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www.CoxColvin.com

Sent via Email

November 12, 2018

Mr. Brandon Pursel
RCRA Corrective Action Project Manager
Land and Chemicals Division
Remediation and Reuse Branch
U.S. EPA, Region 5
77 West Jackson Boulevard (LU-9J)
Chicago, IL 60604

RE: Third Quarter 2018 Groundwater Monitoring Results, AK Steel Corporation - Zanesville Works, Zanesville, Ohio

Dear Mr. Pursel:

On behalf of the AK Steel Corporation (AK Steel), this letter provides the results of the third quarter 2018 groundwater monitoring event conducted at the AK Steel-Zanesville Works facility by Cox-Colvin & Associates, Inc. (Cox-Colvin). Quarterly groundwater monitoring continues to be conducted at the Zanesville Works in association with a 1995 release from the No. 4 Hard Pickle (HP) Line Transfer Station sump (SWMU 1). The groundwater monitoring program has evolved since 1995. The monitoring program details and third quarter 2018 sampling results are provided below. As a reminder, the second and fourth quarterly events consist of a longer list of onsite and offsite wells, while the first and third quarterly events consist of only four wells along the AK Steel property boundary and downgradient from the 1995 release. Given the limited scope of the third quarter event, evaluation and interpretation of results will be presented in the report for the fourth quarter event.

Scope and Sampling Methodology

The third quarter 2018 monitoring event included sampling of AK Steel monitor wells MW-09DD, MW-27A, MW-28A, and MW-28B (Plate 1). MW-09DD is located slightly downgradient of the historical No. 4 HP Line release, and MW-27A, MW-28A, and MW-28B are located immediately beyond the Zanesville Works property boundary. Groundwater sampling was conducted on September 12, 2018. On September 11, 2018, depth-to-water measurements were collected throughout the area from accessible network AK Steel and UTC Superfund Site monitor wells and production wells. Depth-to-water measurements were collected to an accuracy of +/- 0.01 ft using an electronic water-level indicator and recorded on a water level log (attached on CD). The water-level indicator probe was rinsed with distilled water between measurements. A surface water-level measurement for the Muskingum River was collected from a surveyed measuring point located at the Zanesville Works pump house. AK Steel production well DW-05 was temporarily shut down for maintenance activities during the monitoring event and therefore a water level could not be collected. Depth-to-water measurements were entered into the AK Steel environmental database and water-level elevations were calculated automatically by subtracting depth-to-water measurements from surveyed measuring point elevations. Table 1 provides a summary of depth-to-water measurements, measuring point elevations, and calculated groundwater and surface water elevations.

AK Steel monitor wells were purged and sampled using a site-dedicated submersible pump. A minimum of three well volumes were purged from the monitor wells prior to sampling. Measurements of pH, specific conductance, turbidity, and temperature were collected throughout the purging process. Field meters were calibrated at least once per day. Completed water sampling logs and field equipment calibration log are attached on CD. An Alconox recirculation flush, followed by a potable water rinse within containers was performed with the submersible pump prior to purging and sampling each well. Purge water from monitor wells and pump decontamination water was collected in 5-gallon buckets with water-tight lids and transferred to the Zanesville Works industrial wastewater treatment plant (IWTP).

Field replicate MW-28BA and equipment blank MW-09DDEB were collected and analyzed for quality assurance/quality control (QA/QC) purposes. The equipment blank was collected after the Alconox recirculation flush by pumping distilled water through the submersible pump and into sample bottles at the associated monitor well location. Samples were placed in coolers with ice and transported by courier to TestAmerica Laboratories (TestAmerica) in North Canton, Ohio, following standard chain-of-custody documentation procedures. Samples were analyzed for acidity, alkalinity, total cadmium, chloride, total chromium, hexavalent chromium, fluoride, total lead, and sulfate. Analytical results were reported to the method detection limit (MDL).

Results

A groundwater flow map showing groundwater flow conditions in the regional aquifer on September 11, 2018 is provided as Plate 1. As the flow map indicates, groundwater throughout much of the Zanesville Works property continues to flow primarily northward as a result of the influence of pumping from the UTC Superfund Site groundwater treatment system wells, located at the north end of the UTC property, and the City of Zanesville Municipal Well Field diversion and drinking water wells, located to the northeast of the Zanesville Works on the opposite side of the Muskingum River. Localized cones of depression can also be seen around operating AK Steel production well DW-04. Localized mounting occurs around monitor well MW-25 and MW-29, which is typically observed.

Cox-Colvin reviewed and validated the analytical data for compliance with method quality control criteria following appropriate guidance outlined in Ohio EPA's Tier I Data Validation Manual (March 2012). The validated analytical results and field parameter measurements for groundwater samples (excluding QA/QC samples) collected from AK Steel wells are provided in Table 2. The TestAmerica laboratory report and data validation memo are attached on CD.

If you have any questions regarding this information, do not hesitate to contact me at any time.

Sincerely,
Cox-Colvin & Associates, Inc.

Nick M. Petruzzi, PE, CPG
Principal Engineer

Colton B. Creal
Staff Scientist

Attachments

cc: Mr. Matthew Montag - AK Steel (hardcopy and email)
Ms. Kristy Hunt, Ohio EPA - DERR, SEDO (email only)
Mr. Scott Bergreen, Ohio EPA - DERR, SEDO (email only)

K:\CCA\PROJECTS\AKZanesville\RCRAClosureGWMonitoring\2018 Qtry Reports\3rd Quarter\AKZ Third Q 2018 Report.docx

Tables

Table 1. Depth-to-Fluid and Calculated Water-Level Elevations on September 11, 2018,
AK Steel Corporation - Zanesville Works, Zanesville, Ohio

