VIA ELECTRONIC MAIL

June 2, 2023

John Hopkins
Remedial Project Manager
U.S. Environmental Protection Agency, Region III
4 Penn Center
Mail Code – 3LD10
Philadelphia, PA 19103

Subject: **Quarterly Progress Report No. 26**
Former Kop-Flex Facility Site, Hanover, Maryland
USEPA ID No. MDD043373935
Administrative Order on Consent, Docket No. RCRA-03-2016-0170 CA

Dear John:

On behalf of EMERSUB 16, LLC, a subsidiary of Emerson Electric Co., WSP USA, Inc. (WSP) is submitting this quarterly progress report describing the activities conducted in the first quarter of calendar year 2023 (January 1st through March 31st) as part of the corrective measures implementation at the former Kop-Flex, Inc. facility property located at 7555 Harmans Road (Site) in Hanover, Maryland. The Site is identical to the area described as the "Facility" in the Administrative Order on Consent, Docket No. RCRA-03-2016-0170 CA (Consent Order). The report also describes the activities planned for the second quarter of calendar year 2023 (April 1st through June 30th).

This progress report is being submitted to the U.S. Environmental Protection Agency (EPA) pursuant to Section VI.C.3 of the Consent Order. Please note that, in addition to performing the work conducted under the Consent Order, EMERSUB 16 continues to perform the remedial activities specified in the October 2015 Response Action Plan (RAP) approved by the Maryland Department of the Environment (MDE) Voluntary Cleanup Program, and that EMERSUB 16 copies USEPA on all submittals required under that program.

If you have any questions, please do not hesitate to contact us at 703-709-6500.

Kind regards,

Robert E. Johnson
Vice President – Earth & Environment

SLB:REJ
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Encl.

cc: Mr. Stephen Clarke, EMERSUB 16 LLC
Ms. Richelle Hanson, Maryland Department of the Environment

WSP USA
Suite 300
13530 Dulles Technology Drive
Herndon, VA 20171

Tel.: +1 703 709-6500
wsp.com

CERTIFICATION

I certify that the information contained in or accompanying this quarterly progress report is true, accurate, and complete.

As to those portions of this quarterly progress report for which I cannot personally verify their accuracy, I certify under penalty of law that this quarterly report and all attachments were prepared in accordance with procedures designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, or the immediate supervisor of such person(s), the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

Signature: 

Name: Stephen L. Clarke

Title: President of EMERSUB 16, LLC

WSP USA
Suite 300
13530 Dulles Technology Drive
Herndon, VA 20171

Tel.: +1 703 709-6500
Fax: +1 703 709-8505
wsp.com

Site Name:	Former Kop-Flex Facility
Site Address:	7555 Harmans Road Hanover, Maryland 21077
Consultant:	WSP USA Inc.
Address:	13530 Dulles Technology Drive, Suite 300 Herndon, Virginia 20171
Phone No.:	(703) 709-6500
Project Coordinator:	Eric Johnson
Alternate:	Lisa Kelly

1.0 ACTIVITIES COMPLETED DURING JANUARY 2023 – MARCH 2023 REPORTING PERIOD

1.1 HYDRAULIC CONTAINMENT SYSTEM OPERATION

– The hydraulic containment system (System) operated for 85 of the 90 days during the first quarter of 2023, which equates to a 94% run-time efficiency over this 3-month period. There was one (1) unexpected, brief (approximately 3-day) shutdown during January presumably due to weather-related power outages affecting the System controls. The System was manually shut down on March 30th due to failure of a component of the boiler used to generate steam for regeneration of the System treatment resin[1]. As during the previous reporting period, there was no extraction of groundwater from shallow recovery well RW-3S during the 1st quarter of 2023 due to a problem with the water level transducer.[2] Analysis of the recent water level data indicates a similar hydraulic response in the shallow zone of the Lower Patapsco aquifer with and without groundwater pumping from RW-3S. Based on the identical area of hydraulic influence and minimal contaminant mass recovery from RW-3S, WSP plans to keep this well temporarily shut-down to further evaluate the cause(s) for the reduced well yield noted in the summer of 2022 and implement appropriate corrective action(s) to improve well performance, along with allowing time for the repair or replacement of the transducer in the well.

  While the System was in operation, there were two (2) brief periods (1-day each) of no groundwater extraction from deep recovery well RW-1D due to malfunctioning of the variable frequency drive (VFD) that controls the operation of the submersible pump in this well. Since 2020, there has been a recurring "overvoltage" fault for the RW-1D VFD that prevents the RW-1D pump from restarting following the brief pause in System pump operations that occurs at the completion of each resin regeneration. Inspection and servicing of the RW-1D VFD was completed during January 2023 by a programmer from Doddridge Controls, Inc., a system controls and automation expert. The programmer was unable to specifically identify the cause of the recurring overvoltage fault. Based on the manufacturer's recommendations for the recurring fault, the programmer adjusted the VFD operating settings to reduce the potential for overvoltage conditions to occur during pump operation. Since the servicing of the unit, there has been one (1) recurrence of the VFD fault for well RW-1D. Replacement of the RW-1D VFD may be necessary if the overvoltage fault continues to recur regularly.

– A total of approximately 8.08 million gallons of impacted groundwater were extracted and treated during the first quarter of 2023, with the combined average monthly withdrawal rate during full-scale operation ranging from 64 gallons per minute (GPM) to 74 GPM. Effluent samples were collected monthly for chemical analysis in accordance with the requirements specified in the

[1] Repair of the boiler was completed the week of April 10, 2023.
[2] For each recovery well, the water level transducer needs to be functioning or the submersible pump will not operate.

extended National Pollutant Discharge Elimination System (NPDES) Permit for the System. The analytical results for all monitoring parameters complied with the effluent limitations specified in the extended NPDES Permit.

- To monitor and evaluate concentrations of volatile organic compounds (VOCs) and 1,4-dioxane in the untreated (*i.e.*, extracted) and treated water, samples of both the System influent and effluent were collected and analyzed during the reporting period. An influent water sample was collected for analysis in January 2023, while monthly effluent samples were collected from January through March 2023. The total concentration of chlorinated VOCs (CVOCs) and 1,4-dioxane in the influent sample was 392 micrograms per liter (µg/L), which is slightly lower than the results for samples collected during the 3rd and 4th quarters of 2022. The temporal change in contaminant levels in the extracted groundwater is believed to be related to the redistribution, or back diffusion, of CVOCs and 1,4-dioxane between the low and high permeability aquifer materials when the System was shut down from late April to early August 2022. The diffusion of contaminant mass from low permeability to high permeability layers during the shut-down period would have been largely removed during the first few months when the System resumed operation (i.e., 4th quarter 2022), with lower concentrations of CVOCs and 1,4-dioxane in subsequent months. As of the end of March 2023, an estimated total of 478 pounds of CVOCs and 198 pounds of 1,4-dioxane have been recovered from the affected portion of the Lower Patapsco aquifer.

  Analyses of the effluent samples indicated non-detect concentrations for the site related CVOCs. The 1,4-dioxane concentrations in the effluent samples ranged from non-detect (March 2023) to 5.3 µg/L (January 2023). The analytical results for 1,4-dioxane were all below the site-specific cleanup level of 15 µg/L and consistent with concentrations detected in previous samples of the treated groundwater.

1.2 NPDES PERMIT RENEWAL

- To facilitate the preparation of the draft NPDES permit, representatives of the Industrial and General Permits Division of the MDE Water and Science Administration visited the Site on January 11, 2023, to gain more knowledge and understanding of the System design and operation. WSP provided an overview of the System and answered MDE's questions regarding the current and future operation.
- Following the Site visit, WSP responded to requests for additional information from MDE regarding the System. The information was provided in email transmittals between mid-January and mid-February 2023 and included: (1) Safety Data Sheets with the composition of chemicals added to the boiler water; (2) historical data on the concentrations of CVOCs and 1,4-dioxane in the System influent (*i.e.*, untreated water); and (3) historical information concerning the 1,4-dioxane levels in the effluent.

1.3 EVALUATION OF GROUNDWATER PUMPING FROM RW-3S

- WSP collected a synoptic round of water level measurements from the onsite shallow monitoring wells and recovery well piezometers during the week of March 6, 2023. The collection of this additional data from the shallow zone of the Lower Patapsco aquifer (LPA) was to further assess the water level response to remedial pumping with recovery well RW-3S off-line for approximately 6 months. The water level data for this and previous measurement rounds is provided in Table 1.

