2ND UPDATE ON CBP REMOVAL ACTION AND OU2

LCP CHEMICALS SITE | BRUNSWICK, GEORGIA

SEPTEMBER 29, 2020

Honeywell

OVERVIEW GROUNDWATER RI & RELATED ACTIVITY

RI Reporting	Original RI Report	1997
	Supplemental RI Report	2002
	Data Report (Site-wide Sampling & LNAPL Investigation)	2012
	OU2 Data Summary	2017 - 2019
	Site Characterization Summary Report	Jul 2020
Site-wide Groundwater Monitoring	Multiple events over two decades (and additional monitoring other years)	1996 / 2000 / 2001 / 2003 / 2004 / 2005 / 2006 / 2012 / 2017 / 2020
CBP Treatment	Phases 1-3 CO_2 in situ treatment	2013 - 2015
	Phase 4 CO_2 in situ treatment	2019
CBP Monitoring	Monitoring during/after phases	2014 - 2016
	Post-treatment Phases 1-3	2017
	Comprehensive Sampling	2018
	Semi-annual Events of ‘D’ and ‘HW’ Monitoring Wells	Sep 2018 – Aug 2020
	Post-treatment Phase 4	2019 / 2020

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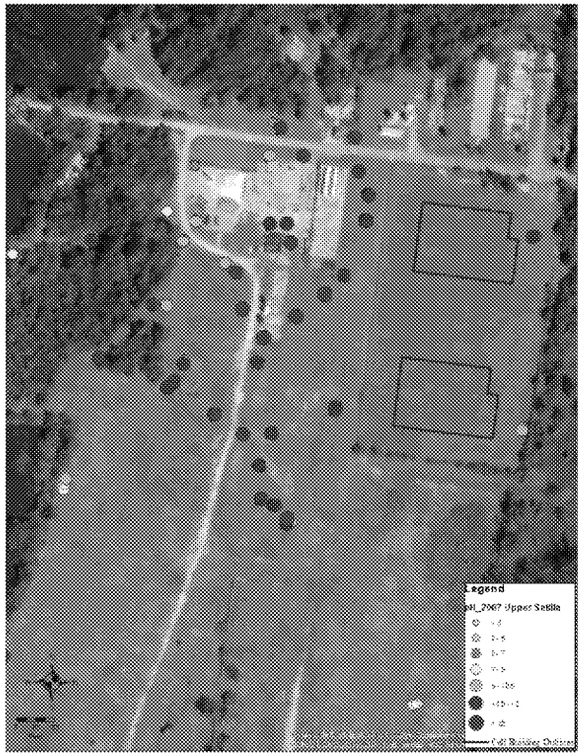
AGENDA

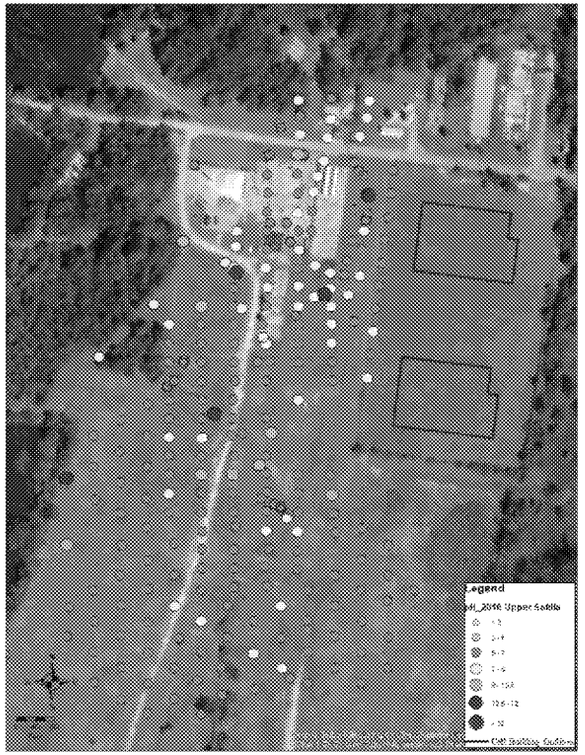
1. Caustic Brine Pool (CBP) Removal Action Review
2. Cell Building Area (CBA) Assessment Review
3. Site-wide Groundwater Assessment Update (2020 Sampling)

