ARM Group LLC
Engineers and Scientists

January 28, 2022

Ms. Barbara Brown
Project Coordinator
Maryland Department of the Environment
1800 Washington Boulevard
Baltimore, MD 21230

Re: Baseline Groundwater Sampling for the Interim Measures Work Plan
Area B: Parcel B14
Tradepoint Atlantic
Sparrows Point, MD 21219

Dear Ms. Brown:

On behalf of Tradepoint Atlantic (TPA), ARM Group LLC (ARM) is pleased to provide the following update on the status of field work related to the Humphrey Impoundment Interim Measures Work Plan (Revision 1 dated January 17, 2022) for Parcel B14 of the TPA property located in Sparrows Point, Maryland. On December 7, 2021, Environmental Protection Agency (EPA) provided conditional approval to initiate the filling of the Humphrey Impoundment in the southeast quadrant only. Obtaining full approval would include and be granted contingent upon:

1. All proposed monitoring wells must be installed.

   Update: Installation of monitoring wells was completed between December 21, 2021, and January 5, 2022, and reported to EPA and MDE via a January 7, 2022 status letter. HI21-MWS was not installed due to access issues, however it will be installed by February 17, 2022.

2. A baseline sampling event of all B14 monitoring wells and Tin Mill Canal locations specified in the comments must be conducted and reported.

   Update: The baseline groundwater sampling event was conducted from January 10-13, 2022. Surface water sampling was conducted on January 14, 2022. Refer below for more details.

3. Ready to use contingent remedies must be described and available should groundwater monitoring results warrant.

Update: Revisions to the B14 IM Work Plan (including more detailed descriptions of contingent remedies) were submitted on January 17, 2022.

4. Satisfactory revision according to all attached comments of the B14 IM Work Plan.

   Update: Revisions to the B14 IM Work Plan were submitted on January 17, 2022. Regulatory review is ongoing.

Groundwater Sampling

Between January 10 and 13, 2022, ARM gauged and sampled the following 17 shallow baseline monitoring wells (refer to **Figure 1**):

- HI10-MWS, HI11-MWS, HI12-MWS, HI13-MWS, HI14-MWS, HI15-MWS, HI16-MWS, HI17-MWS, HI18-MWS, HI19-MWS, HI20-MWS, HI22-MWS, TM04-PZM006, TM08R-PZM007, HI02-PZM006, HI04-PZM006, and HI07-PZM005.

HI22-MWS was dry and unable to be sampled. All other baseline monitoring wells were sampled for the following analytical parameters:

- Volatile organic compounds (VOCs) via 8260,
- Semi-volatile organic compounds (SVOCs) via 8270 and,
- Polycyclic aromatic hydrocarbons (PAHs) via 8270 SIM.

All detected results are included in **Table 1**. All Project Action Limit (PAL) exceedances are included on **Figure 1**. **Figure 2** presents benzene and naphthalene exceedances only.

Benzene exceedances of the PAL (5 µg/L) were observed in four baseline monitoring wells: TM02-PZM009 (5.6 µg/L), HI19-MWS (9.7 µg/L), HI07-PZM005 (13 µg/L), and TM04-PZM006 (390 µg/L). Only TM04-PZM006 is located along the Tin Mill Canal (TMC).

Naphthalene exceedances of the PAL (0.12 µg/L) were observed in 11 baseline monitoring wells, with the maximum concentration observed in TM04-PZM006 (150 µg/L). There are seven baseline monitoring wells located along the TMC that exceed the PAL: HI10-MWS (4.9 µg/L), HI12-MWS (0.12 µg/L), HI14-MWS (0.32 µg/L), HI15-MWS (0.42 µg/L), HI16-MWS (0.16 µg/L), HI17-MWS (0.68 µg/L), TM04-PZM006 (150 µg/L).

TM04-PZM006 continues to be the main area of groundwater impact along the TMC. Groundwater sampling results are available from December 2001, July 2004, October 2017, and October 2021. The historic results are included in the below table along with the January 2022 results. A review of the data indicates that the groundwater concentrations from 2001 – 2022 have been either stable or decreasing.

TM04-PZM006 Groundwater Sampling Results (µg/L)						
	PAL	Dec-01	Jul-04	Oct-17	Oct-21	Jan-22
Benzene	5	1400	610	653	355	390
Naphthalene	0.12	200	51	405	358	150

Monthly groundwater sampling will be conducted for the 18 shallow baseline monitoring wells during filling activities for the Humphrey Impoundment (HI).