  The contouring of the groundwater elevations determined from the early March water level measurements showed spatial variations in the water table (Figure 1) and piezometric surface for the lower portion of the shallow zone (Figure 2) that closely resemble those from previous measurement rounds when all shallow recovery wells were in operation. Based on the head contours for the lower portion of the shallow zone, the southern extent of the recovery well inflow, or capture, area continues to extend to the area of monitoring well MW-44, which is consistent with the evaluation of the groundwater levels during the pumping of RW-3S.

- Figure 3 compares the hydraulic head response to groundwater withdrawals from the shallow zone of the LPA with (May 2021) and without (November 2022 and March 2023) pumping from recovery well RW-3S. As expected, the water table contours for the three measurement events show a slight lowering of the groundwater surface in the area around MW-38R, which is the result

of pumping from wells RW-1S and RW-2S. For the lower portion of the shallow zone, the inferred southern limit of the inflow, or capture, area for the shallow recovery well system extends to the vicinity of the small pond on the adjoining William-Scotsman property for situations when well RW-3S is on-line (*i.e.*, pumping) and off-line (*i.e.*, not pumping). Based on this comparative analysis, the operational status of well RW-3S has no discernable detrimental effect on the hydraulic influence and associated capture area in the shallow LPA zone.

- A yearly breakdown in the contaminant mass removal by each of the shallow recovery wells from 2017 through 2022 is depicted in Figure 4. As indicated in the bar graph, the vast majority of CVOCs and 1,4-dioxane removed by the shallow well system has been via pumping from wells RW-1S and RW-2S. The groundwater discharge from RW-3S has typically contributed less than 1% of the contaminant mass removal over the approximately 6 years of remedial pumping. The very low mass recovery from RW-3S reflects both the low pumping rate for this well due to the localized prevalence of fine-grained (silt and clay) deposits within the shallow zone and very low CVOC and 1,4-dioxane concentrations in the extracted groundwater.
- Based on the above findings, WSP concludes that the temporary cessation of groundwater pumping from well RW-3S should not negatively affect the continued hydraulic containment of the shallow contaminant plume or result in a significant decrease in the CVOC and 1,4-dioxane mass recovery from the shallow LPA zone. Thus, as stated in Section 1.1 above, EMERSUB 16 and WSP proposed to temporarily leave well RW-3S shutdown to further assess and rehabilitate this recovery well. In conjunction with the well assessment, the water level transducer will be repaired or replaced so that it can be installed and, if deemed appropriate, RW-3S brought back on-line.

2.0 PLANNED ONSITE ACTIVITIES FOR THE SECOND QUARTER OF 2023

- Continue with the full-scale System operation, including an interim solution for managing the boiler blowdown discharge, and collection and assessment of System data to evaluate operational performance. Upon receipt of the new NPDES Permit, the blowdown water will be rerouted to enable combining it with the extracted groundwater in the flow equalization tank for treatment through the System.
- Conduct the required monthly effluent monitoring and reporting pursuant to the State Discharge/NPDES Permit.
- Continue to assist and provide information to MDE to facilitate the preparation and issuance of the new NPDES Permit for the System discharge.
- Collect water level measurements from the monitoring and recovery wells and evaluate the data to assess the aquifer response to remedial pumping and capture of the VOC plumes in the shallow and deep zones of the Lower Patapsco aquifer at the Site.
- Conduct semi-annual sampling of the monitoring wells and recovery well discharge in mid-May 2023 pursuant to the approved Groundwater Monitoring Plan.
- Submit the 2022 Operation, Maintenance and Monitoring Report for the hydraulic containment system to EPA and MDE.

3.0 KEY PERSONNEL/FACILITY CHANGES

There were no changes to the key personnel for the corrective action or onsite conditions related to the activities conducted by the facility owner/operator.

FIGURES

STONY RUN

POND

WILLIAMS SCOTSMAN, INC.

TREATMENT EQUIPMENT BUILDING

NORTH WAREHOUSE

SOUTH WAREHOUSE

MW-03

MW-43

MW-39

MW-38R

RW-1S

MW-42
108.35

RW-2S

MW-18

MW-5R
108.44

RW-3S

MW-44

MW-09
114.01

MW-04R
113.59

MW-20

MW-45

MW-16

MW-01
114.51

106 107 108 109 110 111 112 113 114

114

LEGEND

- PROPERTY LINE
- STREAM/EDGE OF WATER
- FENCE LINE
- STORMWATER MANAGEMENT AREA
- SHALLOW MONITORING WELL
- SHALLOW EXTRACTION WELL
- 114.15 GROUNDWATER SURFACE ELEVATION (FEET MSL)
- GROUNDWATER SURFACE CONTOUR (DASHED WHERE INFERRED)
- GROUNDWATER FLOW PATH

NOTE:
THE MARCH 2023 GROUNDWATER ELEVATIONS ARE REPRESENTATIVE OF PUMPING CONDITIONS WITHOUT WELL RW-3S IN OPERATION.

0 140 280
SCALE IN FEET

THE ORIGINAL VERSION OF THIS DRAWING IS IN COLOR. BLACK & WHITE COPIES MAY NOT ACCURATELY DEPICT CERTAIN INFORMATION.

Drawn By: EGC
Checked: 3/24/2023
Approved: 3/29/2023
DWG Name: 314V5608.010-032

FORMER KOP-FLEX FACILITY SITE
HANOVER, MARYLAND
PREPARED FOR
EMERSUB 16 LLC
ST. LOUIS, MISSOURI

FIGURE 1

WATER TABLE CONTOUR MAP, PUMPING CONDITIONS (MARCH 2023)

WSP USA Inc.
13530 DULLES TECHNOLOGY DR
SUITE 300
HERNDON, VA 20171
TEL: +1 703.709.6500

STONY RUN

POND

WILLIAMS SCOTSMAN, INC.

NORTH WAREHOUSE

SOUTH WAREHOUSE

TREATMENT EQUIPMENT BUILDING

MW-03 107.29

MW-43 101.76

MW-39 101.79

MW-38R

RW-1S 105.85

RW-2S 95.66

MW-42

MW-18 102.30

MW-5R

RW-3S 108.90

MW-44 110.18

MW-09

MW-04R

MW-20 113.72

MW-16 112.65

MW-01

106

108

110

112

100

102

104

N

LEGEND

- PROPERTY LINE
- STREAM/EDGE OF WATER
- FENCE LINE
- STORMWATER MANAGEMENT AREA
- SHALLOW MONITORING WELL
- SHALLOW EXTRACTION WELL
- 112.65 PIEZOMETRIC SURFACE ELEVATION (FEET MSL)
- PIEZOMETRIC SURFACE CONTOUR (DASHED WHERE INFERRED)
- GROUNDWATER FLOW PATH

NOTE:
THE NOVEMBER 2022 GROUNDWATER ELEVATIONS ARE REPRESENTATIVE OF PUMPING CONDITIONS WITHOUT WELL RW-3S IN OPERATION.

0 140 280
SCALE IN FEET

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B NOTICE: THIS DRAWING HAS BEEN PREPARED UNDER THE DIRECTION OF A PROFESSIONAL. DO NOT ALTER THIS DOCUMENT IN ANY WAY WITHOUT THE WRITTEN CONSENT OF WSP USA INC.