Name	Measuring-Point Elevation (ft MSL)	Depth To Fluid (ft)	Water-Level Elevation (ft MSL)
B-10S	720.15	36.27	683.88
B-11S	720.98	37.39	683.59
B-12S	724.00	38.85	685.15
B-13S	721.39	37.26	684.13
B-14	720.87	37.57	683.30
B-17	723.37	40.60	682.77
B-18	720.97	37.59	683.38
B-1S	721.90	38.79	683.11
B-23S	699.21	13.81	685.40
B-2S	722.79	41.87	680.92
B-3I	719.24	36.17	683.11
B-4S	722.15	39.70	682.45
B-5S	722.48	38.75	683.73
B-6S	718.92	35.25	683.67
B-7S	715.69	31.65	684.04
B-8S	719.08	36.08	683.00
C-1S	699.13	14.97	684.16
C-2S	699.81	15.34	684.47
C-3S	701.22	16.30	684.92
C-4	700.58	15.14	685.44
C-5	697.22	12.08	685.14
C-6	700.35	15.42	684.93
C-7	698.46	14.03	684.43
C-8	695.34	10.74	684.60
C-9	697.99	13.79	684.20
DW-1	711.39	26.36	685.03
DW-2	710.93	25.34	685.59
DW-3	710.61	25.15	685.46
DW-4	713.77	38.60	675.17
DW-5	708.11	NA	NA
MW-01	707.56	22.01	685.55
MW-02	707.31	21.79	685.52
MW-03	710.85	25.82	685.03
MW-04	707.58	21.99	685.59
MW-06	706.86	21.47	685.39
MW-07	712.15	27.36	684.79
MW-08	711.79	12.91[a]; 13.35[b]	698.82[c]
MW-09	708.32	23.04	685.28
MW-09D	708.55	23.28	685.27
MW-09DD	708.34	23.04	685.30
MW-10	709.45	24.19	685.26
MW-11	709.79	24.56	685.23
MW-13D	719.64	34.90	684.74
MW-14	713.23	27.91	685.32
MW-16	697.46	10.03	687.43
MW-17	696.93	9.14	687.79
MW-18	700.21	12.60	687.61
MW-19	702.90	15.60	687.30
MW-20	703.66	17.02	686.64
MW-21	707.41	21.34	686.07
MW-24	711.11	26.35	684.76
MW-25	709.66	23.83	685.83
MW-26A	710.84	25.73	685.11
MW-26B	710.61	25.49	685.12
MW-27A	709.89	24.71	685.18
MW-27B	709.97	24.76	685.21
MW-28A	709.47	24.16	685.31
MW-28B	709.53	24.18	685.35
MW-29	711.45	26.33	685.12
MW-31	711.00	9.31[a]; 14.20[b]	701.05[c]
MW-32	710.72	25.31	685.41
Pump House	695.31	2.59	692.72

NA - Could not collect water level during this event
a - Depth to product measurement.
b - Depth to water measurement.
c - Corrected elevation to account for floating product in monitor well MW-08 (0.44 ft) and MW-31 (4.89 ft) as calculated:

WLC = M - [(DLNAPL + TLNAPL) - (TLNAPL * rLNAPL)]

Where: WLC - corrected water level elevation
M - measuring point elevation (msl)
DLNAPL - depth to LNAPL (ft.)
TLNAPL - thickness of LNAPL (ft.)
rLNAPL - specific gravity of LNAPL of approximately 0.87

Table 2. Analytical Results for March 2018 Groundwater Samples Collected from AK Steel Wells, AK Steel Corporation - Zanesville Works, Zanesville, Ohio

Location		AK Zanesville	AK Zanesville	AK Zanesville	AK Zanesville
Sample Name		MW-09DD	MW-27A	MW-28A	MW-28B
Sample Date		9/12/18	9/12/18	9/12/18	9/12/18
Sample Type		Monitor Well	Monitor Well	Monitor Well	Monitor Well
Media		Groundwater	Groundwater	Groundwater	Groundwater
Laboratory	Concentration	Test America	Test America	Test America	Test America
Lab ID	Units	240-101077-1	240-101077-2	240-101077-3	240-101077-4
METALS/INORGANICS					
Cadmium	MG/L	0.00048 J	0.00037 J	0.00039 J	0.00056 J
Chromium	MG/L	< 0.005	0.0012 J	< 0.005	< 0.005
Fluoride	MG/L	6.2	0.41	1.2	3.8
Hexavalent Chromium	MG/L	< 0.02	< 0.02	< 0.02	< 0.02
Lead	MG/L	< 0.005	< 0.005	< 0.005	< 0.005
Acidity (Titrimetric)	MG/L	-139	-232	-159	-167
Alkalinity, Total	MG/L	160	250	190	220
Chloride	MG/L	66	26	87	82
Sulfate	MG/L	110	24	63	120
FIELD PARAMETERS					
pH	SU	7.06	7.25	7.3	7.08
Specific Conductance	UMHOS/CM	754	615	806	925
Temperature	Degrees C	15.27	14.34	17.28	15.77
Turbidity	NTU	0.39	0.61	0.49	0.54

Flags following the value are designated upon validation.

< Not detected above the specified reporting limit.

J Result is less than the PQL but greater than or equal to the MDL and the concentration is an approximate value.

ACLs at Property Boundary Wells: Fluoride = 38 mg/L, Chromium = 2.59 mg/L, Hexavalent Chromium = 8.77×10^{-2} mg/L

Attachments on CD

Field Logs, Laboratory Report and Data Validation Memorandum

Cox-Colvin & Associates, Inc.

Field Logs

Cox-Colvin & Associates, Inc.

Cox-Colvin & ASSOCIATES, INC. ENVIRONMENTAL SERVICES

Water Level Log

AK Steel Zanesville

Date: 9/11/18 **Collected by:** ELC, CBC

Production Wells Pumping?/Flow Rate(gpm): CP-01, DW-04

River Level (ft bmp) ~~2.59~~ 2.59'

Well ID	Time	Total Depth (ft bmp)	DTW (ft bmp)	Water Column (ft)	Well Dia. (in)	Comment
MW-01	0826	33.46	22.01	11.45	4	
MW-02	0734	32.91	21.79	11.12	4	
MW-03	0810	34.62	25.82	8.80	4	
MW-04	0828	33.32	21.99	11.33	4	
MW-06	0745	36.45	21.47	14.98	4	Was buried under dirt + gravel
MW-07	1010	36.18	27.36	8.82	4	
MW-08	0940	22.47	p.l. = 12.91 w.l. = 13.35	9.12	4	Water in vault Product thickness = 0.44
MW-09	0815	33.82	23.04	10.78	4	
MW-09D	0816	43.77	23.28	20.49	2	
MW-09DD	0817	60.09	23.04	37.05	2	
MW-10	0721	35.09	24.19	10.90	2	pressurized, let equilibrate
MW-11	~~24.56~~ 0715	33.70	24.56	9.16	2	Standing water in vault
MW-13D	1032	51.90	34.90	17.0	2	
MW-14	0902	42.47	27.91	14.56	2	
MW-16	1107	32.43	10.03	22.40	2	
MW-17	1103	31.68	9.14	22.54	2	
MW-18	1057	31.12	12.60	18.52	2	
MW-19	1048	31.14	15.60	15.54	2	
MW-20	1040	32.88	17.02	15.86	2	