In addition, Solinst Levelogger pressure transducers were installed on January 18, 2022, in two surface water locations (one at the rail bridge northeast of HI, and one at the TMC outlet), and in two monitoring wells (HI10-MWS and HI18-MWS). A rain gauge was also installed at the TMC outlet. Pressure transducer data will be logged at 15-minute intervals and staff gauge readings will be taken monthly by field personnel.

The newly installed wells (to include HI21-MWS), staff gauge datum elevations, and the transducer surface water sample locations will be surveyed within the next 30 days.

Surface Water Sampling

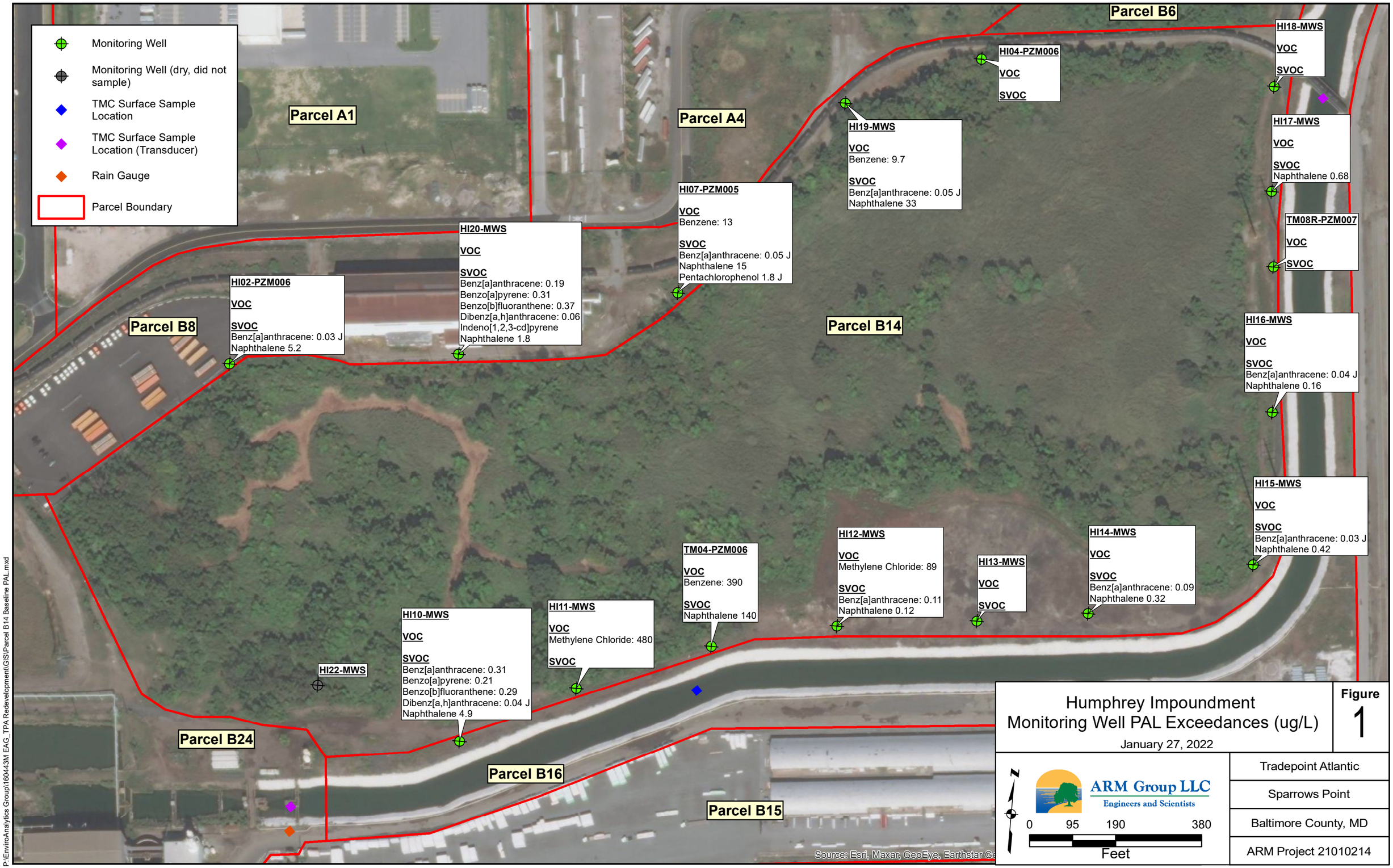
Surface water samples were collected on January 14, 2022, from 3 locations: Canal Bridge (Mid Canal), and Mixing Zone (End of Canal), TM04-TMC-SW (adjacent to TM04-PZM006). The approximate locations of the surface water samples are shown on **Figures 1 and 2**. Results of the surface water samples are still pending.