Drawn By: EGC
Checked: 3/24/2023
Approved: 3/29/2023
DWG Name: 314V5608.010-033

FORMER KOP-FLEX FACILITY SITE
HANOVER, MARYLAND
PREPARED FOR
EMERSUB 16 LLC
ST. LOUIS, MISSOURI

FIGURE 2

PIEZOMETRIC SURFACE CONTOUR MAP FOR THE LOWER PORTION OF THE SHALLOW ZONE OF THE LOWER PATASPCO AQUIFER (MARCH 2023)

WSP USA Inc.
13530 DULLES TECHNOLOGY DR
SUITE 300
HERNDON, VA 20171
TEL: +1 703.709.6500

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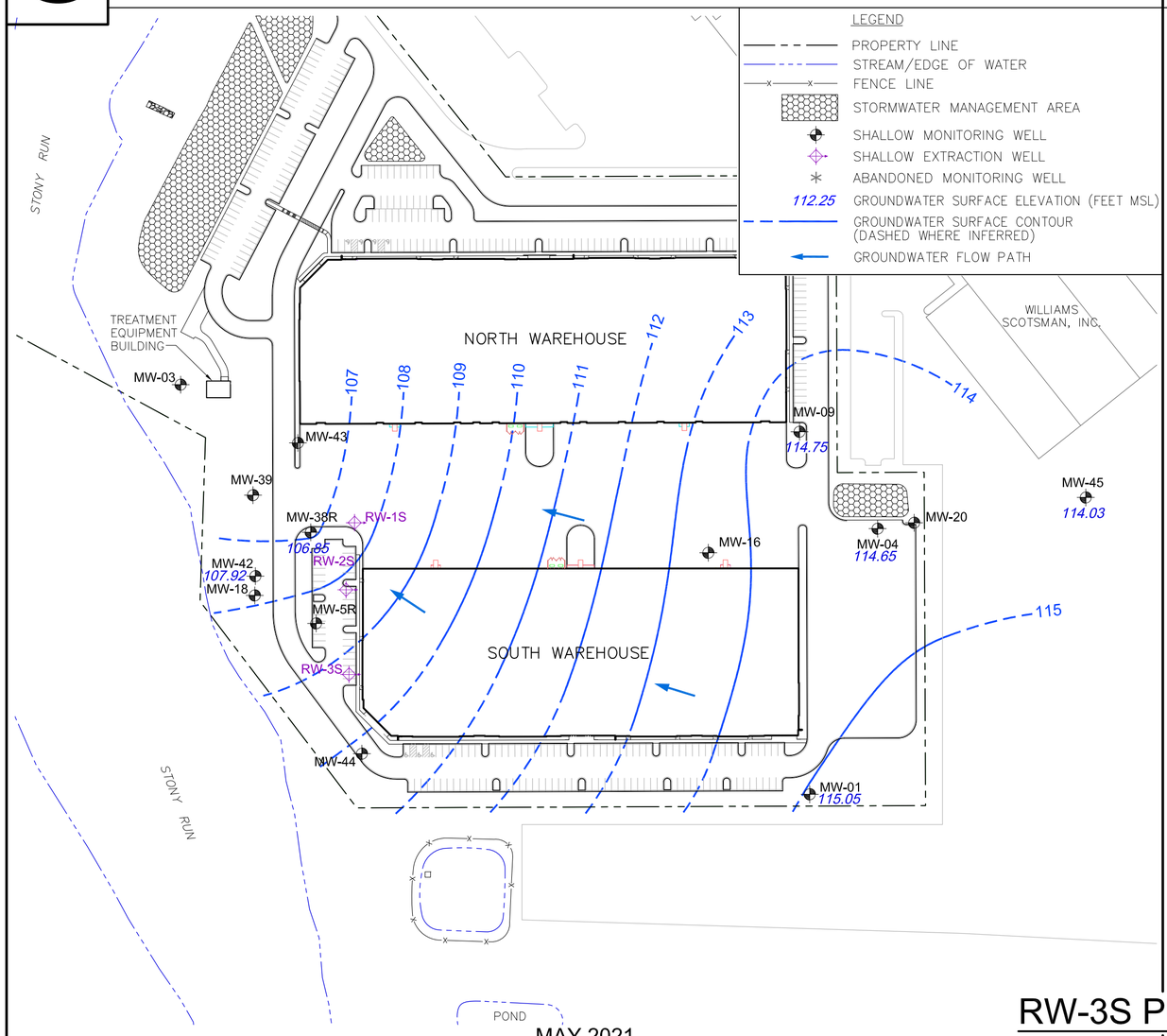
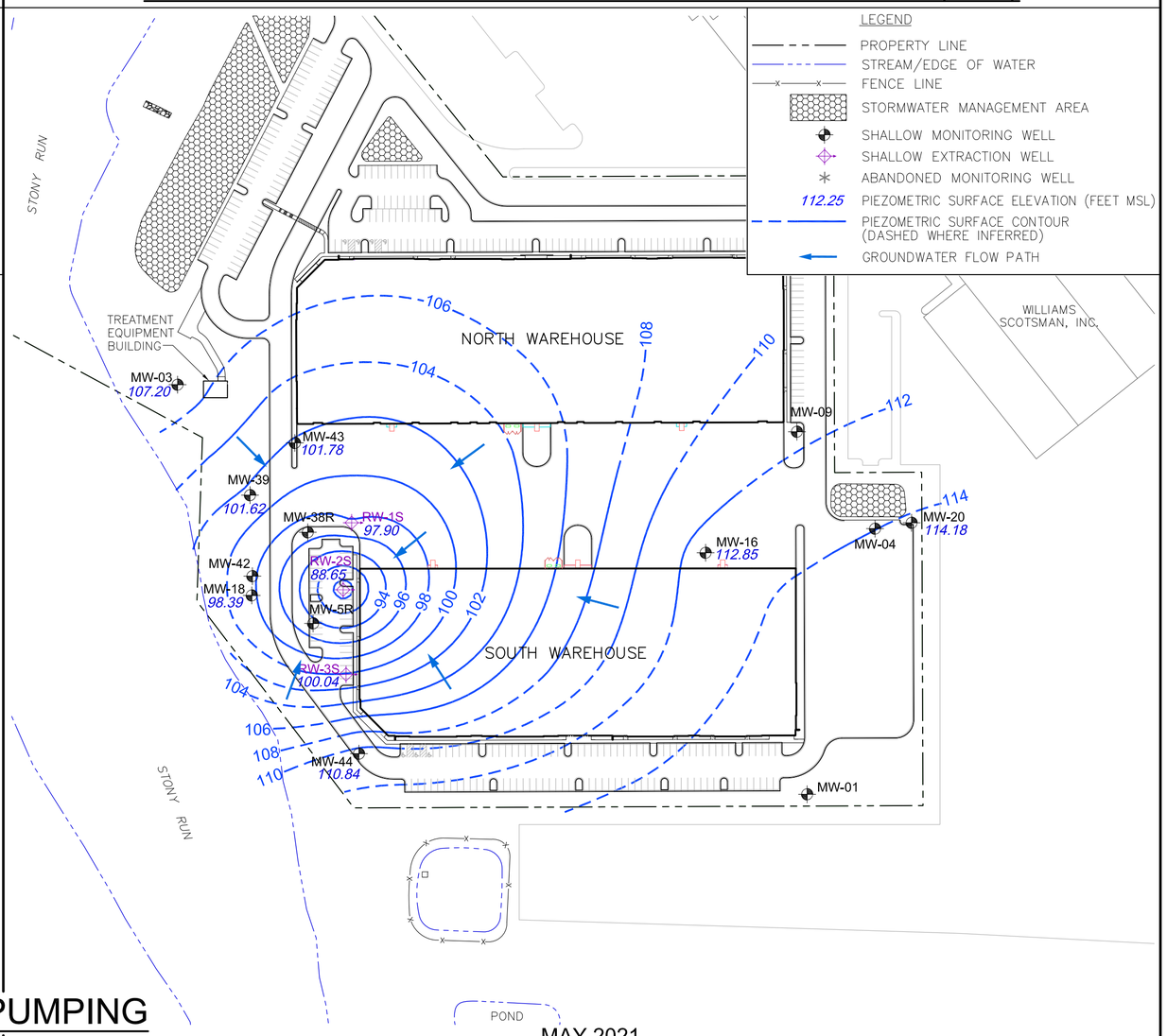
WATER TABLE