Cox-Colvin & Associates, Inc. Environmental Services

Water Level Log

AK Steel Zanesville

Date: 09/11/18

Collected by: ELG/CBC **Production Wells Pumping?** CP-01, DW-04

Well ID	Time	Total Depth (ft bmp)	DTW (ft bmp)	Water Column (ft)	Well Dia. (in)	Comment
MW-21	0854	42.80	21.34	21.46	2	
MW-24	0927	43.49	26.35	17.14	2	Cracked Vault lid, Standing water
MW-25	0719	44.94	23.83	21.11	2	CBC ~~pressured, let equilibrate~~
MW-26A	1312	42.77	25.73	17.04	2	
MW-26B	1311	62.78	25.49	37.29	2	
MW-27A	1307	42.88	24.71	18.17	2	
MW-27B	1306	62.98	24.76	38.22	2	
MW-28A	1304	43.20	24.16	19.04	2	
MW-28B	1303	63.14	24.18	38.96	2	
MW-29	1002	33.75	26.33	7.42	2	
MW-31	0955	15.71	p.l. = 9.31 w.l. = 14.20	1.51	4	Product thickness = 4.89'
MW-32	0836	34.85	25.31	9.54	2	
DW-01	0839	~75	26.36	~48.64	-	Production well
DW-02	0831	~75	25.34	~49.66	-	Production well
DW-03	0847	~75	25.15	~49.85	-	Production well
DW-04	1020	~75	38.60	~36.40	-	Production well
DW-05	0850	~75	NA	NA	-	Production well — Down for repairs

Cox-Colvin & Associates, Inc. Environmental Services

Water Level Log

AK Steel Zanesville

Date: 09/11/18
Collected by: ELC, CBC **Production Wells Pumping?** I-4, I-3 111gpm, I-2, I-1 107gpm

Well ID	Time	Total Depth (ft bmp)	DTW (ft bmp)	Water Column (ft)	Well Dia. (in)	Comment
B-1S	12:39	42.49	38.79	3.7	2	
B-2S	12:16	45.86	41.87	3.99	2	
B-3I	12:45	48.01	36.17	11.84	2	
B-4S	12:37	44.76	39.70	5.06	2	
B-5S	12:31	44.39	38.75	5.64	2	
B-6S	12:50	43.39	35.25	18.14	2	
B-7S	12:53	41.30	31.65	9.65	2	
B-8S	1341	43.93	36.08	7.85	2	
B-10S	12:18	44.90	36.27	8.63	2	
B-11S	12:29	43.03	37.39	5.64	2	
B-12S	13:48	49.60	38.85	10.75	2	
B-13S	1234	45.05	37.26	7.78	2	
B-14	12:26	46.98	37.57	9.41	2	
B-17	12:24	48.67	40.60	8.07	2	
B-18	12:25	55.11	37.59	17.52	2	
B-23S	11:28	29.72	13.81	15.91	2	well casing spins w/ cap

Cox-Colvin & ASSOCIATES, INC. ENVIRONMENTAL SERVICES

Water Level Log

AK Steel Zanesville

Date: 09/11/18

Collected by: CBC, ELL **Production Wells Pumping?** Z-6 running, W-12 appears down for maintenance w/ Layne vehicle on site

I-1, I-2, I-3, I-4
107gpm 111gpm

Well ID	Time	Total Depth (ft bmp)	DTW (ft bmp)	Water Column (ft)	Well Dia. (in)	Comment
I-1	-	-	-	-	Production Well Pumping? (Y) / N	
I-2	-	-	-	-	Production Well Pumping? (Y) / N	
I-3	-	-	-	-	Production Well Pumping? (Y) / N	
I-4	-	-	-	-	Production Well Pumping? (Y) / N	
C-1S	11:46	26.97	14.97	12.0	2	
C-2S	11:45	27.69	15.34	12.35	2	No well cap
C-3S	11:42	28.58	16.30	12.28	2	
C-4	~~11:39~~ 11:18 CBC	48.90	~~15.14~~ 13.79 CBC	~~33.76~~ 35.11 CBC	2	
C-5	11:35	43.61	12.08	31.53	2	
C-6	11:31	59.77	15.42	44.35	2	
C-7	11:23	42.18	14.03	28.15	2	
C-8	11:21	46.55	10.74	35.81	2	
C-9	11:18	54.35	13.79	40.56	2	

TestAmerica Canton
4101 Shuffel Street NW
North Canton, OH 44720
Phone (330) 497-9396 Fax (330) 497-0772

Chain of Custody Record

TestAmerica

Client Information	
Client Contact: Nick Petruzzi	Sampler: CRK, BLC
Company: Cox-Colvin & Associates, Inc.	Phone: (614) 526-2040
Address: 7750 Corporate Blvd	Due Date Requested: Standard
City: Plain City	TAT Requested (days): Standard 2 week
State, Zip: OH, 43064	
Phone: 614-204-4485	PO #: Purchase Order not required
Email: nick_petruzzi@coxcolvin.com	WO #:
Project Name: AKZ - RCRA Closure Q2 Monitoring	Project #: 24009530
Site:	SSOW#:

Lab PM: Johnson, Opal
E-Mail: opal.johnson@testamericainc.com

Page: Page 1 of 1

Analysis Requested: Field Filtered Sample (Yes or No); Perform MS/MSD (Yes or No); SM2310B - Acidity; 2320B - Alkalinity; 6010B - 6010B, Total Ca, Cl, Pb; 300.0_28D, TTHA

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix	SM2310B - Acidity (N)	2320B - Alkalinity (N)	6010B (D)	300.0_28D (N)	Special Instructions/Note:
MW-09DD	09/12/18	0822	G	Water	X	X	X	X	
MW-27A	09/12/18	0935	G	Water	X	X	X	X	
MW-28A	09/12/18	1012	G	Water	X	X	X	X	
MW-28B	09/12/18	1036	G	Water	X	X	X	X	
MW-09DDEB	09/12/18	~~0822~~	G	Water	X	X	X	X	Sample time 0838
MW-28BA	09/12/18	1036	G	Water	X	X	X	X	
				Water					
				Water					
				Water					
				Water					
				Water					