If you have questions regarding any information covered in this document, please feel free to contact Peter Haid at Tradepoint Atlantic: 443-649-5055.

Respectfully Submitted,
ARM Group LLC

Kaye Guille, P.E., PMP
Senior Engineer

T. Neil Peters, P.E.
Senior Vice President



Humphrey Impoundment
Monitoring Well PAL Exceedances (ug/L)

January 27, 2022

Figure 1

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Sparrows Point

Baltimore County, MD

ARM Project 21010214

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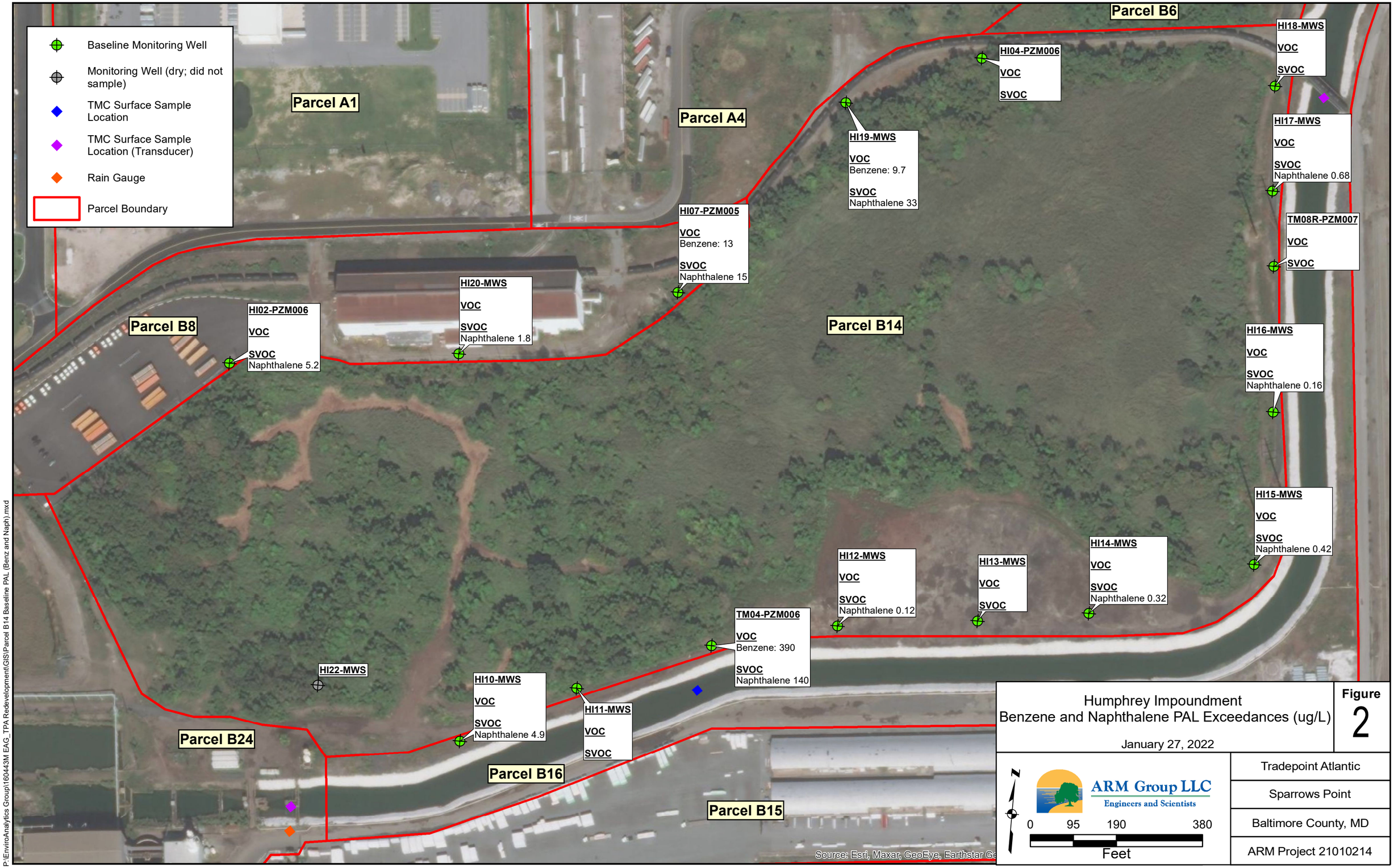

