Sample Date	10/10/2016	01/11/2017	04/05/2017	07/07/2017	10/16/2015	01/18/2016	04/08/2016	08/02/2016	08/24/2016	10/10/2016	10/10/2016	01/11/2017	04/05/2017	07/07/2017
Parameter	Laboratory Sample I.D.	8642519	8785348	8925554	9092426	8094230	8212826	8326636	8508593	8548013	8642520	8642521	8785350	8925555	9092427
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	0.1J	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		0.3J	0.1J	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	0.2J	0.2J	ND@0.5	ND@0.5	ND@0.5
TRICHLOROETHYLENE		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
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, PW-23 Shutdown Test Groundwater Sampling
Southeast Quadrant Area of Concern (Operable Unit 9)
Former IBM East Fishkill Facility, East Fishkill, New York

Parameter	Sample Location	543	543	543	543	543	543	543	543	543	545	545	545	545	545
	Sample Description	GW	GW	GW	GW	GW	GW	REP	GW	GW	GW	GW	GW	GW	REP
	Sample Date	10/16/2015	01/18/2016	04/08/2016	07/11/2016	10/10/2016	01/11/2017	01/11/2017	04/05/2017	07/06/2017	10/16/2015	01/18/2016	04/08/2016	07/11/2016	07/11/2016
	Laboratory Sample I.D.	8094232	8212828	8326633	8473082	8642538	8785346	8785347	8925552	9092396	8094241	8212827	8326634	8473083	8473084
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		0.2J	0.3J	0.3J	0.2J	0.2J	0.6	0.6	ND@0.5	0.4J	0.1J	0.2J	ND@0.5	ND@0.5	ND@0.5
TRICHLOROETHYLENE		ND@0.5	ND@0.5	ND@0.5	0.1J	0.1J	ND@0.5	ND@0.5	ND@0.5	0.1J	ND@0.5	ND@0.5	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	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	545	545	545	545	545	857	857	857	857	857	857	857	857	858
	Sample Description	GW	GW	GW	GW	REP	GW	GW	GW	GW	GW	GW	GW	GW	GW
	Sample Date	10/10/2016	01/11/2017	04/05/2017	07/06/2017	07/06/2017	10/15/2015	01/11/2016	04/11/2016	08/03/2016	10/10/2016	01/11/2017	04/06/2017	07/07/2017	10/16/2015
	Laboratory Sample I.D.	8642539	8785349	8925553	9092397	9092398	8092473	8204553	8331033	8508596	8642522	8785332	8929590	9092425	8094231
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	0.1J	0.1J	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		ND@0.5	0.1J	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	0.1J	ND@0.5	ND@0.5
TRICHLOROETHYLENE		ND@0.5	ND@0.5	ND@0.5	ND@0.5	0.1J	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
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, PW-23 Shutdown Test Groundwater Sampling
Southeast Quadrant Area of Concern (Operable Unit 9)
Former IBM East Fishkill Facility, East Fishkill, New York

	Sample Location	858	858	858	858	858	858	858	987	987	987	987	987	987	987
	Sample Description	GW	GW	GW	GW	GW	GW	GW	GW	REP	GW	GW	GW	GW	GW
	Sample Date	01/11/2016	04/08/2016	08/03/2016	10/10/2016	01/11/2017	04/06/2017	07/07/2017	10/15/2015	10/15/2015	01/18/2016	04/07/2016	08/03/2016	10/11/2016	01/12/2017
Parameter	Laboratory Sample I.D.	8204552	8326642	8508595	8642518	8785333	8929591	9092424	8092470	8092471	8212525	8326640	8508600	8642523	8787069
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		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	0.1J	0.1J	ND@0.5	ND@0.5	ND@0.5
TRICHLOROETHYLENE		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	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)

	Sample Location	987	987	990	990	990	990	990	990	990	990	990	990	990	PW-23
	Sample Description	GW	GW	GW	GW	GW	GW	GW	REP	GW	REP	GW	REP	GW	GW
	Sample Date	04/05/2017	07/06/2017	10/15/2015	01/18/2016	04/07/2016	08/03/2016	10/11/2016	10/11/2016	01/11/2017	01/11/2017	04/05/2017	04/05/2017	07/06/2017	10/16/2015
Parameter	Laboratory Sample I.D.	8925542	9092419	8092472	8212526	8326641	8508601	8642524	8642525	8785334	8785335	8925543	8925544	9092420	8094228
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	0.1J	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		ND@0.5	ND@0.5	1.3	1.4	1.2	1.7	1.2	1.3	1.2	1.2	1.1	1.1	1.1	0.2J
TRICHLOROETHYLENE		ND@0.5	ND@0.5	0.3J	0.2J	0.2J	0.2J	0.3J	0.2J	0.2J	0.2J	0.1J	0.2J	0.2J	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	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