1.
CBP REMOVAL ACTION

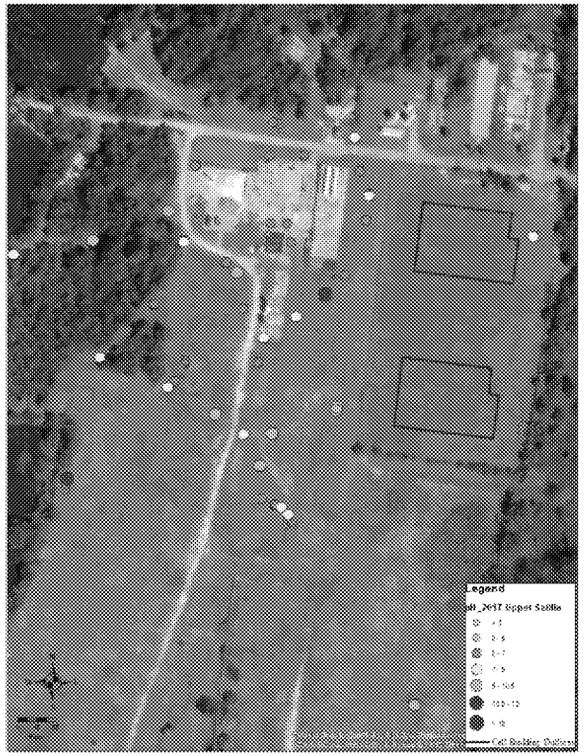
PHASE 1-3 : PH PRE- AND POST-TREATMENT



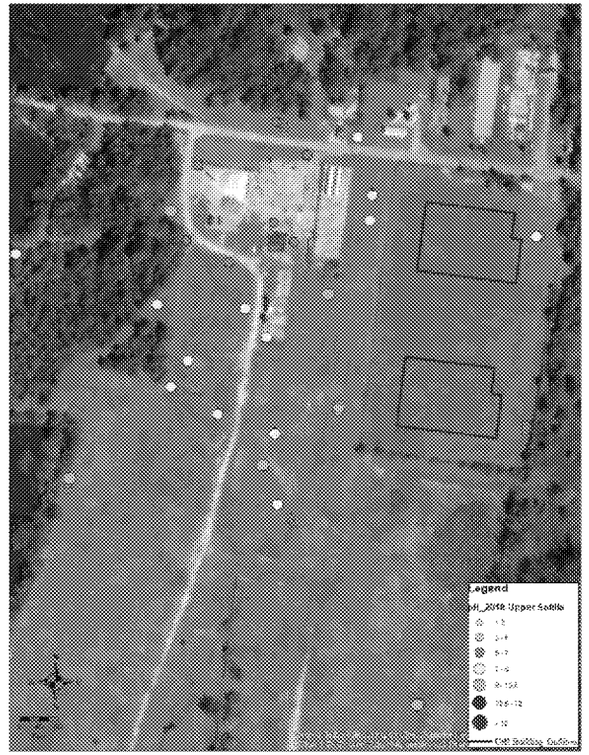
Pre-treatment: 2007



Post-treatment: 2016

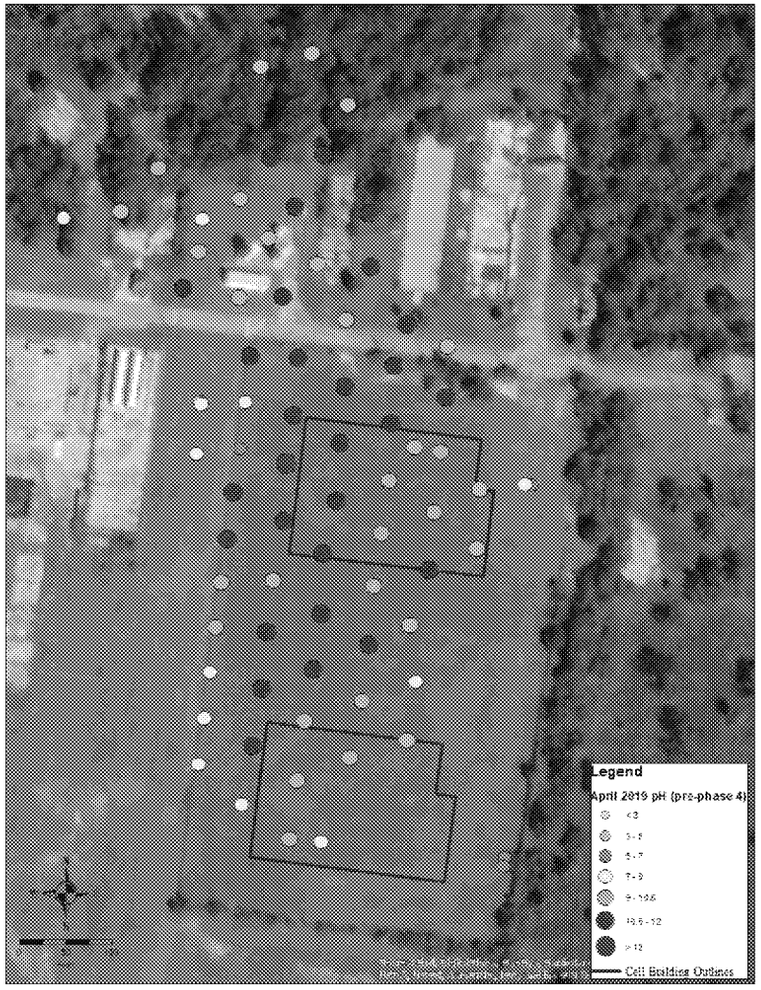


Post-treatment: 2017

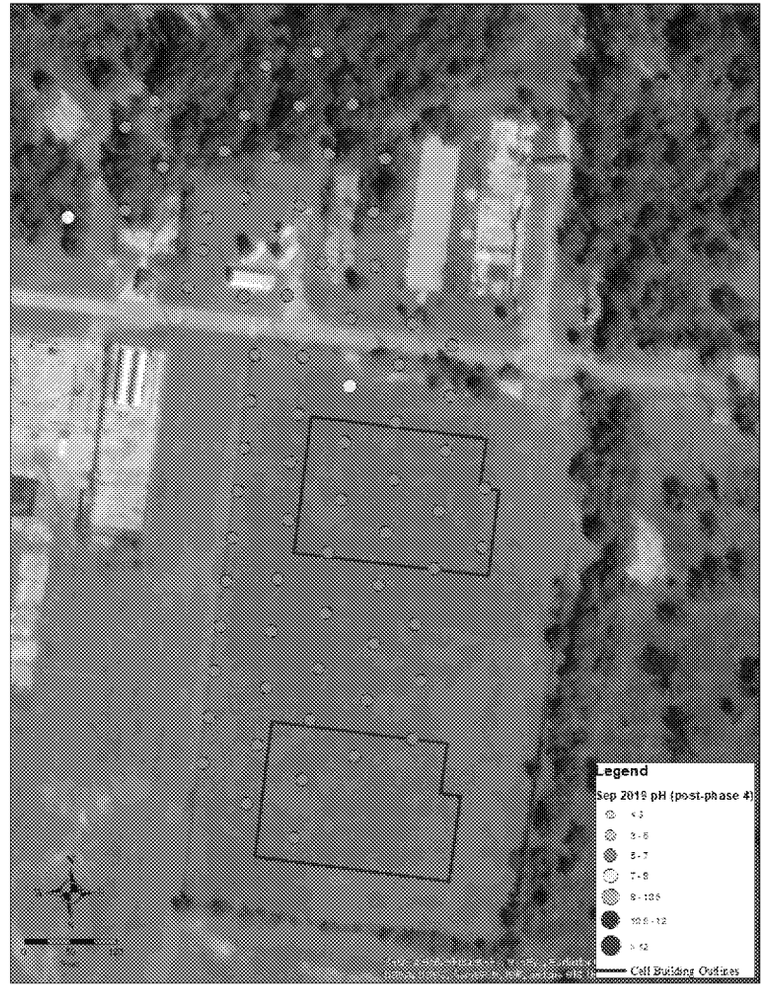


Post-treatment: 2018

PHASE 4 CBP TREATMENT AREA



Pre-treatment: Apr 2019



Post-treatment: Sep 2019

DEEP WELLS –OU2 SITE-WIDE & CBP SEMI-ANNUAL MONITORING

	September-17		September-18		March-19		September-19		August-20	
	pH	Hg (ppb)	pH	Hg (ppb)	pH	Hg (ppb)	pH	Hg (ppb)	pH	Hg (ppb)
HWEast 1	6.75	0.06	7.17	0.06	7.90	0.32	7.48	0.38	7.00	0.31
HWEast 2	6.63	0.00	6.88	0.00	6.75	0.00	7.19	0.00	6.80	0.00
HWEast 3	6.87	0.00	7.04	0.00	6.77	0.00	6.88	0.00	6.80	0.00
HWEast 4	7.54	6.89	9.13	15.20	10.53	15.80	9.40	12.10	9.30	6.54
HWEast 5	9.90	9.07	9.85	8.50	11.60	8.90	10.08	5.01	10.10	7.98
HWEast 6	6.19	0.03	6.65	0.03	6.38	0.02	6.57	0.05	6.50	0.05
HWWest 1	9.21	2.30	8.55	1.00	8.54	0.41	8.04	0.95	7.00	0.01
HWWest 2	11.43	43.40	11.21	54.60	11.47	68.50	11.12	3.33	11.00	25.20
HWWest 3	11.42	41.10	11.31	44.90	13.33	67.60	11.18	2.52	11.30	22.00
HWWest 4	10.75	1.79	10.94	2.00	12.84	2.75	10.81	0.11	10.80	1.55
HWWest 5	6.71	0.11	8.40	0.70	8.41	0.89	8.09	0.47	8.50	0.96
HWWest 6	6.97	0.10	7.50	0.00	7.43	0.01	7.27	0.00	9.10	0.04
MW-115D	10.22	8.91	9.93	7.30	10.15	10.10	11.30	1.29	10.10	4.87
MW-352D	6.59	0.01	6.60	0.00	6.86	0.00	6.78	0.00	6.80	0.00
MW-358D	7.02	0.01	6.98	0.18	9.03	0.14	10.32	0.60	10.30	0.26
MW-360D	10.36	83.80	10.34	64.50	10.41	80.20	10.35	3.58	11.10	22.10

- Site-wide groundwater sampling in Sep 2017
- Beginning Sep 2018: two years of semi-annual monitoring of HW and D wells
- Last event performed in August 2020
- Prior monitoring goes back to 2002 (and earlier for some MWs)