Humphrey Impoundment
Benzene and Naphthalene PAL Exceedances (ug/L)

January 27, 2022

Figure 2

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0 95 190 380
Feet

Tradepoint Atlantic
Sparrows Point
Baltimore County, MD
ARM Project 21010214

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Table 1 - Parcel B14 Baseline Groundwater Sampling (January 2022)
Summary of Organics Detected in Groundwater

Parameter	Units	PAL	HI02-PZM006 1/11/2022	HI04-PZM006 1/11/2022	HI07-PZM005 1/11/2022	HI10-MWS 1/11/2022	HI11-MWS 1/11/2022	HI12-MWS 1/12/2022	HI13-MWS 1/12/2022	HI14-MWS 1/12/2022	HI15-MWS 11/13/2022	HI16-MWS 11/13/2022	HI17-MWS 1/12/2022
SVOCs													
1,1-Biphenyl	µg/L	0.83	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
2,4-Dimethylphenol	µg/L	360	9.9	5 U	4.2 J	5 U	5 U	5 U	5 U	5 U	5 U	5 U	2.1 J
2-Methylnaphthalene	µg/L	36	0.64	0.1 U	0.91	**1.8**	0.04 J	0.1 J	0.1 U	0.08 J	0.05 J	0.1 U	**0.48**
2-Methylphenol	µg/L	930	0.69 J	5 U	0.54 J	5 U	5 U	5 U	5 U	5 U	5 U	5 U	0.75 J
3&4-Methylphenol(m&p Cresol)	µg/L	930	7.4	5 U	**6.2**	2.1 J	1.2 J	5 U	5 U	5 U	5 U	5 U	**26**
Acenaphthene	µg/L	530	0.68	**0.38**	**0.3**	**0.98**	**0.13**	**1.5**	0.05 J	**2.7**	0.08 J	0.1 U	0.08 J
Acenaphthylene	µg/L	530	0.06 J	0.1 U	**0.4**	**0.18**	0.1 U	0.08 J	0.02 J	0.07 J	0.03 J	0.03 J	0.03 J
Acetophenone	µg/L	1,900	5 U	5 U	0.72 J	5 U	5 U	1.1 J	5 U	5 U	5 U	5 U	5 U
Anthracene	µg/L	1,800	0.07 J	0.08 J	**0.17**	**0.52**	0.04 J	**0.37**	0.05 J	**0.35**	0.07 J	0.1 J	0.08 J
Benz[a]anthracene	µg/L	0.03	**0.03 J**	0.05 U	**0.05 J**	**0.31**	0.05 U	**0.11**	0.05 U	**0.09**	**0.03 J**	**0.04 J**	0.05 U
Benzaldehyde	µg/L	1,900	5 U	0.58 J	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Benzo[a]pyrene	µg/L	0.2	0.1 U	0.1 U	0.1 U	**0.21**	0.1 U	0.06 J	0.1 U	0.02 J	0.02 J	0.1 U	0.1 U
Benzo[b]fluoranthene	µg/L	0.25	0.05 U	0.03 J	0.02 J	**0.29**	0.05 U	**0.09**	0.05 U	0.03 J	0.03 J	0.02 J	0.05 U
Benzo[g,h,i]perylene	µg/L		0.1 U	0.1 U	0.1 U	**0.10**	0.1 U	0.04 J	0.1 U	0.1 U	0.03 J	0.1 U	0.1 U
Benzo[k]fluoranthene	µg/L	2.5	0.1 U	0.1 U	0.1 U	**0.10**	0.1 U	0.03 J	0.1 U	0.1 U	0.03 J	0.01 J	0.1 U
bis(2-Ethylhexyl)phthalate	µg/L	6.0	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	1.6 J	1.6 J
Carbazole	µg/L		1.3 J	2 U	1.6 J	1.2 J	2 U	0.7 J	2 U	0.59 J	2 U	2 U	2 U
Chrysene	µg/L	25	0.1 U	0.1 U	0.03 J	**0.24**	0.1 U	0.07 J	0.1 U	0.05 J	0.1 U	0.02 J	0.1 U