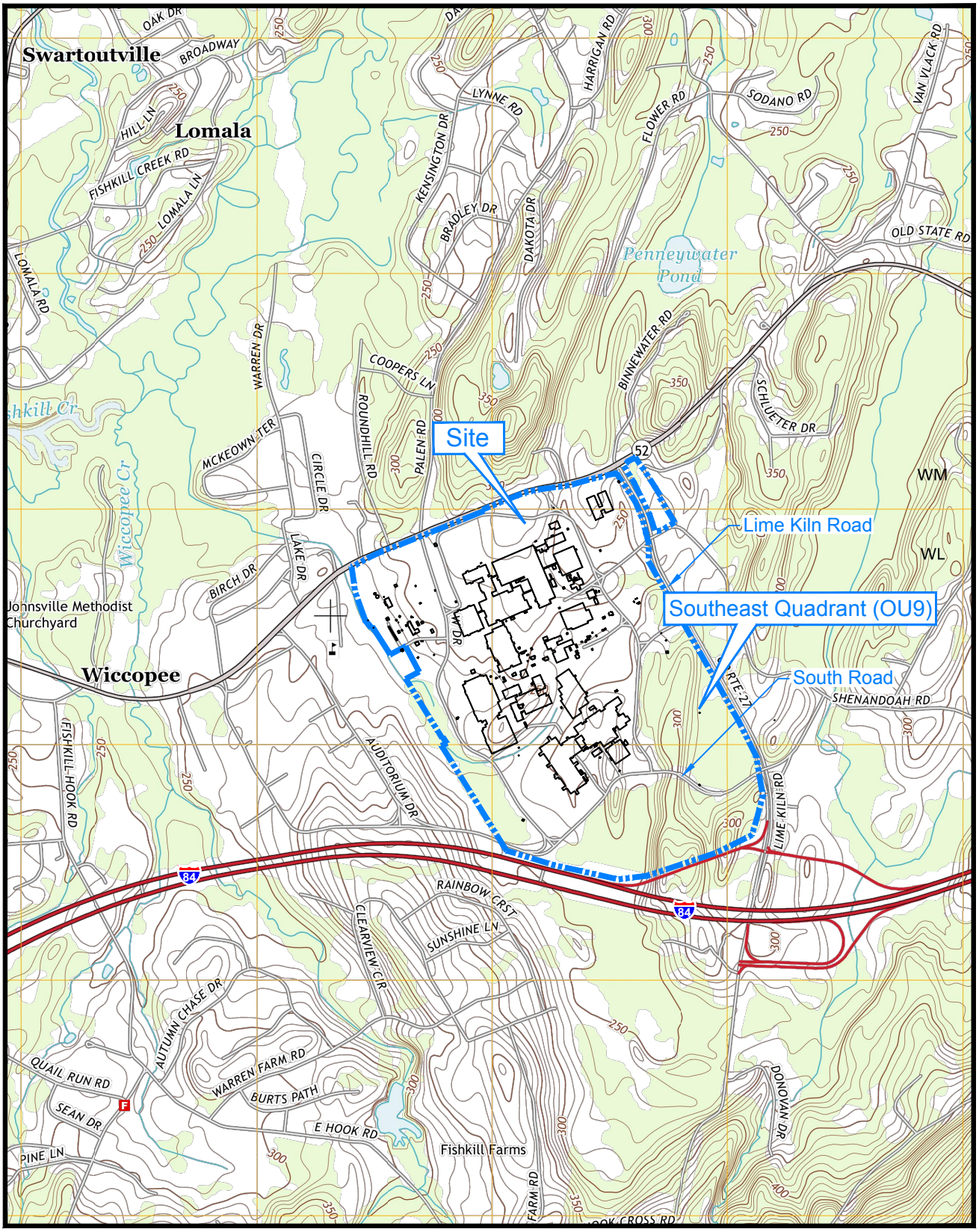
Table 2
Volatile Organic Compound Data, PW-23 Shutdown Test Groundwater Sampling
Southeast Quadrant Area of Concern (Operable Unit 9)
Former IBM East Fishkill Facility, East Fishkill, New York