Possible Hazard Identification: ☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month): ☐ Return To Client ☒ Disposal By Lab ☐ Archive For ____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements: 24 hr add HEX Chrome

Empty Kit Relinquished by: | Date: | Time: | Method of Shipment:

Relinquished by	Date/Time	Company	Received by	Date/Time	Company
[signature]	9/12/18 1103	CCA	B Bidwell	9/12/18 1103	TA

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.: | Cooler Temperature(s) °C and Other Remarks:

Ver: 08/04/2016

Cox-Colvin & ASSOCIATES, INC. ENVIRONMENTAL SERVICES

Volumetric Water Sampling Log

Well ID: MW-09DD

Date: 09/12/18

Client	Project	City / State
AK Steel Zanesville	AKZ Groundwater Sampling	Zanesville, Ohio
Measuring Point Description	**Total Well Depth (ft. / m)**	**Well Diameter (in)**
Mark on TOC	60.09	2
Depth to Water (ft / m)	**Water Column Height (ft. / m)**	**One Well Volume (gal / L)**
23.04	37.05	5.928
Minimum Volume to be Extracted (gal / L)	**Well Evacuation Method**	**Sampling Method**
18	Bailer / Submersible Pump / _____	Bailer / Submersible Pump / _____

$Z_{in} = 0.16$

Purged Volume (Gal / L)	Temp C° (+/-0.5)	Conductivity (µS/cm) (+/- 3%)	pH (+/- 0.2)	Turbidity	Other	Comments
0	Start of Purging					Purge Start Time: 0800 WL: 22.87
1	15.87	759.34	6.16	6.05		Clear
6	15.31	754.70	6.68	0.51		Clear
12	15.28	754.11	6.92	0.74		Clear
18	15.28	755.28	7.02	0.83		Clear
21	15.28	755.06	7.04	0.39		Clear
24	15.27	754.77	7.06	↓		Clear, Sampled PWL 22.87
-						

Purge Volume (gal / L)	Depth to Water (ft / m)	
26	22.87	
Sample Date	**Sample Time**	**QA Samples**
9/12/18	0822	MW-09DDEB

Constituents Sampled	Sample Container	Preservative
Total Cr, Cd, Pb	500 ml Plastic	HNO3 , Ice
Fluoride, Cr+6, Chloride, Sulfate	500 ml Plastic	Ice
Alkalinity	250 ml Plastic	Ice
Acidity	250 ml Plastic	Ice

Comments, Well condition: EB collected after decon w/ Ice Mtn distilled H_2O

Sampling Personnel: ELC, CBC

Cox-Colvin & ASSOCIATES, INC.
ENVIRONMENTAL SERVICES

Volumetric Water Sampling Log

Well ID: MW-27A

Date: 9/12/18

Client	Project	City / State
AK Steel Zanesville	AKZ Groundwater Sampling	Zanesville, Ohio
Measuring Point Description	**Total Well Depth (ft. / m)**	**Well Diameter (in)**
Mark on TOC	42.88	2
Depth to Water (ft. / m)	**Water Column Height (ft. / m)**	**One Well Volume (gal / L)**
24.71	18.17	2.907 2
Minimum Volume to be Extracted (gal / L)	**Well Evacuation Method**	**Sampling Method**
9	Bailer / Submersible Pump / _____	Bailer / Submersible Pump / _____

0.16

Purged Volume (Gal / L)	Temp C° (+/-0.5)	Conductivity (µS/cm) (+/- 3%)	pH (+/- 0.2)	Turbidity	Other	Comments
0	Start of Purging					Purge Start Time: 0928 WL: 24.78
0.5	15.67	608.89	7.27	6.75		Clear
3	14.60	618.85	7.24	2.43		Clear
6	14.38	617.46	7.24	1.09		Clear
9	14.34	615.35	7.25	0.61		Clear, Sample

Purge Volume (gal / L)	Depth to Water (ft. / m)	
12	24.58	
Sample Date	**Sample Time**	**QA Samples**
9/12/18	0935	N/A

Constituents Sampled	Sample Container	Preservative
Total Cr, Cd, Pb	500 ml Plastic	HNO3 , Ice
Fluoride, Cr+6, Chloride, Sulfate	500 ml Plastic	Ice
Alkalinity	250 ml Plastic	Ice
Acidity	250 ml Plastic	Ice

Comments, Well condition: _____

Sampling Personnel: ELC, CBC

Cox-Colvin & ASSOCIATES, INC. ENVIRONMENTAL SERVICES

Volumetric Water Sampling Log

Well ID: ~~267~~ MW-28A

Date: 9/12/18

Client	Project	City / State
AK Steel Zanesville	AKZ Groundwater Sampling	Zanesville, Ohio
Measuring Point Description	**Total Well Depth (ft. / m)**	**Well Diameter (in)**
Mark at TOC	43.20	2
Depth to Water (ft. / m)	**Water Column Height (ft / m)**	**One Well Volume (gal / L)**
24.16	19.04	3.0464
Minimum Volume to be Extracted (gal / L)	**Well Evacuation Method**	**Sampling Method**
9.25	Bailer / ~~Submersible Pump~~ / _____	Bailer / ~~Submersible Pump~~ / _____

Purged Volume (Gal / L)	Temp C° (+/-0.5)	Conductivity (µS/cm) (+/- 3%)	pH (+/- 0.2)	Turbidity	Other	Comments
0	Start of Purging					Purge Start Time: 1000 WL 24.01
0.5	17.81	1108.2	7.22	11.2		Clear
3	17.25	862.37	7.28	3.29		Clear
6	17.25	825.36	7.29	0.79		Clear
9	17.29	800.73	7.30	0.77		Clear
12	17.28	806.32	7.30	0.49		Clear, Sample

Purge Volume (gal / L)	Depth to Water (ft. / m)	
14.5	24.00	
Sample Date	**Sample Time**	**QA Samples**
9/12/18	1012	N/A

Constituents Sampled	Sample Container	Preservative
Total Cr, Cd, Pb	500 ml Plastic	HNO3 , Ice
Fluoride, Cr+6, Chloride, Sulfate	500 ml Plastic	Ice
Alkalinity	250 ml Plastic	Ice
Acidity	250 ml Plastic	Ice