Dibenz[a,h]anthracene	µg/L	0.025	0.05 U	0.05 U	0.05 U	**0.04 J**	0.05 U	0.05 U	0.05 U	0.05 U	0.02 J	0.05 U	0.05 U
Fluoranthene	µg/L	800	**0.11**	0.13	**0.43**	**0.99**	0.09 J	**0.45**	0.06 J	**1.0**	0.06 J	**0.17**	0.06 J
Fluorene	µg/L	290	**0.46**	0.1 U	**0.56**	**0.99**	0.05 J	**0.37**	0.04 J	**1.1**	0.08 J	0.1 U	0.06 J
Indeno[1,2,3-c,d]pyrene	µg/L	0.25	0.1 U	0.1 U	0.1 U	**0.14**	0.1 U	0.05 J	0.1 U	0.1 U	0.03 J	0.1 U	0.1 U
Naphthalene	µg/L	0.12	**5.2**	0.1 U	**15**	**4.9**	0.07 J	**0.12**	0.07 J	**0.32**	**0.42**	**0.16**	**0.68**
Pentachlorophenol	µg/L	1.0	10 U	10 U	**1.8 J**	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Phenanthrene	µg/L		**0.56**	0.05 U	**1.0**	**2.2**	**0.11**	**0.13**	0.04 J	**0.82**	**0.11**	0.05 J	**0.09**
Phenol	µg/L	5,800	5 U	5 U	0.82 J	5 U	1.8 J	5 U	5 U	5 U	0.65 J	5 U	**11**
Pyrene	µg/L	120	0.08 J	**0.14**	**0.26**	**0.77**	0.07 J	**0.34**	0.06 J	**0.70**	0.05 J	**0.13**	0.06 J
VOCs													
1,1-Dichloroethane	µg/L	2.7	0.48 J	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
2-Butanone (MEK)	µg/L	5,600	5 U	5 U	5 U	5 U	**5.6**	2.3 J	5 U	5 U	5 U	5 U	5 U
Acetone	µg/L	14,000	5 U	5 U	1.8 J	2.5 J	**65**	**37**	2.8 J	2.6 J	4.4 J	5 U	1.8 J
Benzene	µg/L	5	**1.5**	0.5 U	**13**	**0.8**	0.18 J	**0.96**	0.23 J	0.5 U	0.43 J	0.5 U	0.5 U
Carbon disulfide	µg/L	810	5 U	5 U	5 U	5 U	0.65 J	2 J	5 U	5 U	5 U	5 U	5 U
Cyclohexane	µg/L	13,000	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Ethylbenzene	µg/L	700	0.5 U	0.5 U	0.25 J	0.5 U	0.5 U	**0.56**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
m&p-Xylene	µg/L		0.42 J	1 U	**2.7**	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Methylene Chloride	µg/L	5	2.5 U	2.5 U	2.5 U	**2.7**	**480**	**89**	2.5 U	**2.6**	2.5 U	2.5 U	2.5 U
o-Xylene	µg/L		1 U	1 U	**1.5**	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Styrene	µg/L	100	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Toluene	µg/L	1,000	0.49 J	0.75 U	**4.2**	0.32 J	0.27 J	0.41 J	0.75 U	0.75 U	0.22 J	0.75 U	**140**
Vinyl chloride	µg/L	2	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Xylenes	µg/L	10,000	0.42 J	1 U	**4.2**	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U

Detections in bold
Values in red indicate an exceedance of the Project Action Limit (PAL)
SVOCs analyzed via SIM

U: This analyte was not detected in the sample. The numeric value represents the sample. quantitation/detection limit
J: The positive result reported for this analyte is a quantitative estimate.