	Sample Location	PW-23	PW-23	PW-23	PW-23	PW-23	PW-23	PW-23
	Sample Description	GW	GW	GW	GW	GW	GW	GW
	Sample Date	01/11/2016	04/08/2016	07/15/2016	10/11/2016	01/12/2017	04/05/2017	07/06/2017
Parameter	Laboratory Sample I.D.	8204554	8326632	8478108	8642526	8787070	8925546	9092423
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
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
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
1,2-DICHLOROBENZENE		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
CHLOROBENZENE		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	0.1J	0.1J	0.1J	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
ETHYLBENZENE		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
O-XYLENE		ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5	ND@0.5
TETRACHLOROETHYLENE		2.3	0.7	0.6	0.7	1.5	2.6	0.5
TRICHLOROETHYLENE		0.1J	0.1J	0.1J	0.2J	0.1J	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
VINYL CHLORIDE		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'

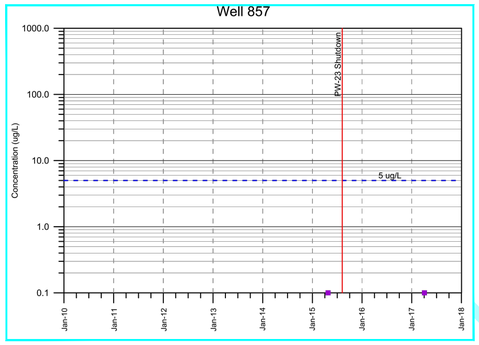
Figure 1

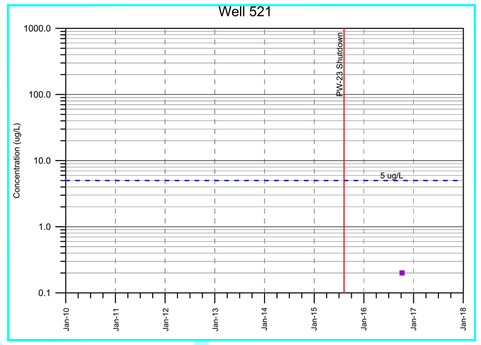
Former IBM East Fishkill Facility