Comments, Well condition: _____

Sampling Personnel: _____

Cox-Colvin & ASSOCIATES, INC. ENVIRONMENTAL SERVICES

Volumetric Water Sampling Log

Well ID: MW-28B

Date: 9/12/18

Client	Project	City / State
AK Steel Zanesville	AKZ Groundwater Sampling	Zanesville, Ohio
Measuring Point Description	**Total Well Depth (ft. / m)**	**Well Diameter (in)**
Mark at TOC	63.14	2
Depth to Water (ft / m)	**Water Column Height (ft. / m)**	**One Well Volume (gal / L)**
~~26.13~~ 24.18	38.96	6.2336
Minimum Volume to be Extracted (gal / L)	**Well Evacuation Method**	**Sampling Method**
19	Bailer / Submersible Pump / _____	Bailer / Submersible Pump / _____

0.16

Purged Volume (Gal / L)	Temp C° (+/-0.5)	Conductivity (µS/cm) (+/- 3%)	pH (+/- 0.2)	Turbidity	Other	Comments
0	Start of Purging					Purge Start Time: 1020 WL: 24.05
3	16.65	931.39	7.29	7.51		Clear
6.25	15.76	927.43	7.12	1.17		Clear
12.50	15.69	926.33	7.08	0.63		Clear
18.75	15.77	925.25	7.08	0.54		Clear, Sample

Purge Volume (gal / L)	Depth to Water (ft. / m)	
24	24.07	
Sample Date	**Sample Time**	**QA Samples**
9/12/18	1036	MW-28BA

Constituents Sampled	Sample Container	Preservative
Total Cr, Cd, Pb	500 ml Plastic	HNO3 , Ice
Fluoride, Cr+6, Chloride, Sulfate	500 ml Plastic	Ice
Alkalinity	250 ml Plastic	Ice
Acidity	250 ml Plastic	Ice

Comments, Well condition: Replicate collected by split sampling method

Sampling Personnel: ELC, CBC

Cox-Colvin & ASSOCIATES, INC. ENVIRONMENTAL SERVICES

Field Equipment Calibration Log

Project: AK Zanesville Quarterly Groundwater
Location: Zanesville, Ohio
Calibrator (Name): E. Cox

Instrument Type	In-Situ Flow cell	Instrument Type: Hach	Instrument Type:
Serial #:	349655	Serial #: 10030C045478	Serial #:
Standard Type:	pH 7.0	Standard Type: Verification Standard	Standard Type:
Standard Lot #:	pH 7.0 C800071 pH 4.0 C693379 1413 µs/cm C744421	Standard Lot #: AB108	Standard Lot #:

Instrument	Date mm/dd/yy	Time	Temperature (F/C)	Standard Value (eg, pH 4.0)	Measured Value	Reason for Calibration/Comments
In-Situ	09/12/18	0725	22.63	pH 7.0	7.02	Start of day
"	"	"	"	pH 4.0	3.99	"
"	"	"	"	1413 µs/cm	1414.7	"
Hach	"	"	" ~~10 NTU~~ LOC	~~9.69~~ 10 NTU	9.69 NTU	"

Laboratory Reports
240-101077

Cox-Colvin & Associates, Inc.

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Canton
4101 Shuffel Street NW
North Canton, OH 44720
Tel: (330)497-9396

Imported
By: lchilcot Date:10/13/18 4:29

TestAmerica Job ID: 240-101077-1
Client Project/Site: AKZ - RCRA Closure Q2 Monitoring
Revision: 1

For:
Cox-Colvin & Associates, Inc.
7750 Corporate Blvd.
Plain City, Ohio 43064

Attn: Nick Petruzzi

Authorized for release by:
10/10/2018 11:29:04 AM

Opal Johnson, Project Manager II
(330)966-9279
opal.johnson@testamericainc.com

Validated by Cox-Colvin 10-10-18
kms

Received by Cox-Colvin 10-10-18

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

Definitions/Glossary

Client: Cox-Colvin & Associates, Inc.
Project/Site: AKZ - RCRA Closure Q2 Monitoring

TestAmerica Job ID: 240-101077-1

Qualifiers

Metals

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
U	Indicates the analyte was analyzed for but not detected.

General Chemistry

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Job ID: 240-101077-1

Laboratory: TestAmerica Canton

Narrative

CASE NARRATIVE

Client: Cox-Colvin & Associates, Inc.

Project: AKZ - RCRA Closure Q2 Monitoring

Report Number: 240-101077-1

Revision I

Revision I: Revised the narrative to outline the sample run events for the Hexavalent Chromium Test. See associated section below.

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

The Acidity by SM 2310B analysis was performed at TestAmerica Pittsburgh Laboratory.

TestAmerica Canton attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

RECEIPT

The samples were received on 9/12/2018 1:33 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 2.7° C.

TOTAL RECOVERABLE METALS (ICP)

Samples MW-09DD (240-101077-1), MW-27A (240-101077-2), MW-28A (240-101077-3), MW-28B (240-101077-4), MW-09DDEB (240-101077-5) and MW-28BA (240-101077-6) were analyzed for total recoverable metals (ICP) in accordance with EPA SW-846 Method 6010B. The samples were prepared on 09/13/2018 and analyzed on 09/14/2018.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

HEXAVALENT CHROMIUM

Samples MW-09DD (240-101077-1), MW-27A (240-101077-2), MW-28A (240-101077-3), MW-28B (240-101077-4), MW-09DDEB (240-101077-5) and MW-28BA (240-101077-6) were analyzed for hexavalent chromium in accordance with EPA SW-846 Method 7196A. The samples were analyzed on 09/12/2018.