Table 1 - Parcel B14 Baseline Groundwater Sampling (January 2022)
Summary of Organics Detected in Groundwater

Parameter	Units	PAL	HI18-MWS 1/12/2022	HI19-MWS 1/12/2022	HI20-MWS 1/11/2022	TM04-PZM006 1/12/2022	TM08R-PZM007 1/12/2022
SVOCs							
1,1-Biphenyl	µg/L	0.83	2 U	0.5 J	2 U	2 U	2 U
2,4-Dimethylphenol	µg/L	360	5 U	**13**	**22**	**6.4**	5 U
2-Methylnaphthalene	µg/L	36	0.1 U	**3.1**	**0.26**	**2**	0.1 U
2-Methylphenol	µg/L	930	5 U	5 U	1.2 J	5 U	5 U
3&4-Methylphenol(m&p Cresol)	µg/L	930	5 U	**6.8**	**23**	5 U	5 U
Acenaphthene	µg/L	530	0.1 U	**0.62**	**0.43**	**0.49**	0.1 U
Acenaphthylene	µg/L	530	0.1 U	**0.42**	0.06 J	**4.2**	0.1 U
Acetophenone	µg/L	1,900	5 U	5 U	5 U	5 U	5 U
Anthracene	µg/L	1,800	0.04 J	**0.26**	0.1 J	0.09 J	0.04 J
Benz[a]anthracene	µg/L	0.03	0.05 U	**0.05 J**	**0.19**	0.05 U	0.05 U
Benzaldehyde	µg/L	1,900	5 U	5 U	5 U	5 U	5 U
Benzo[a]pyrene	µg/L	0.2	0.1 U	0.1 U	**0.31**	0.1 U	0.1 U
Benzo[b]fluoranthene	µg/L	0.25	0.05 U	0.02 J	**0.37**	0.05 U	0.05 U
Benzo[g,h,i]perylene	µg/L		0.1 U	0.1 U	**0.25**	0.1 U	0.1 U
Benzo[k]fluoranthene	µg/L	2.5	0.1 U	0.1 U	**0.13**	0.1 U	0.1 U
bis(2-Ethylhexyl)phthalate	µg/L	6.0	3 U	1.5 J	3 U	3 U	3 U
Carbazole	µg/L		2 U	0.75 J	2 U	0.69 J	2 U
Chrysene	µg/L	25	0.1 U	0.03 J	**0.17**	0.1 U	0.1 U
Dibenz[a,h]anthracene	µg/L	0.025	0.05 U	0.05 U	**0.06**	0.05 U	0.05 U
Fluoranthene	µg/L	800	0.1 U	**0.51**	**0.32**	0.09 J	0.1 U
Fluorene	µg/L	290	0.1 U	**0.81**	**0.22**	**0.36**	0.1 U
Indeno[1,2,3-c,d]pyrene	µg/L	0.25	0.1 U	0.1 U	**0.32**	0.1 U	0.1 U
Naphthalene	µg/L	0.12	0.1 U	**33**	**1.8**	**150 E**	0.1 U
Pentachlorophenol	µg/L	1.0	10 U	10 U	10 U	10 U	10 U
Phenanthrene	µg/L		0.05 U	**1.4**	**0.48**	**0.44**	0.05 U
Phenol	µg/L	5,800	0.6 J	1.8 J	1.7 J	1 J	5 U
Pyrene	µg/L	120	0.1 U	**0.34**	**0.29**	0.09 J	0.1 U
VOCs							
1,1-Dichloroethane	µg/L	2.7	0.75 U	0.75 U	0.48 J	1.9 U	0.75 U
2-Butanone (MEK)	µg/L	5,600	5 U	5 U	5 U	12 U	5 U
Acetone	µg/L	14,000	1.5 J	1.9 J	2.8 J	12 U	5 U
Benzene	µg/L	5	0.5 U	**9.7**	**0.94**	**390**	0.5 U
Carbon disulfide	µg/L	810	5 U	5 U	0.3 J	12 U	5 U
Cyclohexane	µg/L	13,000	10 U	10 U	10 U	0.78 J	10 U
Ethylbenzene	µg/L	700	0.5 U	0.5 U	0.5 U	**5.4**	0.5 U
m&p-Xylene	µg/L		1 U	**1.4**	1 U	**6.2**	1 U
Methylene Chloride	µg/L	5	2.5 U	2.5 U	0.84 J	6.2 U	2.5 U
o-Xylene	µg/L		1 U	0.66 J	1 U	2.3 J	1 U
Styrene	µg/L	100	1 U	1 U	1 U	1.3 J	1 U
Toluene	µg/L	1,000	0.75 U	**2.7**	0.37 J	1.3 J	0.75 U
Vinyl chloride	µg/L	2	1 U	1 U	1 U	0.5 J	1 U
Xylenes	µg/L	10,000	1 U	2.1 J	1 U	8.5 J	1 U