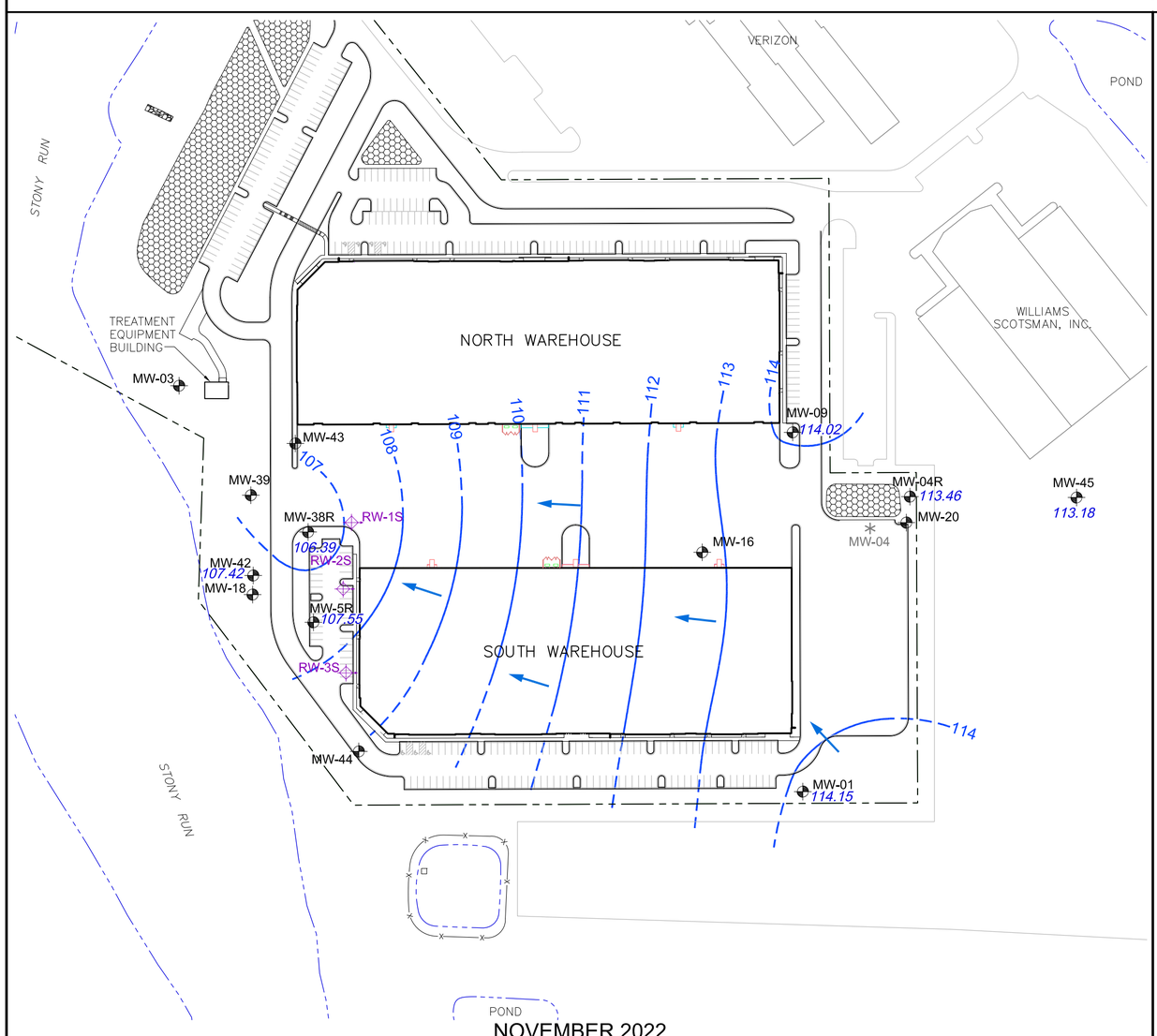
MAY 2021

PIEZOMETRIC SURFACE OF THE LOWER PORTION OF SHALLOW ZONE OF LOWER PATAPSCO AQUIFER (LPA)