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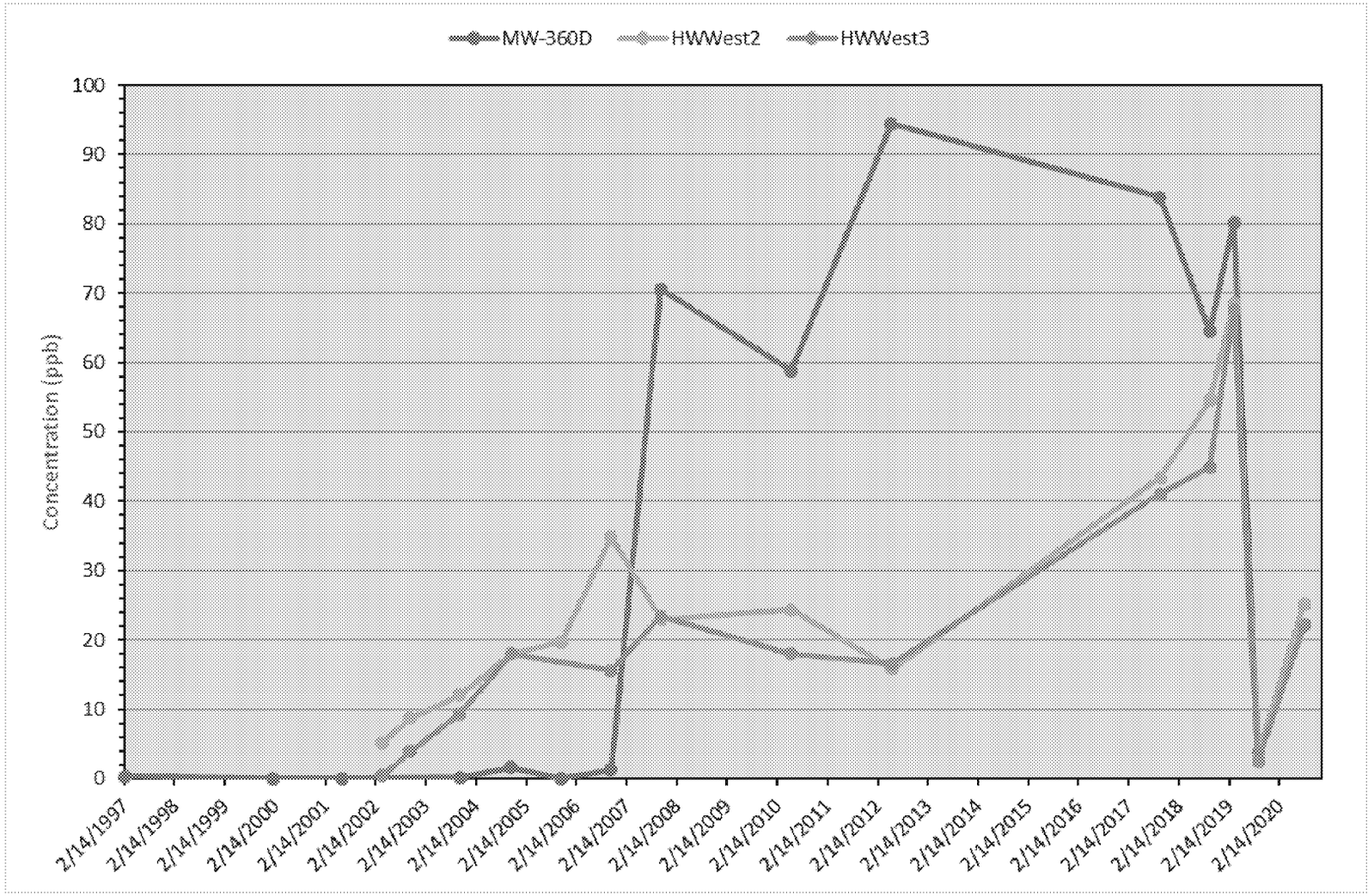
HW-WEST2, HW-WEST3 AND MW-360D TIME SERIES

- Hg condition in HWWest-2 and HWWest-3 peaked initially in 2006-7 then followed a decreasing trend through 2012
- Fall 2019 sampling shows consistent marked drop in Hg condition to approximately the early baseline condition
- Fall 2020 sampling shows consistent Hg condition to pre-CO_2 injection period (of 2006-2012)



SUMMARY

- CO_2 sparging has been effective in lowering (and maintaining) the groundwater pH
  - The lone monitoring well previously reporting pH above 10.5 (MW-361B) now reports pH 7 (as predicted, based on ‘balancing’ of the condition following sparging)
  - A secondary benefit is reduction in dissolved-phase Hg (and some other metals)
- Conditions of the Removal Action Order have been met
  - pH below 10.5, reduction in density
  - Two years of semi-annual monitoring now completed
  - No “rebound” of the condition has occurred
- Decommissioning of sparge wells appropriate

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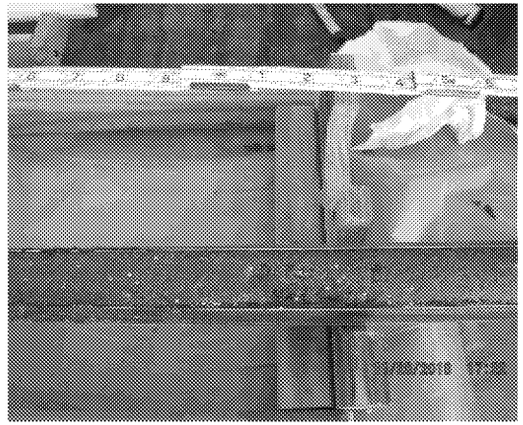
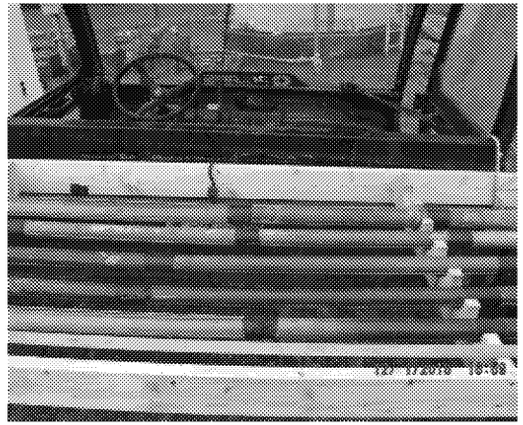
2.
CBA ASSESSMENT

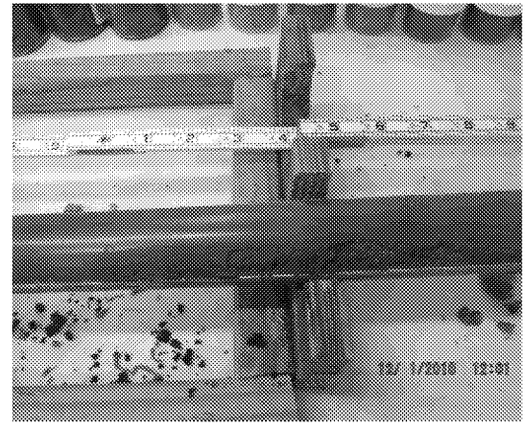
SOIL CORE OBSERVATIONS: 2018-19 CBA



Hg beads entrained in coarse sand



Weathered residual oil smear zone



Lower clay (typical)

Grout (from early attempt at corrective action in late 1970s – early 1980s)

2018-19 CBA MERCURY ASSESSMENT

Geoprobe Borings

Cell Building 2 Area

Boring	Depth (ft bgs)	Hg (ppm)
CB2-SB-3	6.5	13.60
	Hg beads (only 1-2) at 8.1ft	
	9.5	0.14
	12.5	0.14
	18.0	0.51
	22.5	0.24
	28.0	0.62
	33.0	1.10
	38.0	0.28
	42.0	0.19
	Hg beads 48-50ft	
	52.5	183.00
CB2-SB-4	8.0	135.00
	9.5	139.00
	12.5	16.90
	18.3	23.40
	23.0	188.00
	26.0	137.00
	Hg beads 28-29.3ft	
	Hg beads 31-33ft	
	Hg beads 33-35ft	
	36.0	23.70
	Hg beads 38.8-41ft	
	Hg beads 41-45ft	