Job ID: 240-101077-1 (Continued)

Laboratory: TestAmerica Canton (Continued)

Samples MW-09DD (240-101077-1), MW-27A (240-101077-2), MW-28A (240-101077-3), MW-28B (240-101077-4), MW-09DDEB (240-101077-5) and MW-28BA (240-101077-6) were documented as being analyzed on 09/12/2018 11:19 AM due to a data entry error. The Chain of Custody (COC) documented the samples arrived on 09/12/2018 01:33 PM. The sample analysis time reported was based on the time the batch was initiated and not the true sample analysis time. Due to this laboratory error, the actual time of analysis is not known. The closing CCV, CCB and samples were analyzed by 09/12/2018 2:55 PM and within holding time.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ALKALINITY

Samples MW-09DD (240-101077-1), MW-27A (240-101077-2), MW-28A (240-101077-3), MW-28B (240-101077-4), MW-09DDEB (240-101077-5) and MW-28BA (240-101077-6) were analyzed for alkalinity in accordance with SM 2320B. The samples were analyzed on 09/13/2018.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ANIONS

Samples MW-09DD (240-101077-1), MW-27A (240-101077-2), MW-28A (240-101077-3), MW-28B (240-101077-4), MW-09DDEB (240-101077-5) and MW-28BA (240-101077-6) were analyzed for anions in accordance with EPA Method 300.0. The samples were analyzed on 09/14/2018.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ACIDITY

Samples MW-09DD (240-101077-1), MW-27A (240-101077-2), MW-28A (240-101077-3), MW-28B (240-101077-4), MW-09DDEB (240-101077-5) and MW-28BA (240-101077-6) were analyzed for acidity in accordance with SM 2310B. The samples were analyzed on 09/20/2018.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Method Summary

Client: Cox-Colvin & Associates, Inc.
Project/Site: AKZ - RCRA Closure Q2 Monitoring

TestAmerica Job ID: 240-101077-1

Method	Method Description	Protocol	Laboratory
6010B	Metals (ICP)	SW846	TAL CAN
2310B-2011	Acidity	SM	TAL PIT
2320B-1997	Alkalinity, Total	SM	TAL CAN
300.0	Anions, Ion Chromatography	MCAWW	TAL CAN
7196A	Chromium, Hexavalent	SW846	TAL CAN
3005A	Preparation, Total Recoverable or Dissolved Metals	SW846	TAL CAN

Protocol References:

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.
SM = "Standard Methods For The Examination Of Water And Wastewater"
SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL CAN = TestAmerica Canton, 4101 Shuffel Street NW, North Canton, OH 44720, TEL (330)497-9396
TAL PIT = TestAmerica Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058

Sample Summary

Client: Cox-Colvin & Associates, Inc.
Project/Site: AKZ - RCRA Closure Q2 Monitoring

TestAmerica Job ID: 240-101077-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
240-101077-1	MW-09DD	Water	09/12/18 08:22	09/12/18 13:33
240-101077-2	MW-27A	Water	09/12/18 09:35	09/12/18 13:33
240-101077-3	MW-28A	Water	09/12/18 10:12	09/12/18 13:33
240-101077-4	MW-28B	Water	09/12/18 10:36	09/12/18 13:33
240-101077-5	MW-09DDEB	Water	09/12/18 08:38	09/12/18 13:33
240-101077-6	MW-28BA	Water	09/12/18 10:36	09/12/18 13:33

Detection Summary

Client: Cox-Colvin & Associates, Inc.
Project/Site: AKZ - RCRA Closure Q2 Monitoring

TestAmerica Job ID: 240-101077-1

Client Sample ID: MW-09DD — Lab Sample ID: 240-101077-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Cadmium	0.00048	J	0.0020	0.00020	mg/L	1		6010B	Total Recoverable
Acidity	- 139		5.0	5.0	mg/L	1		2310B-2011	Total/NA
Alkalinity	160		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Chloride	66		1.0	0.28	mg/L	1		300.0	Total/NA
Fluoride	6.2		0.10	0.024	mg/L	1		300.0	Total/NA
Sulfate	110		2.0	0.35	mg/L	1		300.0	Total/NA

Client Sample ID: MW-27A — Lab Sample ID: 240-101077-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Cadmium	0.00037	J	0.0020	0.00020	mg/L	1		6010B	Total Recoverable
Chromium	0.0012	J	0.0050	0.00063	mg/L	1		6010B	Total Recoverable
Acidity	- 232		5.0	5.0	mg/L	1		2310B-2011	Total/NA
Alkalinity	250		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Chloride	26		1.0	0.28	mg/L	1		300.0	Total/NA
Fluoride	0.41		0.10	0.024	mg/L	1		300.0	Total/NA
Sulfate	24		2.0	0.35	mg/L	1		300.0	Total/NA

See complete results pages for validated data. 10-10-18

Client Sample ID: MW-28A — Lab Sample ID: 240-101077-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Cadmium	0.00039	J	0.0020	0.00020	mg/L	1		6010B	Total Recoverable
Acidity	- 159		5.0	5.0	mg/L	1		2310B-2011	Total/NA
Alkalinity	190		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Chloride	87		1.0	0.28	mg/L	1		300.0	Total/NA
Fluoride	1.2		0.10	0.024	mg/L	1		300.0	Total/NA
Sulfate	63		2.0	0.35	mg/L	1		300.0	Total/NA

Client Sample ID: MW-28B — Lab Sample ID: 240-101077-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Cadmium	0.00056	J	0.0020	0.00020	mg/L	1		6010B	Total Recoverable
Acidity	- 167		5.0	5.0	mg/L	1		2310B-2011	Total/NA
Alkalinity	220		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Chloride	82		1.0	0.28	mg/L	1		300.0	Total/NA
Fluoride	3.8		0.10	0.024	mg/L	1		300.0	Total/NA
Sulfate	120		2.0	0.35	mg/L	1		300.0	Total/NA

Client Sample ID: MW-09DDEB — Lab Sample ID: 240-101077-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Acidity	- 0.14		5.0	5.0	mg/L	1		2310B-2011	Total/NA

Client Sample ID: MW-28BA — Lab Sample ID: 240-101077-6

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: Cox-Colvin & Associates, Inc.
Project/Site: AKZ - RCRA Closure Q2 Monitoring

TestAmerica Job ID: 240-101077-1

Client Sample ID: MW-28BA (Continued)

Lab Sample ID: 240-101077-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Cadmium	0.00034	J	0.0020	0.00020	mg/L	1		6010B	Total Recoverable
Acidity	- 161		5.0	5.0	mg/L	1		2310B-2011	Total/NA
Alkalinity	220		5.0	2.6	mg/L	1		2320B-1997	Total/NA
Chloride	82		1.0	0.28	mg/L	1		300.0	Total/NA
Fluoride	3.8		0.10	0.024	mg/L	1		300.0	Total/NA
Sulfate	120		2.0	0.35	mg/L	1		300.0	Total/NA

This Detection Summary does not include radiochemical test results.