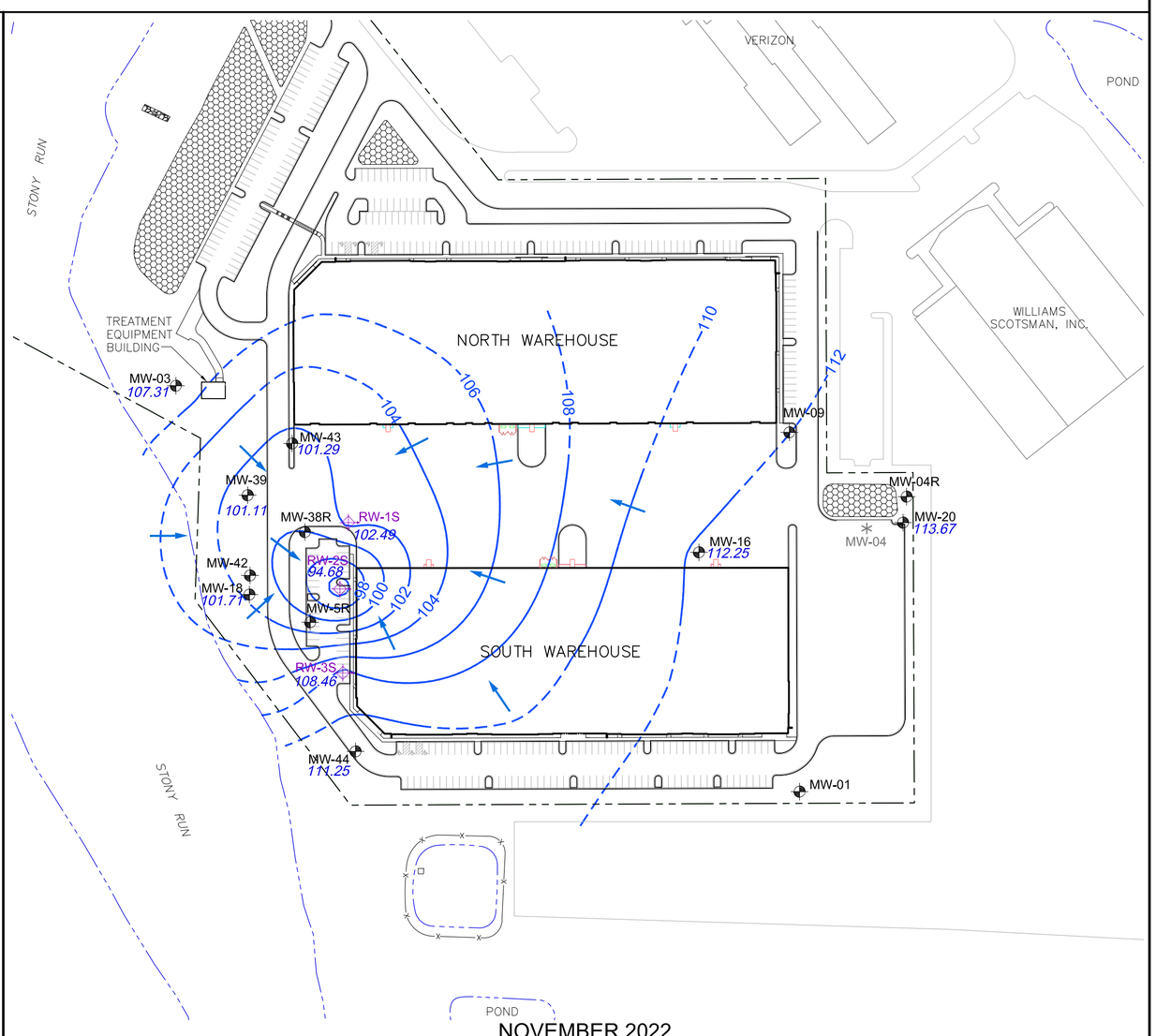


MAY 2021

RW-3S PUMPING

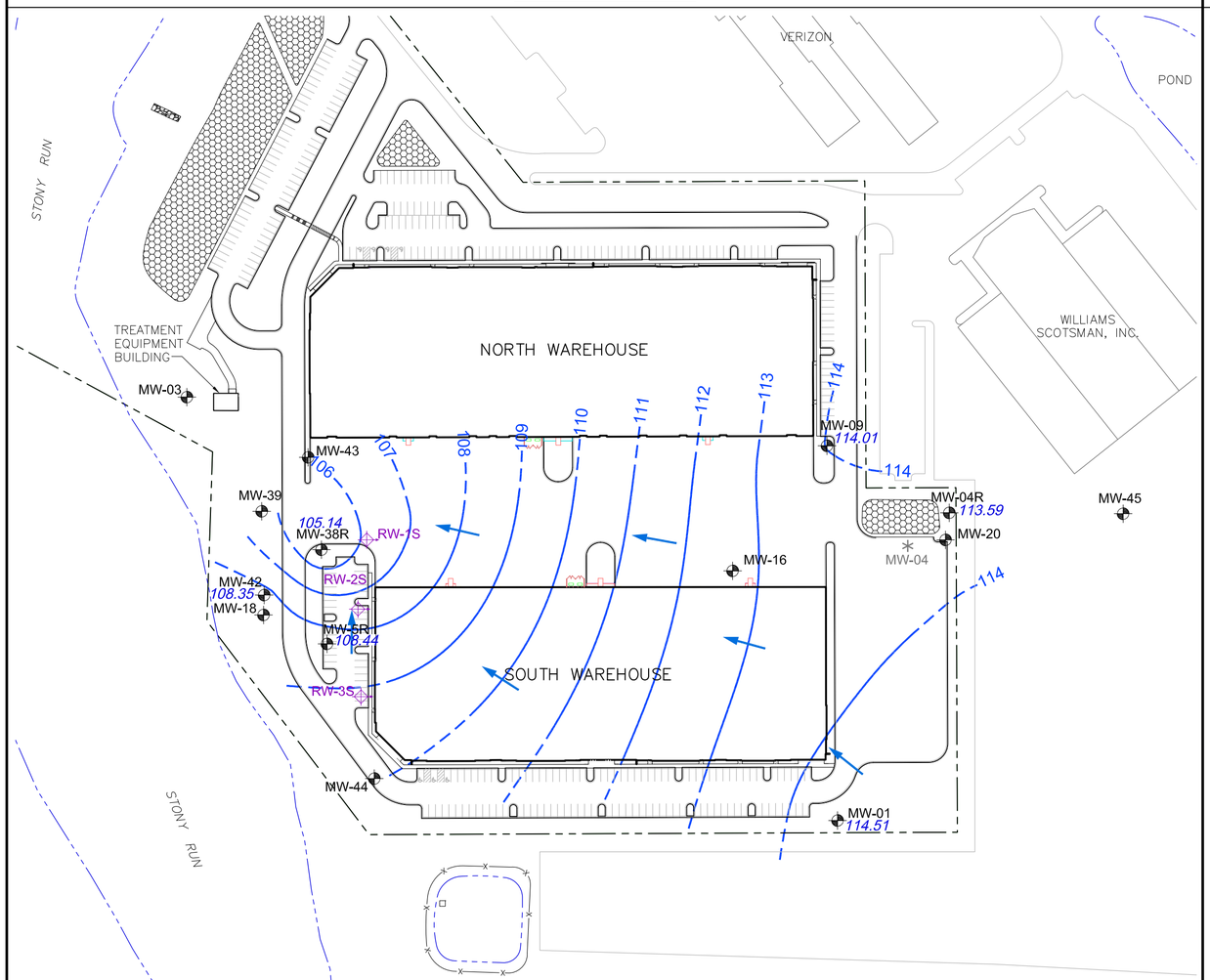


NOVEMBER 2022

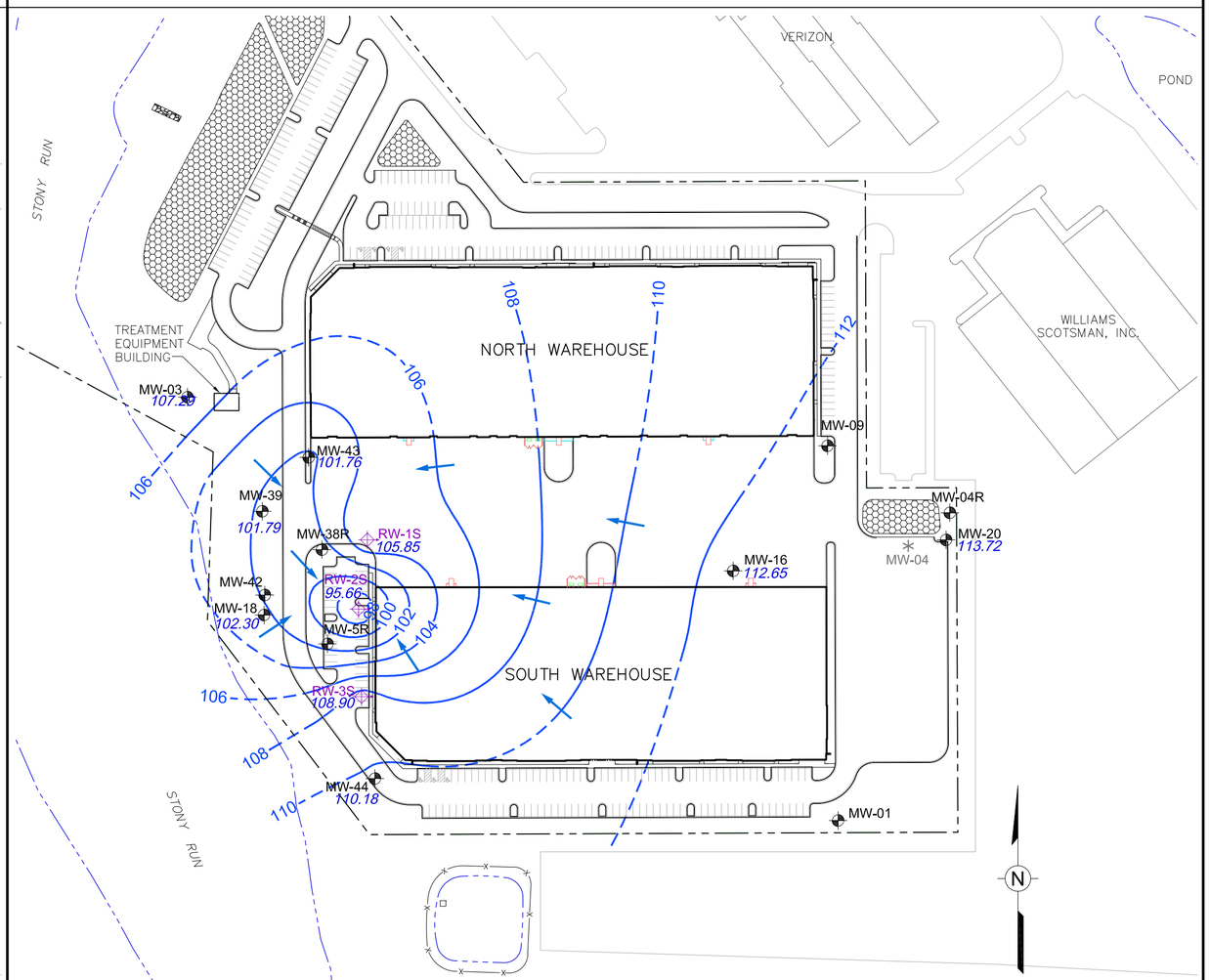


NOVEMBER 2022

RW-3S NOT PUMPING



MARCH 2023



MARCH 2023

0 100 200 300
SCALE IN FEET

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314V5608.010-040
Drawing Number

FIGURE 3

WSP USA Inc.
13530 DULLES TECHNOLOGY DR, SUITE 300
HERNDON, VA 20171
TEL: +1 703.709.6500

CONTOURS OF THE WATER TABLE AND PIEZOMETRIC SURFACE FOR LOWER PORTION OF SHALLOW LPA ZONE WITH AND WITHOUT PUMPING FROM RW-3S

FORMER KOP-FLEX FACILITY SITE
HANOVER, MARYLAND

PREPARED FOR

EMERSUB 16 LLC
ST. LOUIS, MISSOURI

DRAWN BY	EGC
CHECKED	
APPROVED	4/25/2023

SEAL

DATE

REVISIONS

REV	DESCRIPTION		
1	Revised:	Chkd:	Appr.:
2	Revised:	Chkd:	Appr.:
3	Revised:	Chkd:	Appr.:

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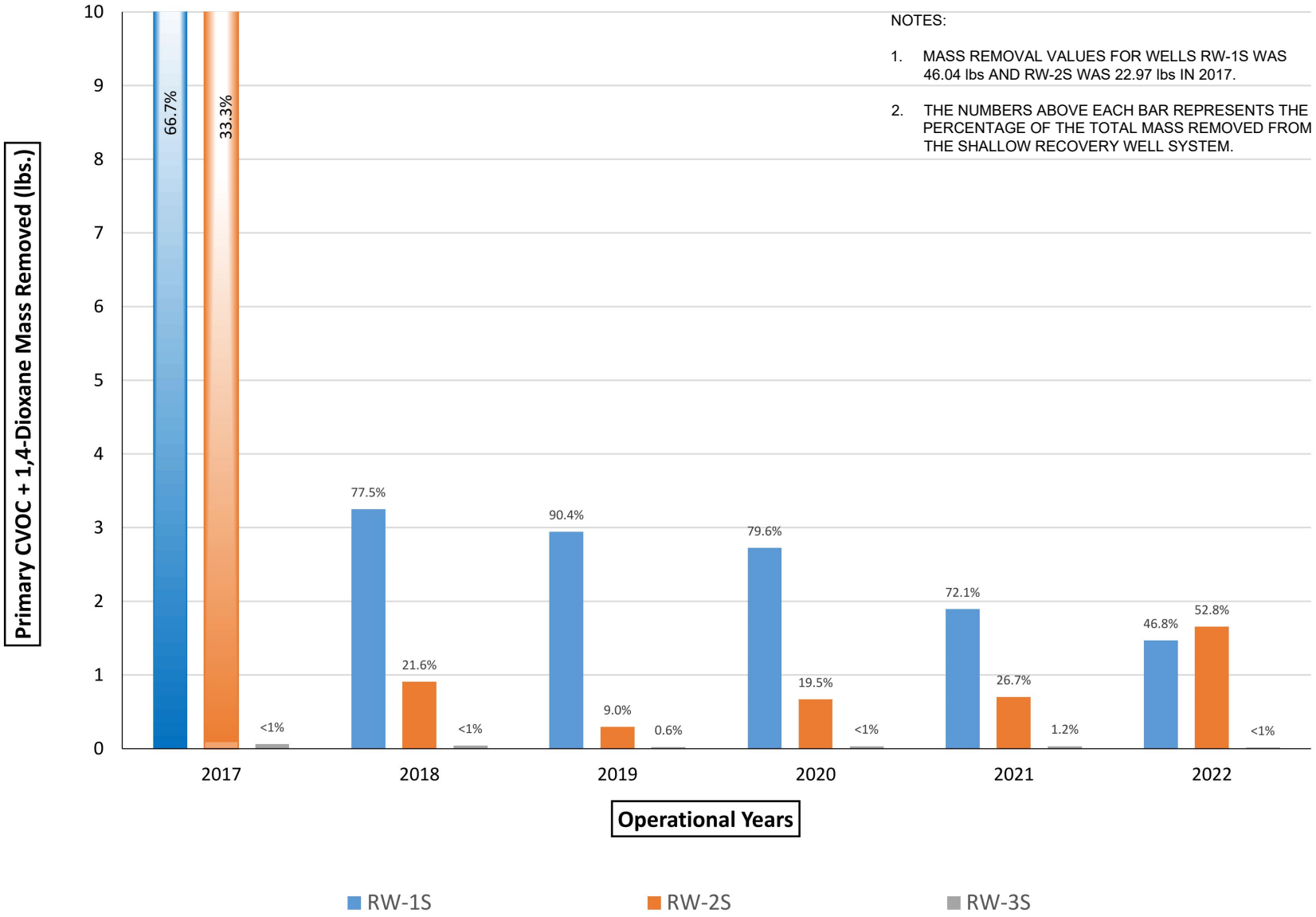

NOTES:

1. MASS REMOVAL VALUES FOR WELLS RW-1S WAS 46.04 lbs AND RW-2S WAS 22.97 lbs IN 2017.
2. THE NUMBERS ABOVE EACH BAR REPRESENTS THE PERCENTAGE OF THE TOTAL MASS REMOVED FROM THE SHALLOW RECOVERY WELL SYSTEM.

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WSP USA Inc.
13530 DULLES TECHNOLOGY DR
SUITE 300
HERNDON, VA 20171
TEL: +1 703.709.6500

Figure 4

VOLATILE ORGANIC COMPOUND AND 1,4-DIOXANE MASS REMOVAL AT THE SHALLOW RECOVERY WELL LOCATIONS (2017-2022)

FORMER KOP-FLEX FACILITY SITE
HANOVER, MARYLAND

PREPARED FOR
EMERSUB 16 LLC
ST. LOUIS, MISSOURI

Drawn By: EGC
Checked: KT 4/26/2023
Approved: RKJ
DWG Name: 314V5608.010-041

TABLE

Table 1

Historical Water Level Measurements in
Onsite Monitoring Wells and Recovery Well Piezometers
Former Kop-Flex Facility Site
Hanover, Maryland
(December 2016 to March 2023) (a)

Well ID	Zone	TOC elevation	12/7/2016 (c)		2/1/2017 (c)		3/21/2017		4/7/2017		4/10/2017		4/13/2017	
			Depth to Water	*Groundwater Elevation*	*Depth to Water*	*Groundwater Elevation*	*Depth to Water*	*Groundwater Elevation*	*Depth to Water*	*Groundwater Elevation*	*Depth to Water*	*Groundwater Elevation*	*Depth to Water*	*Groundwater Elevation*
MW-01	Shallow	129.8	NM	-	15.98	113.82	16.16	113.64	15.93	113.87	15.95	113.85	15.94	113.86
MW-03	Shallow	113.6	6.78	106.82	6.83	106.77	6.79	106.81	6.41	107.19	6.76	106.84	6.91	106.69
MW-04	Shallow	124.4	12.28	112.12	11.14	113.26	11.17	113.23	11.05	113.35	11.09	113.31	11.06	113.34
MW-04R (b)	Shallow	127.5	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-
MW-5R	Shallow	123.5	15.87	107.63	13.49	110.01	15.98	107.52	16.15	107.35	16.38	107.12	16.45	107.05
MW-09	Shallow	125.1	10.84	114.26	11.30	113.80	11.51	113.59	11.41	113.69	11.41	113.69	11.51	113.59
MW-16	Shallow	124.0	10.92	113.08	11.12	112.88	11.66	112.34	11.74	112.26	11.81	112.19	11.82	112.18
MW-18	Shallow	125.1	20.77	104.33	20.84	104.26	22.85	102.25	22.85	102.25	23.11	101.99	23.18	101.92
MW-20	Shallow	125.4	NM	-	12.24	113.16	12.5	112.90	12.33	113.07	12.31	113.09	12.3	113.10
MW-38R	Shallow	125.4	15.58	109.82	15.76	109.64	19.64	105.76	19.6	105.80	20.81	104.59	19.81	105.59
MW-39	Shallow	124.6	NM	-	20.96	103.64	22.64	101.96	22.55	102.05	21.86	102.74	23	101.60
MW-42	Shallow	125.9	16.18	109.72	16.26	109.64	19.28	106.62	19.33	106.57	19.52	106.38	19.49	106.41
MW-43	Shallow	122.8	19.25	103.55	19.31	103.49	20.68	102.12	20.31	102.49	20.61	102.19	21.81	100.99
MW-44	Shallow	127.1	14.93	112.17	15.25	111.85	17.7	109.40	17.08	110.02	17.18	109.92	17.35	109.75
MW-45	Shallow	126.7	NM	-	NM	-	14.1	112.62	13.85	112.87	13.85	112.87	13.85	112.87
RW-1S	Shallow	122.9	12.96	109.94	13.17	109.73	12.96	109.94	20.36	102.54	20.6	102.30	20.56	102.34
RW-2S	Shallow	123.5	14.12	109.38	14.02	109.48	28.55	94.95	28.88	94.62	29.81	93.69	29	94.50
RW-3S	Shallow	125.4	14.29	111.11	14.24	111.16	20.34	105.06	23.49	101.91	23.59	101.81	23.69	101.71
MW-1D	Deep	129.4	42.81	86.59	42.22	87.18	56.15	73.25	56.06	73.34	56.22	73.18	56.44	72.96
MW-16D	Deep	124.1	34.91	89.19	34.72	89.38	37.55	86.55	37.6	86.50	38.02	86.08	38.1	86.00
MW-21D	Deep	126.3	37.8	88.50	37.59	88.71	47.12	79.18	47.26	79.04	47.57	78.73	47.61	78.69
MW-22D	Deep	128.9	40.78	88.07	40.49	88.36	43.28	85.57	43.3	85.55	43.59	85.26	43.76	85.09
MW-23D	Deep	125.2	35.14	90.06	34.74	90.46	36.33	88.87	36.29	88.91	36.72	88.48	36.81	88.39
MW-24D	Deep	129.1	46.3	82.80	45.73	83.37	47.44	81.66	47.71	81.39	48	81.10	48.16	80.94
MW-27D	Deep	117.2	29.66	87.54	26.78	90.42	27.73	89.47	27.68	89.52	28.18	89.02	28.3	88.90
MW-40D	Deep	124.1	35.14	88.96	34.94	89.16	37.19	86.91	37.51	86.59	37.98	86.12	37.98	86.12
MW-41D	Deep	127.1	41.98	85.12	41.44	85.66	44.00	83.10	44.06	83.04	44.48	82.62	44.56	82.54
MW-46D	Deep	124.8	NM	-	NM	-	NM	-	NM	-	NM	-	NM	-
RW-1D	Deep	126.9	38.53	88.37	38.19	88.71	58.69	68.21	59.02	67.88	59.06	67.84	59.02	67.88
RW-2D	Deep	127.4	42.31	85.09	41.62	85.78	68.82	58.58	68.51	58.89	68.39	59.01	68.78	58.62

a/ Vertical datum is NAVD-88
NM = not measured
TOC = top of casing
NA = not available because the well had not been installed
Light gray shading denotes wells screened in the shallow (unconfined) zone; blue shading denotes wells screened in the deep (confined) zone.
Continuous pumping of the groundwater recovery well system started on March 29, 2017.
Water levels from both shallow and deep recovery wells were measured in piezometers co-located with the wells.
b/ MW-04 was replaced in September 2022 with MW-04R.
c/ Water level measurements representative of non-pumping conditions in the aquifer system.