Sonic Borings

Cell Building 1 Area

Boring	Depth (ft bgs)
SW-227	Hg 5-7ft
SW-228	Hg 0-5ft
SW-230	Hg 20-35ft & 46-50ft
SW-231	Hg 10-40ft
SW-234	Hg 5-30ft
SW-235	Hg 10-20ft

Cell Building 2 Area

Boring	Depth (ft bgs)
SW-210	Hg 32-46ft
SW-213	Hg 20-30ft

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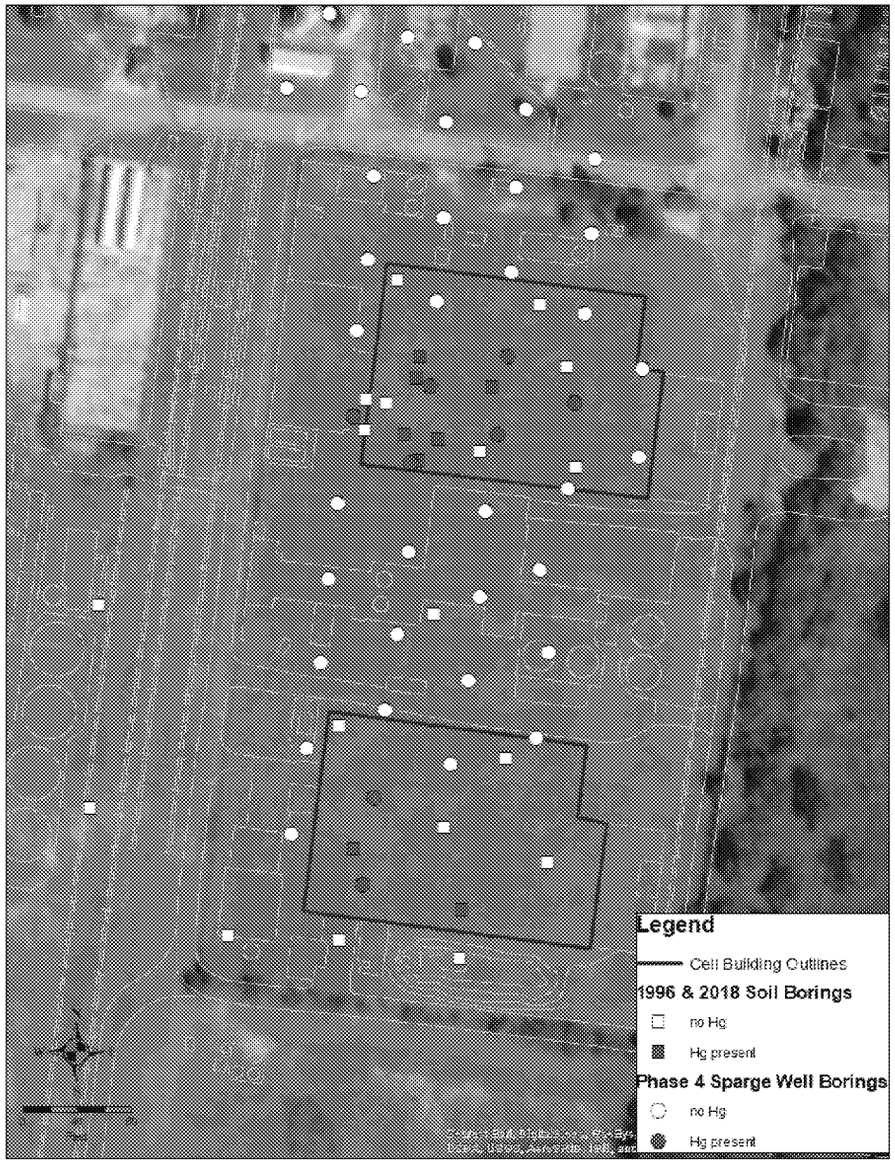
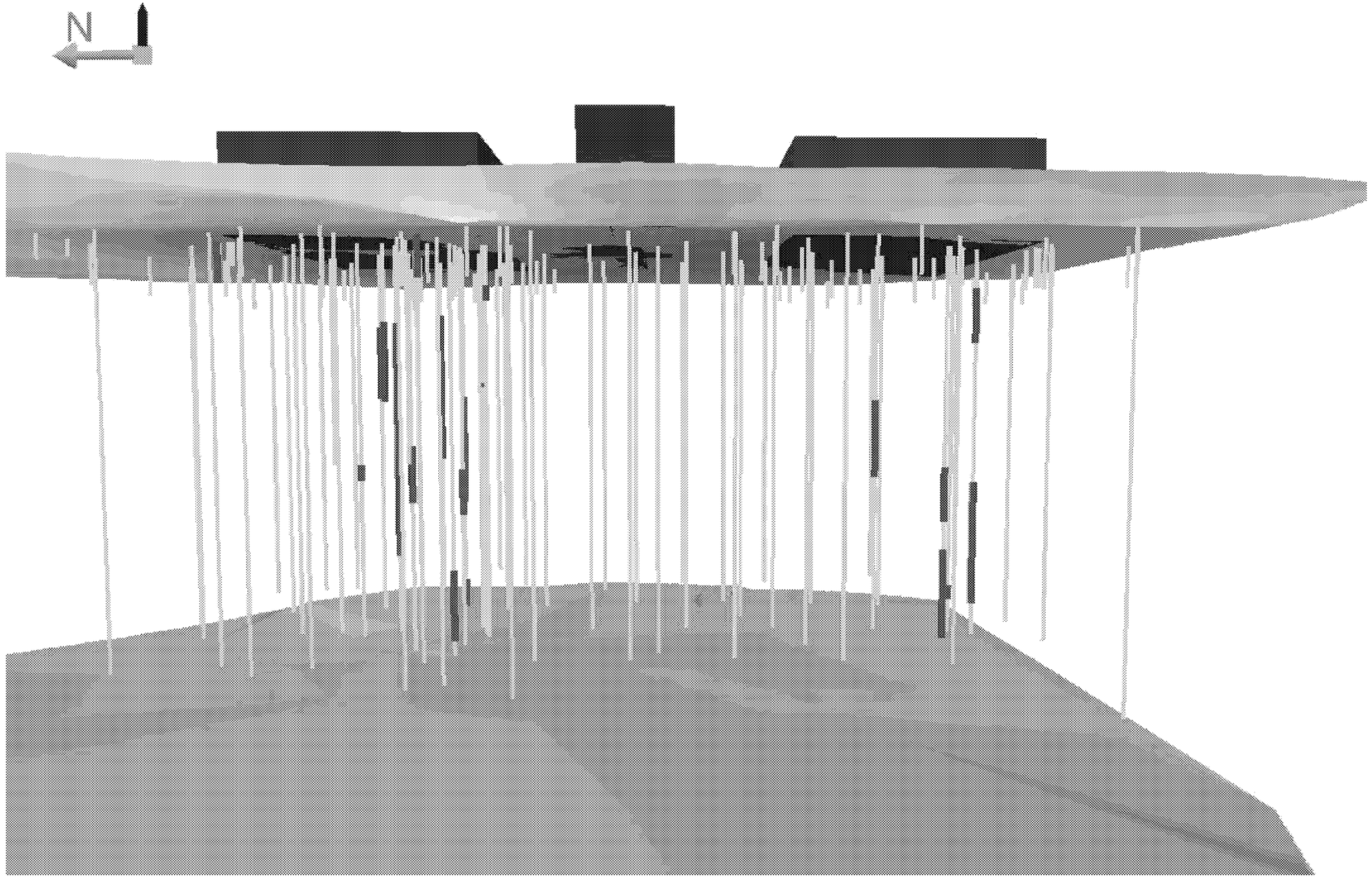
COMBINED DATA SETS CBA SOIL BORINGS