Client: Cox-Colvin & Associates, Inc.
Project/Site: AKZ - RCRA Closure Q2 Monitoring

TestAmerica Job ID: 240-101077-1

Method: 6010B - Metals (ICP) - Total Recoverable

Client Sample ID: MW-09DD
Date Collected: 09/12/18 08:22
Date Received: 09/12/18 13:33

Lab Sample ID: 240-101077-1
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	**0.00048**	**J** J	0.0020	0.00020	mg/L		09/13/18 14:00	09/14/18 22:57	1
Chromium	0.0050	U	0.0050	0.00063	mg/L		09/13/18 14:00	09/14/18 22:57	1
Lead	0.0050	U	0.0050	0.0028	mg/L		09/13/18 14:00	09/14/18 22:57	1

kms 10-10-18

Client Sample Results

Client: Cox-Colvin & Associates, Inc.
Project/Site: AKZ - RCRA Closure Q2 Monitoring

TestAmerica Job ID: 240-101077-1

Method: 6010B - Metals (ICP) - Total Recoverable

Client Sample ID: MW-27A
Date Collected: 09/12/18 09:35
Date Received: 09/12/18 13:33

Lab Sample ID: 240-101077-2
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	**0.00037**	**J** J	0.0020	0.00020	mg/L		09/13/18 14:00	09/14/18 23:02	1
Chromium	**0.0012**	**J** J	0.0050	0.00063	mg/L		09/13/18 14:00	09/14/18 23:02	1
Lead	0.0050	U	0.0050	0.0028	mg/L		09/13/18 14:00	09/14/18 23:02	1

kms 10-10-18

Client: Cox-Colvin & Associates, Inc.
Project/Site: AKZ - RCRA Closure Q2 Monitoring

TestAmerica Job ID: 240-101077-1

Method: 6010B - Metals (ICP) - Total Recoverable

Client Sample ID: MW-28A
Date Collected: 09/12/18 10:12
Date Received: 09/12/18 13:33

Lab Sample ID: 240-101077-3
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	**0.00039**	**J** J	0.0020	0.00020	mg/L		09/13/18 14:00	09/14/18 23:06	1
Chromium	0.0050	U	0.0050	0.00063	mg/L		09/13/18 14:00	09/14/18 23:06	1
Lead	0.0050	U	0.0050	0.0028	mg/L		09/13/18 14:00	09/14/18 23:06	1

kms 10-10-18

Client Sample Results

Client: Cox-Colvin & Associates, Inc.
Project/Site: AKZ - RCRA Closure Q2 Monitoring

TestAmerica Job ID: 240-101077-1

Method: 6010B - Metals (ICP) - Total Recoverable

Client Sample ID: MW-28B
Date Collected: 09/12/18 10:36
Date Received: 09/12/18 13:33

Lab Sample ID: 240-101077-4
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	**0.00056**	**J** J	0.0020	0.00020	mg/L		09/13/18 14:00	09/14/18 23:11	1
Chromium	0.0050	U	0.0050	0.00063	mg/L		09/13/18 14:00	09/14/18 23:11	1
Lead	0.0050	U	0.0050	0.0028	mg/L		09/13/18 14:00	09/14/18 23:11	1

kms 10-10-18

Client: Cox-Colvin & Associates, Inc.
Project/Site: AKZ - RCRA Closure Q2 Monitoring

TestAmerica Job ID: 240-101077-1

Method: 6010B - Metals (ICP) - Total Recoverable

Client Sample ID: MW-09DDEB
Date Collected: 09/12/18 08:38
Date Received: 09/12/18 13:33

Lab Sample ID: 240-101077-5
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.0020	U	0.0020	0.00020	mg/L		09/13/18 14:00	09/14/18 23:16	1
Chromium	0.0050	U	0.0050	0.00063	mg/L		09/13/18 14:00	09/14/18 23:16	1
Lead	0.0050	U	0.0050	0.0028	mg/L		09/13/18 14:00	09/14/18 23:16	1

Client: Cox-Colvin & Associates, Inc.
Project/Site: AKZ - RCRA Closure Q2 Monitoring

TestAmerica Job ID: 240-101077-1

Method: 6010B - Metals (ICP) - Total Recoverable

Client Sample ID: MW-28BA
Date Collected: 09/12/18 10:36
Date Received: 09/12/18 13:33

Lab Sample ID: 240-101077-6
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	**0.00034**	**J** J	0.0020	0.00020	mg/L		09/13/18 14:00	09/14/18 23:21	1
Chromium	0.0050	U	0.0050	0.00063	mg/L		09/13/18 14:00	09/14/18 23:21	1
Lead	0.0050	U	0.0050	0.0028	mg/L		09/13/18 14:00	09/14/18 23:21	1

kms 10-10-18

Client: Cox-Colvin & Associates, Inc.
Project/Site: AKZ - RCRA Closure Q2 Monitoring

TestAmerica Job ID: 240-101077-1

General Chemistry

Client Sample ID: MW-09DD
Date Collected: 09/12/18 08:22
Date Received: 09/12/18 13:33

Lab Sample ID: 240-101077-1
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acidity	**- 139**		5.0	5.0	mg/L			09/20/18 11:06	1
Alkalinity	**160**		5.0	2.6	mg/L			09/13/18 17:51	1
Chloride	**66**		1.0	0.28	mg/L			09/14/18 01:51	1
Fluoride	**6.2**		0.10	0.024	mg/L			09/14/18 01:51	1
Sulfate	**110**		2.0	0.35	mg/L			09/14/18 20:41	1
Hexavalent chromium	0.020	U	0.020	0.0030	mg/L			09/12/18 11:19	1

Client: Cox-Colvin & Associates, Inc.
Project/Site: AKZ - RCRA Closure Q2 Monitoring

TestAmerica Job ID: 240-101077-1

General Chemistry

Client Sample ID: MW-27A
Date Collected: 09/12/18 09:35
Date Received: 09/12/18 13:33

Lab Sample ID: 240-101077-2
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acidity	**- 232**		5.0	5.0	mg/L			09/20/18 11:06	1
Alkalinity	**250**		5.0	2.6	mg/L			09/13/18 17:56	1
Chloride	**26**		1.0	0.28	mg/L			09/14/18 02:11	1
Fluoride	**0.41**		0.10	0.024	mg/L			09/14/18 02:11	1
Sulfate	**24**		2.0	0.35	mg/L			09/14/18 21:43	1
Hexavalent chromium	0.020	U	0.020	0.0030	mg/L			09/12/18 11:19	1