Table 1

Historical Water Level Measurements in
Onsite Monitoring Wells and Recovery Well Piezometers
Former Kop-Flex Facility Site
Hanover, Maryland
(December 2016 to March 2023) (a)

Well ID	Zone	TOC elevation	4/17/2017		5/1/2017		5/8/2017		8/31/2017		10/25/2017		11/14/2017	
			Depth to Water	*Groundwater Elevation*	*Depth to Water*	*Groundwater Elevation*	*Depth to Water*	*Groundwater Elevation*	*Depth to Water*	*Groundwater Elevation*	*Depth to Water*	*Groundwater Elevation*	*Depth to Water*	*Groundwater Elevation*
MW-01	Shallow	129.8	15.90	113.90	15.92	113.88	15.81	113.99	15.49	114.31	NA	NA	14.17	115.63
MW-03	Shallow	113.6	6.90	106.70	6.96	106.64	6.87	106.73	7.59	106.01	NA	NA	7.27	106.33
MW-04	Shallow	124.4	11.13	113.27	10.95	113.45	10.91	113.49	10.66	113.74	NA	NA	10.97	113.43
MW-04R (b)	Shallow	127.5	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-
MW-5R	Shallow	123.5	16.47	107.03	16.60	106.90	16.60	106.90	16.90	106.60	NA	NA	16.78	106.72
MW-09	Shallow	125.1	11.48	113.62	11.41	113.69	11.34	113.76	11.09	114.01	NA	NA	NA	NA
MW-16	Shallow	124.0	12.08	111.92	11.99	112.01	11.81	112.19	11.90	112.10	NA	NA	12.00	112.00
MW-18	Shallow	125.1	23.19	101.91	23.30	101.80	23.28	101.82	24.63	100.47	NA	NA	24.41	100.69
MW-20	Shallow	125.4	13.38	112.02	13.01	112.39	12.24	113.16	12.39	113.01	NA	NA	11.98	113.42
MW-38R	Shallow	125.4	19.84	105.56	19.94	105.46	19.96	105.44	20.16	105.24	NA	NA	19.93	105.47
MW-39	Shallow	124.6	23.01	101.59	23.05	101.55	23.00	101.60	24.51	100.09	NA	NA	23.93	100.67
MW-42	Shallow	125.9	19.55	106.35	19.68	106.22	19.67	106.23	19.95	105.95	NA	NA	19.82	106.08
MW-43	Shallow	122.8	20.92	101.88	21.11	101.69	20.90	101.90	21.73	101.07	NA	NA	21.66	101.14
MW-44	Shallow	127.1	17.23	109.87	17.31	109.79	17.27	109.83	17.18	109.92	NA	NA	17.00	110.10
MW-45	Shallow	126.7	13.75	112.97	13.67	113.05	13.60	113.12	13.20	113.52	NA	NA	13.80	112.92
RW-1S	Shallow	122.9	20.60	102.30	20.80	102.10	20.79	102.11	21.49	101.41	NA	NA	21.98	100.92
RW-2S	Shallow	123.5	29.14	94.36	29.61	93.89	29.74	93.76	32.10	91.40	NA	NA	30.76	92.74
RW-3S	Shallow	125.4	23.73	101.67	24.32	101.08	24.46	100.94	26.20	99.20	NA	NA	28.47	96.93
MW-1D	Deep	129.4	56.37	73.03	56.40	73.00	56.29	73.11	56.70	72.70	58.17	71.23	58.09	71.31
MW-16D	Deep	124.1	37.94	86.16	37.98	86.12	38.08	86.02	41.1	83.00	40.71	83.39	40.63	83.47
MW-21D	Deep	126.3	47.58	78.72	47.54	78.76	47.61	78.69	56.7	69.60	50.61	75.69	50.53	75.77
MW-22D	Deep	128.9	43.73	85.12	43.82	85.03	43.81	85.04	46.71	82.14	46.74	82.11	46.25	82.60
MW-23D	Deep	125.2	36.61	88.59	36.71	88.49	36.77	88.43	39.9	85.30	39.21	85.99	39.04	86.16
MW-24D	Deep	129.1	48.29	80.81	48.35	80.75	48.37	80.73	55.82	73.28	52.15	76.95	51.99	77.11
MW-27D	Deep	117.2	28.03	89.17	28.21	88.99	28.21	88.99	31.11	86.09	30.52	86.68	30.34	86.86
MW-40D	Deep	124.1	37.85	86.25	38.01	86.09	38.04	86.06	41.00	83.10	40.75	83.35	40.50	83.60
MW-41D	Deep	127.1	44.43	82.67	44.61	82.49	44.62	82.48	49.18	77.92	47.94	79.16	47.71	79.39
MW-46D	Deep	124.8	NM	-	NM	-	NM	-	NM	-	NM	-	NM	-
RW-1D	Deep	126.9	59.26	67.64	58.88	68.02	58.99	67.91	60.23	66.67	62.62	64.28	63.62	63.28
RW-2D	Deep	127.4	68.63	58.77	68.70	58.70	68.44	58.96	70.11	57.29	68.90	58.50	68.95	58.45

a/ Vertical datum is NAVD-88
NM = not measured
TOC = top of casing
NA = not available because the well had not been installed
Light gray shading denotes wells screened in the shallow (unconfined) zone; blue shading denotes wells screened in the deep (confined) zone.
Continuous pumping of the groundwater recovery well system started on March 29, 2017.
Water levels from both shallow and deep recovery wells were measured in piezometers co-located with the wells.
c/ MW-04 was replaced in September 2022 with MW-04R.
b/ Water level measurements representative of non-pumping conditions in the aquifer system.

Table 1

Historical Water Level Measurements in
Onsite Monitoring Wells and Recovery Well Piezometers
Former Kop-Flex Facility Site
Hanover, Maryland
(December 2016 to March 2023) (a)