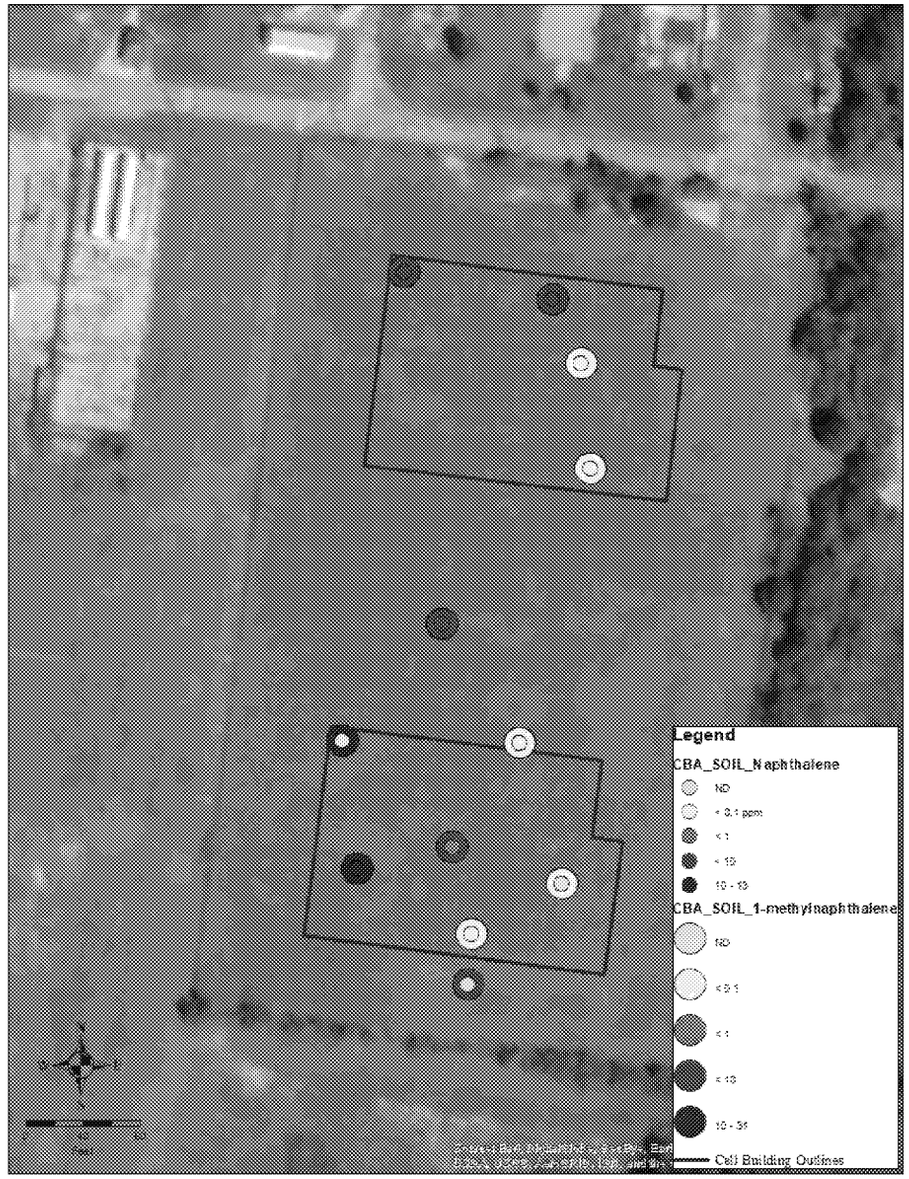


- Map shows all of the deep soil borings completed in the CBA
  (to the base of the surficial aquifer)
- Locations with observed metallic mercury (beads) are shown in dark gray

3D VISUALIZATION OF SOIL BORINGS & MERCURY



PAH TESTING OF SOIL CORES



- Per workplan, testing of stained soils was performed during the 2018 CBA assessment
- Sample depths varied from 4ft to 16ft
- Most commonly detected and highest concentration PAHs were naphthalene and 1- / 2-methylnaphthalene
  - Concentrations all below Industrial RSLs

CBA ASSESSMENT FINDINGS & CONCLUSIONS

- No significant accumulation (“pools”) of metallic Hg exist
  - sporadically present (isolated vertical intervals) in generally well-sorted, coarser-grained sand layers between clay lenses
- Lateral & vertical extent is delineated across both cell buildings
  - metallic Hg in the subsurface soil is limited to beneath portions of the CB1 and CB2 floor slab
- A weathered petroleum layer underlies much of the CBP in the upper 15-20ft of depth below the ground surface

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3.
SITE-WIDE GROUNDWATER

2017 SITE-WIDE SAMPLING RESULTS | SATILLA GROUNDWATER

2020 evaluation to be completed following data validation

Exceeding MCLs

Mercury (48)
Arsenic (37)
Beryllium (37)
Chromium (36)
Lead (18)
Benzene (9)
Methylene Chloride (8)
Chlorobenzene (7)
1,4-Dichlorobenzene (3)
Others (1)

Exceeding Tap-water RSLs

Naphthalene (86)
Vanadium (57)
Aluminum (21)
Benzo(a)Anthracene (13)
Chloroform (10)
Iron (10)
1,2,4-Trimethylbenzene (6)
1,1-Dichloroethane (5)
Dibenzo(a,h)Anthracene (5)
2-Methylnaphthalene (5)