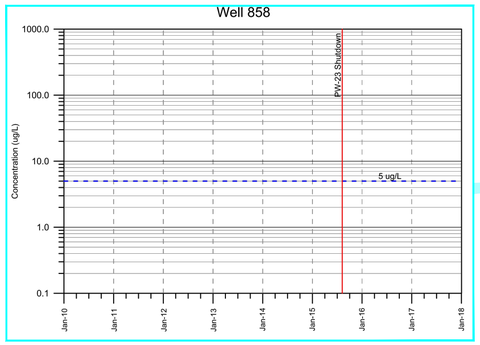
Site Location Map

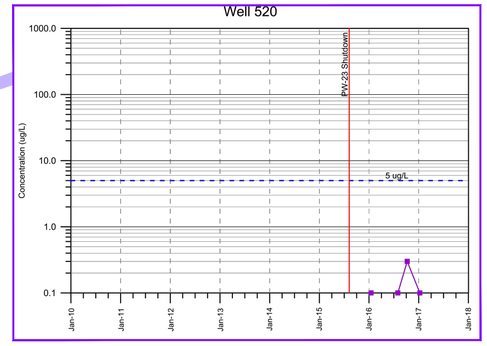
GROUNDWATER SCIENCES CORPORATION

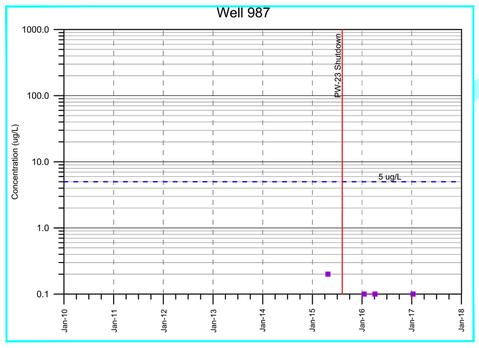
95007-044-E2 / 1-21-16

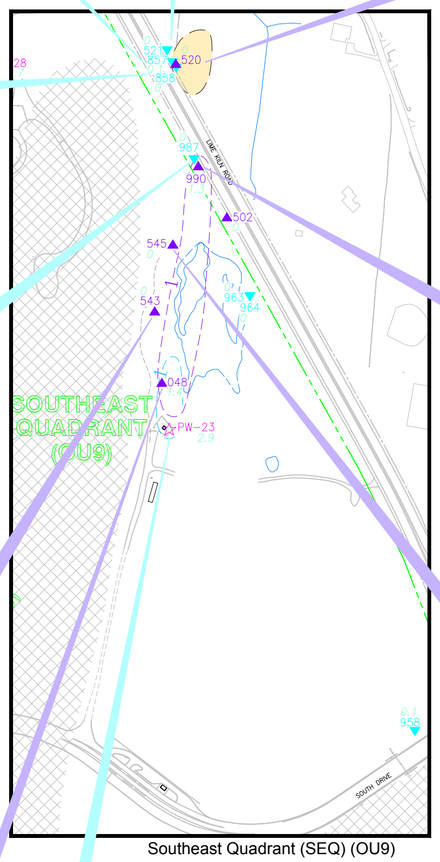




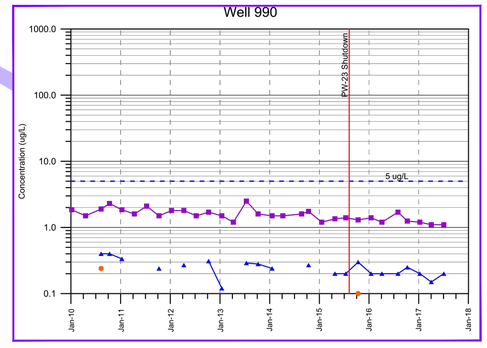


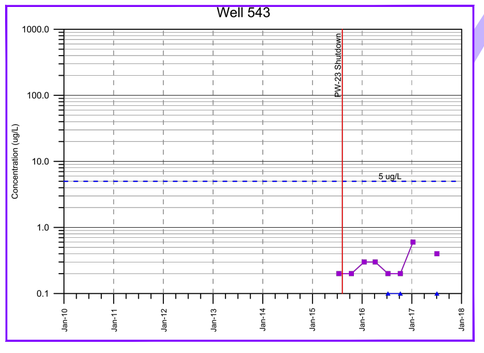


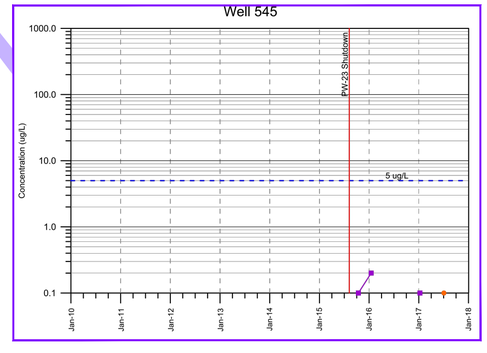


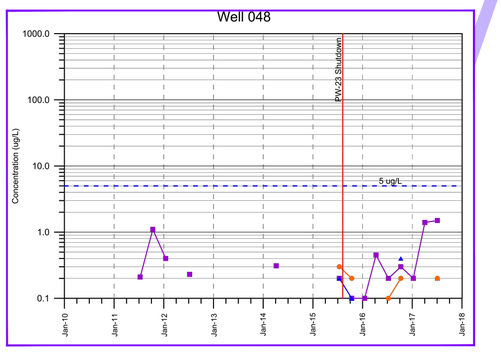


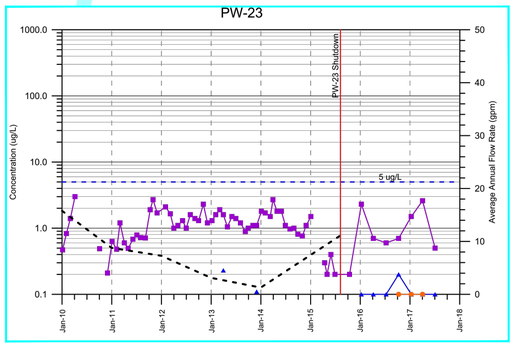
Southeast Quadrant (SEQ) (OU9)











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
- Inactive Bedrock Extraction Well
- GMP Bedrock Monitoring Well
- GMP Soil Monitoring Well
- OU - Operable Unit
- 2.9 - 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=Dillution 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.

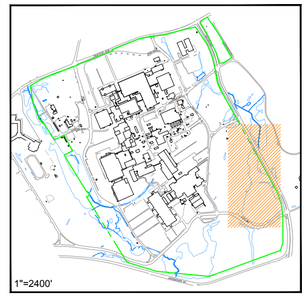


Figure 2

N

Scale
0 200' 300'

Former IBM East Fishkill Facility

Southeast Quadrant (SEQ) (OU9)
Well Location Map and
Time vs. Concentration Graphs
Soil/Bedrock

DRAWN BY: MHM	DATE: 8/31/17	DRAWING NO. 95007-089-H2
CHECKED & APPROVED BY: CES/RCW		

GROUNDWATER SCIENCES CORPORATION