Well ID	Zone	TOC elevation	5/30/2018		11/7/2018		5/21/2019		11/19/2019		5/12/2020		11/22/2020	
			Depth to Water	*Groundwater Elevation*	*Depth to Water*	*Groundwater Elevation*	*Depth to Water*	*Groundwater Elevation*	*Depth to Water*	*Groundwater Elevation*	*Depth to Water*	*Groundwater Elevation*	*Depth to Water*	*Groundwater Elevation*
MW-01	Shallow	129.8	15.52	114.28	13.99	115.81	13.98	115.82	16.47	113.33	15.67	114.13	15.58	114.22
MW-03	Shallow	113.6	7.17	106.43	6.43	107.17	7.08	106.52	7.02	106.58	6.09	107.51	6.1	107.50
MW-04	Shallow	124.4	10.19	114.21	9.16	115.24	8.80	115.60	11.07	113.33	11.00	113.40	10.85	113.55
MW-04R (b)	Shallow	127.5	NA	-	NA	-	NA	-	NA	-	NA	-	NA	-
MW-5R	Shallow	123.5	15.89	107.61	15.51	107.99	15.74	107.76	16.61	106.89	16.55	106.95	15.84	107.66
MW-09	Shallow	125.1	10.78	114.32	9.16	115.94	9.61	115.49	12.00	113.10	11.57	113.53	11.23	113.87
MW-16	Shallow	124.0	11.76	112.24	10.96	113.04	9.37	114.63	12.43	111.57	11.66	112.34	11.68	112.32
MW-18	Shallow	125.1	23.80	101.30	23.13	101.97	22.97	102.13	21.12	103.98	23.10	102.00	23.80	101.30
MW-20	Shallow	125.4	12.15	113.25	11.74	113.66	10.64	114.76	12.98	112.42	12.57	112.83	12.11	113.29
MW-38R	Shallow	125.4	19.35	106.05	18.67	106.73	19.13	106.27	19.83	105.57	19.03	106.37	19.25	106.15
MW-39	Shallow	124.6	23.72	100.88	23.09	101.51	23.00	101.60	23.94	100.66	23.04	101.56	23.52	101.08
MW-42	Shallow	125.9	19.16	106.74	18.55	107.35	18.91	106.99	19.44	106.46	18.85	107.05	NM	-
MW-43	Shallow	122.8	20.47	102.33	20.60	102.20	21.46	101.34	22.04	100.76	20.98	101.82	21.91	100.89
MW-44	Shallow	127.1	16.32	110.78	15.78	111.32	15.91	111.19	17.24	109.86	16.30	110.80	16.52	110.58
MW-45	Shallow	126.7	12.98	113.74	12.00	114.72	11.75	114.97	14.55	112.17	NM	-	13.61	113.11
RW-1S	Shallow	122.9	22.88	100.02	23.97	98.93	26.42	96.48	28.64	94.26	29.16	93.74	28.13	94.77
RW-2S	Shallow	123.5	28.37	95.13	27.48	96.02	31.16	92.34	31.70	91.80	33.33	90.17	35.31	88.19
RW-3S	Shallow	125.4	26.91	98.49	24.39	101.01	22.10	103.30	23.24	102.16	22.85	102.55	26.72	98.68
MW-1D	Deep	129.4	58.03	71.37	57.22	72.18	56.55	72.85	59.49	69.91	57.17	72.23	59.91	69.49
MW-16D	Deep	124.1	40.37	83.73	39.33	84.77	38.30	85.80	40.99	83.11	38.67	85.43	39.97	84.13
MW-21D	Deep	126.3	50.38	75.92	49.61	76.69	48.38	77.92	50.75	75.55	48.50	77.80	50.37	75.93
MW-22D	Deep	128.9	46.30	82.55	35.31	93.54	44.02	84.83	46.20	82.65	44.05	84.80	46.55	82.30
MW-23D	Deep	125.2	38.87	86.33	37.72	87.48	36.88	88.32	39.40	85.80	37.16	88.04	39.22	85.98
MW-24D	Deep	129.1	50.94	78.16	50.72	78.38	49.67	79.43	51.12	77.98	48.80	80.30	53.02	76.08
MW-27D	Deep	117.2	30.20	87.00	29.17	88.03	28.15	89.05	30.68	86.52	28.64	88.56	30.62	86.58
MW-40D	Deep	124.1	40.44	83.66	39.60	84.50	38.50	85.60	41.16	82.94	38.59	85.51	40.97	83.13
MW-41D	Deep	127.1	47.56	79.54	46.56	80.54	45.42	81.68	48.50	78.60	45.28	81.82	48.65	78.45
MW-46D	Deep	124.8	37.37	87.40	32.65	92.12	35.47	89.30	37.90	86.87	35.73	89.04	37.72	87.05
RW-1D	Deep	126.9	62.75	64.15	62.97	63.93	62.44	64.46	64.86	62.04	NM	-	NM	-
RW-2D	Deep	127.4	69.21	58.19	68.34	59.06	68.19	59.21	71.36	56.04	69.35	58.05	69.72	57.68

a/ Vertical datum is NAVD-88
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NA = not available because the well had not been installed
Light gray shading denotes wells screened in the shallow (unconfined) zone; blue shading denotes wells screened in the deep (confined) zone.
Continuous pumping of the groundwater recovery well system started on March 29, 2017.
Water levels from both shallow and deep recovery wells were measured in piezometers co-located with the wells.
c/ MW-04 was replaced in September 2022 with MW-04R.
b/ Water level measurements representative of non-pumping conditions in the aquifer system.

Table 1

Historical Water Level Measurements in
Onsite Monitoring Wells and Recovery Well Piezometers
Former Kop-Flex Facility Site
Hanover, Maryland
(December 2016 to March 2023) (a)

Well ID	Zone	TOC elevation	5/9/2021		11/14/2021 (c)		6/26/2022 (c)		11/7/2022		11/20/2022		3/8/2023	
			Depth to Water	*Groundwater Elevation*	*Depth to Water*	*Groundwater Elevation*	*Depth to Water*	*Groundwater Elevation*	*Depth to Water*	*Groundwater Elevation*	*Depth to Water*	*Groundwater Elevation*	*Depth to Water*	*Groundwater Elevation*
MW-01	Shallow	129.8	14.75	115.05	15.35	114.45	14.85	114.95	15.66	114.14	15.65	114.15	15.29	114.51
MW-03	Shallow	113.6	6.4	107.20	5.86	107.74	6.21	107.39	6.39	107.21	6.29	107.31	6.31	107.29
MW-04	Shallow	124.4	9.75	114.65	10.43	113.97	9.90	114.50	-	- (b)	-	- (b)		- (b)
MW-04R (b)	Shallow	127.5	NA	-	NA	-	NA	-	13.93	113.54	14.01	113.46	13.88	113.59
MW-5R	Shallow	123.5	NM	-	13.52	109.98	14.36	109.14	NM	-	15.95	107.55	15.06	108.44
MW-09	Shallow	125.1	10.35	114.75	10.85	114.25	10.50	114.60	10.81	114.29	11.08	114.02	11.09	114.01
MW-16	Shallow	124.0	11.15	112.85	11.05	112.95	11.22	112.78	11.84	112.16	11.75	112.25	11.35	112.65
MW-18	Shallow	125.1	26.71	98.39	21.42	103.68	22.05	103.05	23.37	101.73	23.39	101.71	22.80	102.30
MW-20	Shallow	125.4	11.22	114.18	11.34	114.06	14.41	110.99	11.35	114.05	11.73	113.67	11.68	113.72
MW-38R	Shallow	125.4	18.55	106.85	15.63	109.77	17.66	107.74	19.32	106.08	19.01	106.39	20.26	105.14
MW-39	Shallow	124.6	22.98	101.62	21.29	103.31	22.22	102.38	23.74	100.86	23.49	101.11	22.81	101.79
MW-42	Shallow	125.9	17.98	107.92	15.64	110.26	NM	-	18.68	107.22	18.48	107.42	17.55	108.35
MW-43	Shallow	122.8	21.02	101.78	20.10	102.70	20.47	102.33	21.58	101.22	21.51	101.29	21.04	101.76
MW-44	Shallow	127.1	16.26	110.84	15.21	111.89	15.80	111.30	16.12	110.98	15.85	111.25	16.92	110.18
MW-45	Shallow	126.7	12.69	114.03	13.35	113.37	12.91	113.81	NM	-	13.54	113.18	NM	-
RW-1S	Shallow	122.9	25.00	97.90	13.28	109.62	NM	-	20.77	102.13	20.41	102.49	17.05	105.85
RW-2S	Shallow	123.5	34.85	88.65	16.02	107.48	NM	-	29.30	94.20	28.82	94.68	27.84	95.66
RW-3S	Shallow	125.4	25.36	100.04	15.69	109.71	NM	-	NM	-	16.94	108.46	16.50	108.90
MW-1D	Deep	129.4	57.46	71.94	45.20	84.20	47.46	81.94	NM	-	60.02	69.38	NM	-
MW-16D	Deep	124.1	38.81	85.29	37.06	87.04	NM	-	NM	-	NM	-	NM	-
MW-21D	Deep	126.3	48.64	77.66	41.50	84.80	43.11	83.19	NM	-	51.95	74.35	NM	-
MW-22D	Deep	128.9	44.72	84.13	43.36	85.49	44.90	83.95	NM	-	46.90	81.95	NM	-
MW-23D	Deep	125.2	37.36	87.84	36.73	88.47	38.36	86.84	NM	-	39.85	85.35	NM	-
MW-24D	Deep	129.1	50.01	79.09	49.40	79.70	51.06	78.04	NM	-	53.11	75.99	NM	-
MW-27D	Deep	117.2	28.89	88.31	28.72	88.48	29.82	87.38	NM	-	31.18	86.02	NM	-
MW-40D	Deep	124.1	39.00	85.10	37.48	86.62	40.04	84.06	NM	-	41.58	82.52	NM	-
MW-41D	Deep	127.1	45.95	81.15	44.51	82.59	46.96	80.14	NM	-	48.78	78.32	NM	-
MW-46D	Deep	124.8	35.95	88.82	35.62	89.15	37.13	87.64	NM	-	38.38	86.39	NM	-
RW-1D	Deep	126.9	NM	-	41.71	85.19	NM	-	NM	-	64.80	62.10	NM	-
RW-2D	Deep	127.4	69.41	57.99	43.90	83.50	NM	-	NM	-	71.59	55.81	NM	-

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c/ Water level measurements representative of non-pumping conditions in the aquifer system.