133 total wells in Satilla

2017/19 & 2020 SATILLA GROUNDWATER CONDITION

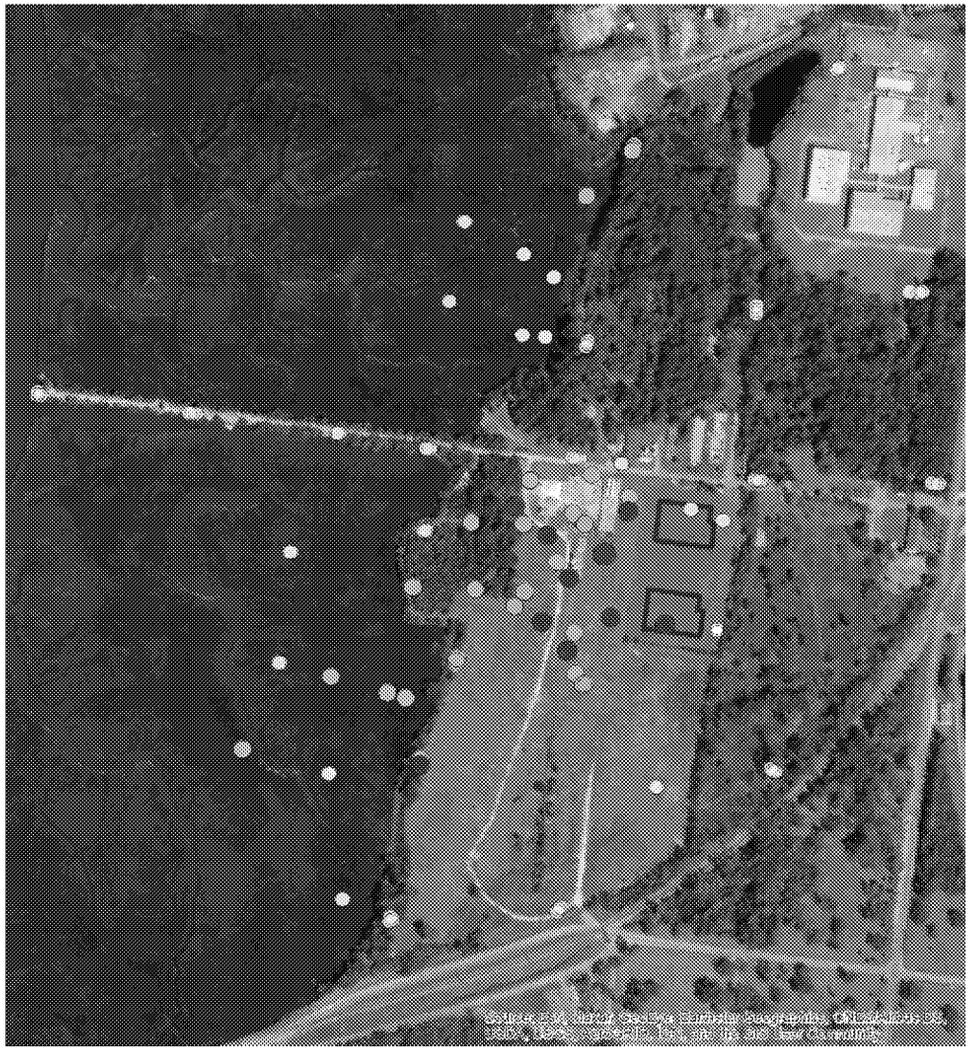
MERCURY

- Concentrations in CBP treatment areas remain consistent (which was lowered by CO_2 sparging)
- Improvement at northern extent

Mercury (ppb)

- ND
- <2
- 2-20 (>MCL)
- 20-200
- >200

2017-2019



2020

2017/19 & 2020 SATILLA GROUNDWATER CONDITION

ARSENIC

- Concentrations in 2020 consistent with past monitoring

Arsenic (ppb)

- ND
- <10
- 10-100 (>MCL)
- 100-1,000
- >1,000

2017-2019

2020

2017/19 & 2020 SATILLA GROUNDWATER CONDITION

CHROMIUM

- Concentrations in 2020 consistent with past monitoring

Chromium (ppb)

- ND
- 0-10
- 10-100
- 100-1,000 (>MCL)
- >1,000

2017-2019

2020

2017/19 & 2020 SATILLA GROUNDWATER CONDITION

LEAD

- Concentrations in 2020 consistent (or lower) with past monitoring
- Improvement in MCL-based condition at several locations

Lead (ppb)

- ND
- <15
- 15-150 (>MCL)
- 150-1,500
- >1,500

2017-2019

2020

2017/19 & 2020 SATILLA GROUNDWATER CONDITION

BENZENE

- Concentrations in 2020 consistent with past monitoring

Benzene (ppb)

- ND
- <5
- 5-10 (> MCL)
- 10-25
- 25-75

2017-2019

2020

2017/19 & 2020 SATILLA GROUNDWATER CONDITION

CHLORO-BENZENE

- Concentrations in 2020 consistent with past monitoring

Chlorobenzene (ppb)

- ND
- <10
- 10-100
- 100-1,000 (>MCL)
- >1,000

2017-2019

2020

2017/19 & 2020 SATILLA GROUNDWATER CONDITION

NAPHTHALENE

- Concentrations in 2020 consistent with past monitoring

Naphthalene (ppb)

- ND
- <0.17
- 0.17-10 (>RSL)
- 10-100
- >100 (>LHA)

2017-2019

2020

2017/19 & 2020 SATILLA GROUNDWATER CONDITION

BENZO(A) ANTHRACENE

- Concentrations in 2020 consistent (or lower) with past monitoring
- Reduction in # of wells in high concentration ranges

2017-2019

2020

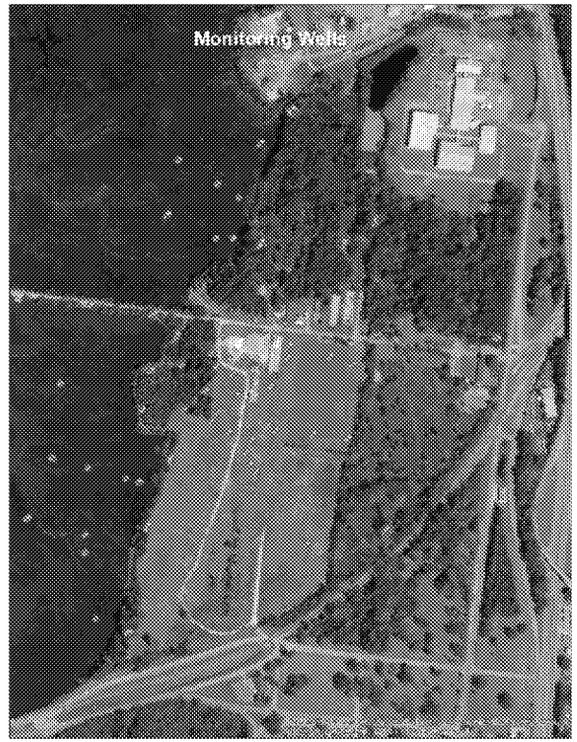
Benzo(a)anthracene (pp

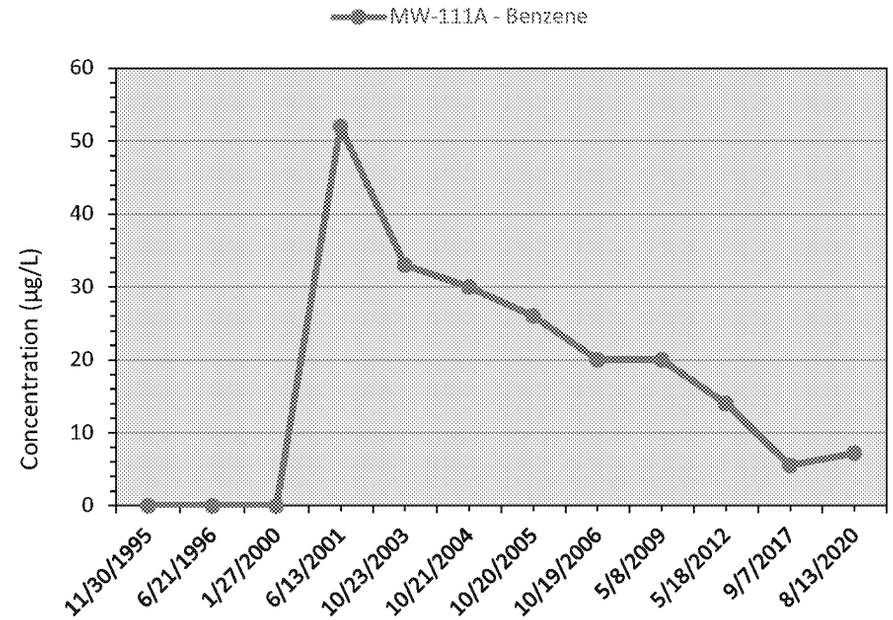
- ND
- <0.03
- .03-.3 (>RSL)
- .3-3
- >3

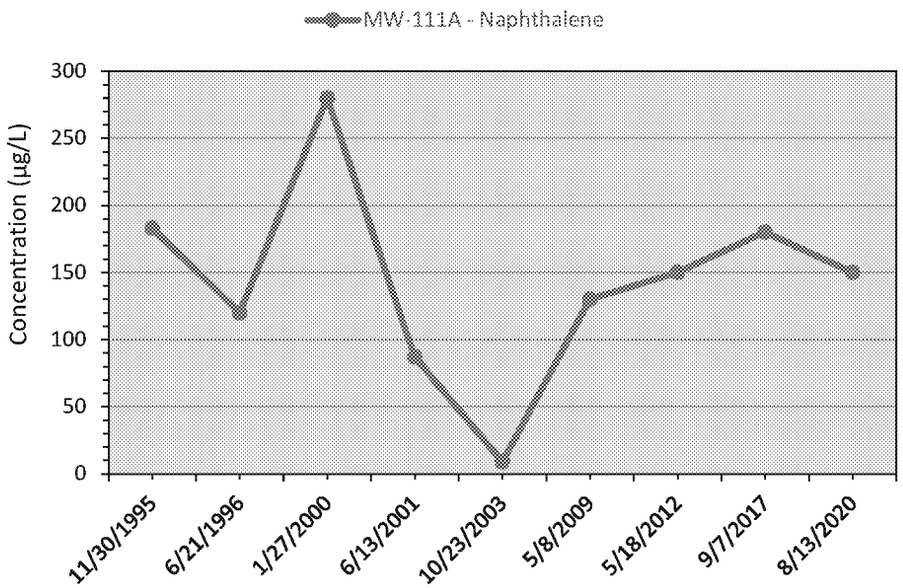
EPA COMMENT #5/#7

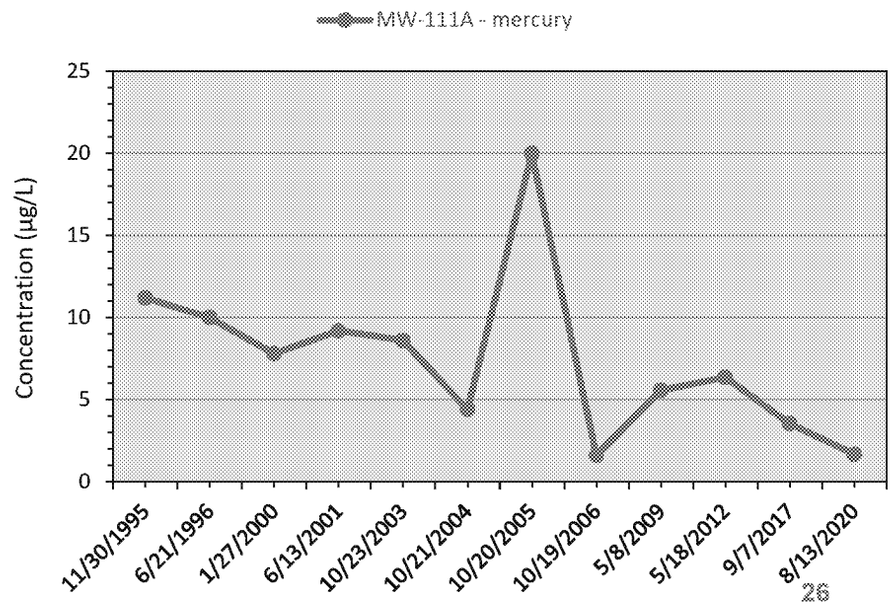
MW-111A STATUS

- EPA interest due to historical elevated condition of COCs
- Mercury & benzene trending lower 2020
- Naphthalene within historical fluctuation range





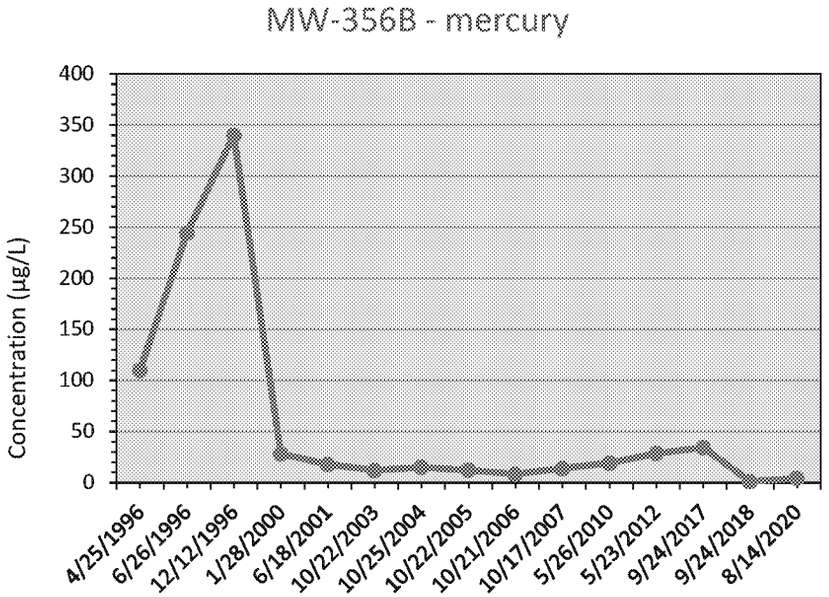




EPA COMMENT #8

MW-356B STATUS

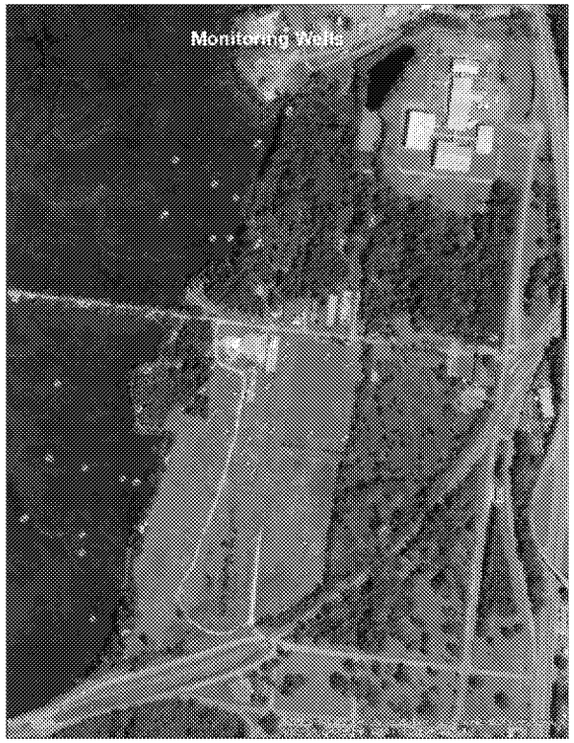
- EPA interest due to historical elevated Hg condition and sudden decrease in concentration in 2018
- 2020 sampling confirmed low 2018 Hg condition

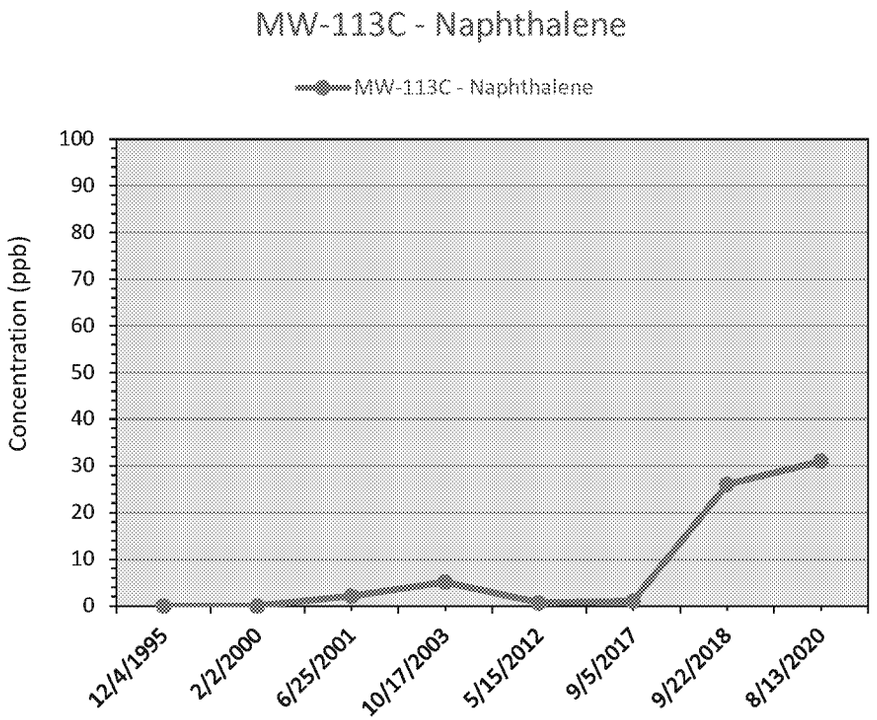


EPA COMMENT #9

MW-113C STATUS

- EPA interest due to rise in naphthalene condition reported in 2018
- 2020 sampling confirmed 2018 naphthalene condition





EPA COMMENT #10

- EPA requested sampling of select monitoring wells to ensure there are no data gaps
- Honeywell addressed these locations during the August 2020 sampling event
  - MW-1B and MW-306A were not sampled per approved workplan

Limited Data Points	*Elevated Detections*	*Confirm Decreasing Trends*
MW-1B	*HWEast4*	*HWEast5*
MW-306A	*HWWest2*	*MW-111A*
MW-361B	*HWWest3*	*MW-112B*
MW-362A	*MW-131*	*MW-112C*
MW-362B	*MW-132*	*MW-113A*
MW-506A	*MW-135*	*MW-113C*
MW-510A	*MW-304*	*MW-115A*
MW-507A	*MW-353B*	*MW-115D*
	MW-356B	*MW-301B*
	MW-357A	*MW-505A*
	MW-358B	*MW-513A*
	MW-360D	*MW-516B*
	MW-503B	*MW-517B*
	MW-504A	
	MW-506B	
	MW-507B	
	MW-509B	
	MW-512B	
	MW-513B	
	MW-515B	
	MW-516A	
	MW-517A	

EPA COMMENT #10

"Limited Data Points"

Location	Hg Range	EPA Review Comment	2020 Data		As Range	EPA Review Comment	2020 Data
MW-361B	ND-4.3	*Previously None Detect*	0.04		--	--	--
MW-362A	3.9-9.7	*Elevated Constant*	2.6		--	--	--
MW-362B	1.5-38.9	*Was Decreasing, Now Increasing*	4.8		8.6-37.2	*Was Decreasing, Now Increasing*	ND
MW-506A	2.8-12.9	*Elevated, Decreasing*	1.8		12.6-46.2	*Elevated, Decreasing*	12
MW-507A	5.7-10.4	*Elevated, Decreasing*	2		13.1-25.1	*Elevated, Increasing*	11
MW-510A	45.2-120	*Elevated, Decreasing*	13.9		38.8-135	*Elevated, Decreasing*	47

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EPA COMMENT #10

"Elevated Detections"

Location	Hg Range	EPA Review Comment	2020 Data		As Range	EPA Review Comment	2020 Data
HWEast4	4.9-15.8	*Elevated, Decreasing*	6.54		ND-6.6	--	2.4
HWWest2	3.3-68.5	*Elevated, Decreasing*	25.2		24-140	--	54
HWWest3	0.44-67.6	*Elevated, Decreasing*	22		ND-200	*Elevated, Increasing*	42
MW-131	3.1-8.9	*Elevated, Increasing*	0.005		ND-15.4	*Elevated, Decreasing*	ND
MW-132	ND-3.2	*Elevated, Decreasing*	1.2		ND-48	*Elevated, Decreasing*	ND
MW-135	ND-12	*Elevated, Decreasing*	0.004		7.1-37	*Elevated, Decreasing*	ND
MW-304	1.8-12	*Elevated, Increasing*	4.1		ND-22.6	*Elevated, Decreasing*	14
MW-353B	1.8-160	*Elevated, Decreasing*	1.9		ND-90	*Was Decreasing, Now Increasing*	11
MW-356B	1.2-340	*Elevated, Decreasing*	4.1		ND-604	*Elevated Constant*	37
MW-357A	1-174	*Elevated Constant*	0.9		ND-254	--	ND
MW-358B	ND-19	*Elevated, Decreasing*	4.8		ND-100	*Was Decreasing, Now Increasing*	11
MW-360D	ND-94.4	*Elevated, Decreasing*	22.1		ND-63	--	ND
MW-503B	.27-51	*Elevated Constant*	6.4		ND-28.2	--	18
MW-504A	13.3-120	*Elevated, Decreasing*	9.5		9.4-56	*Elevated, Increasing*	4.8
MW-506B	2.1-8.6	*Elevated, Increasing*	5.9		4.4-45.8	*Elevated, Increasing*	34
MW-507B	1.9-8.2	*Elevated Constant*	3.3		ND-38.6	*Elevated, Increasing*	17
MW-509B	7.3-47.5	*Elevated, Increasing*	13.8		20.7-49.1	*Elevated, Increasing*	37
MW-512B	ND-690	*Elevated, Decreasing*	3.4		ND-183	--	2.3
MW-513B	11-1,620	*Elevated, Decreasing*	6.5		ND-511	*Elevated, Decreasing*	16
MW-515B	9.5-64.8	*Elevated Constant, Increasing*	4.3		ND-48	*Elevated, Decreasing*	30
MW-516A	16-125	*Elevated Constant*	30.6		6.8-34	*Was Decreasing, Now Increasing*	11
MW-517A	17-90	*Elevated, Increasing*	18.8		ND-31	*Was Decreasing, Now Increasing*	6.3

EPA COMMENT #10

"Confirm Decreasing Trend"

Location	Hg Range	EPA Review Comment	2020 Data		As Range	EPA Review Comment	2020 Data
HWEast5	2.2-15.6	*Elevated, Decreasing*	7.98		ND-8.7	--	ND
MW-111A	1.6-20	*Elevated Constant*	1.68		33.6-160	*Elevated, Decreasing*	71
MW-112B	ND-11.3	*Elevated, Increasing*	1.4		ND-150	*Elevated, Increasing*	7.8
MW-112C	ND-27	*Was Decreasing, Now Increasing*	2.6		ND-160	*Was Decreasing, Now Increasing*	ND
MW-113A	27.6-170	*Elevated Constsant*	24		15-43	*Elevated, Decreasing*	11
MW-113C	1.3-69.1	*Elevated, Increasing*	9.7		ND-26	*Below MCL But Increasing*	19
MW-115A	1.1-16.3	*Elevated, Increasing*	4.7		ND-17.2	*Elevated, Increasing*	9.9
MW-115D	1.1-16.3	*Was Decreasing, Now Increasing*	4.9		ND-9.5	--	ND
MW-301B	ND-4.5	*Elevated, Increasing*	1.5		37.2-290	*Elevated, Decreasing*	41
MW-505A	19-359	*Elevated, Decreasing*	10.6		ND-68	*Elevated, Increasing*	24
MW-513A	32-550	*Elevated Continuous*	11.1		38-123	*Was Decreasing, Now Increasing*	28
MW-516B	1.8-160	*Elevated, Decreasing*	0.03		ND-68	--	ND
MW-517B	6.9-150	*Elevated, Increasing*	22.8		ND-101	*Elevated, Increasing*	40

SUMMARY & NEXT STEPS

- Conditions of the Removal Action Order have been met
  - Prepare plan for sparge well decommissioning
- Site-wide groundwater assessment supports development of the OU2 RI/FS
  - Aug 2020 sampling event COC concentrations are within the range (or below) of RI monitoring period
- Primary groundwater COCs include:
  - Metals — mercury, arsenic, chromium, lead, beryllium, vanadium
  - VOCs — benzene, chlorobenzene, chloroform, trimethylbenzenes
  - PAHs — naphthalene, benzo(a)anthracene

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