Client: Cox-Colvin & Associates, Inc.
Project/Site: AKZ - RCRA Closure Q2 Monitoring

TestAmerica Job ID: 240-101077-1

General Chemistry

Client Sample ID: MW-28A
Date Collected: 09/12/18 10:12
Date Received: 09/12/18 13:33

Lab Sample ID: 240-101077-3
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acidity	**- 159**		5.0	5.0	mg/L			09/20/18 11:06	1
Alkalinity	**190**		5.0	2.6	mg/L			09/13/18 18:14	1
Chloride	**87**		1.0	0.28	mg/L			09/14/18 03:52	1
Fluoride	**1.2**		0.10	0.024	mg/L			09/14/18 03:52	1
Sulfate	**63**		2.0	0.35	mg/L			09/14/18 22:03	1
Hexavalent chromium	0.020	U	0.020	0.0030	mg/L			09/12/18 11:19	1

Client: Cox-Colvin & Associates, Inc.
Project/Site: AKZ - RCRA Closure Q2 Monitoring

TestAmerica Job ID: 240-101077-1

General Chemistry

Client Sample ID: MW-28B
Date Collected: 09/12/18 10:36
Date Received: 09/12/18 13:33

Lab Sample ID: 240-101077-4
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acidity	**- 167**		5.0	5.0	mg/L			09/20/18 11:06	1
Alkalinity	**220**		5.0	2.6	mg/L			09/13/18 18:19	1
Chloride	**82**		1.0	0.28	mg/L			09/14/18 04:53	1
Fluoride	**3.8**		0.10	0.024	mg/L			09/14/18 04:53	1
Sulfate	**120**		2.0	0.35	mg/L			09/14/18 22:24	1
Hexavalent chromium	0.020	U	0.020	0.0030	mg/L			09/12/18 11:19	1

Client: Cox-Colvin & Associates, Inc.
Project/Site: AKZ - RCRA Closure Q2 Monitoring

TestAmerica Job ID: 240-101077-1

General Chemistry

Client Sample ID: MW-09DDEB
Date Collected: 09/12/18 08:38
Date Received: 09/12/18 13:33

Lab Sample ID: 240-101077-5
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acidity	**- 0.14**		5.0	5.0	mg/L			09/20/18 11:06	1
Alkalinity	5.0	U	5.0	2.6	mg/L			09/13/18 18:23	1
Chloride	1.0	U	1.0	0.28	mg/L			09/14/18 05:13	1
Fluoride	0.10	U	0.10	0.024	mg/L			09/14/18 05:13	1
Sulfate	2.0	U	2.0	0.35	mg/L			09/14/18 23:06	1
Hexavalent chromium	0.020	U	0.020	0.0030	mg/L			09/12/18 11:19	1

Client: Cox-Colvin & Associates, Inc.
Project/Site: AKZ - RCRA Closure Q2 Monitoring

TestAmerica Job ID: 240-101077-1

General Chemistry

Client Sample ID: MW-28BA
Date Collected: 09/12/18 10:36
Date Received: 09/12/18 13:33

Lab Sample ID: 240-101077-6
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acidity	**- 161**		5.0	5.0	mg/L			09/20/18 11:06	1
Alkalinity	**220**		5.0	2.6	mg/L			09/13/18 18:31	1
Chloride	**82**		1.0	0.28	mg/L			09/14/18 05:33	1
Fluoride	**3.8**		0.10	0.024	mg/L			09/14/18 05:33	1
Sulfate	**120**		2.0	0.35	mg/L			09/14/18 23:26	1
Hexavalent chromium	0.020	U	0.020	0.0030	mg/L			09/12/18 11:19	1

Method: 6010B - Metals (ICP)

Lab Sample ID: MB 240-345231/1-A
Matrix: Water
Analysis Batch: 345484

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 345231

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	0.0020	U	0.0020	0.00020	mg/L		09/13/18 14:00	09/14/18 21:20	1
Chromium	0.0050	U	0.0050	0.00063	mg/L		09/13/18 14:00	09/14/18 21:20	1
Lead	0.0050	U	0.0050	0.0028	mg/L		09/13/18 14:00	09/14/18 21:20	1

Lab Sample ID: LCS 240-345231/2-A
Matrix: Water
Analysis Batch: 345484

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 345231

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Cadmium	0.0500	0.0530		mg/L		106	80 - 120
Chromium	0.200	0.203		mg/L		101	80 - 120
Lead	0.500	0.499		mg/L		100	80 - 120

Method: 2310B-2011 - Acidity

Lab Sample ID: MB 180-257383/2
Matrix: Water
Analysis Batch: 257383

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acidity	5.0	U	5.0	5.0	mg/L			09/20/18 11:06	1

Lab Sample ID: LCS 180-257383/1
Matrix: Water
Analysis Batch: 257383

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Acidity	250	267		mg/L		107	90 - 110

Method: 2320B-1997 - Alkalinity, Total

Lab Sample ID: MB 240-345363/30
Matrix: Water
Analysis Batch: 345363

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity	5.0	U	5.0	2.6	mg/L			09/13/18 18:05	1

Lab Sample ID: MB 240-345363/4
Matrix: Water
Analysis Batch: 345363

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity	5.0	U	5.0	2.6	mg/L			09/13/18 15:51	1

Method: 2320B-1997 - Alkalinity, Total (Continued)

Lab Sample ID: LCS 240-345363/29
Matrix: Water
Analysis Batch: 345363

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Alkalinity	271	255		mg/L		94	86 - 123

Lab Sample ID: LCS 240-345363/3
Matrix: Water
Analysis Batch: 345363

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Alkalinity	271	256		mg/L		95	86 - 123

Lab Sample ID: 240-101077-3 DU
Matrix: Water
Analysis Batch: 345363

Client Sample ID: MW-28A
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Alkalinity	190		186		mg/L		0.2	20

Method: 300.0 - Anions, Ion Chromatography

Lab Sample ID: MB 240-345213/3
Matrix: Water
Analysis Batch: 345213

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	1.0	U	1.0	0.28	mg/L			09/13/18 15:08	1
Fluoride	0.10	U	0.10	0.024	mg/L			09/13/18 15:08	1

Lab Sample ID: MB 240-345213/39
Matrix: Water
Analysis Batch: 345213

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	1.0	U	1.0	0.28	mg/L			09/14/18 03:12	1
Fluoride	0.10	U	0.10	0.024	mg/L			09/14/18 03:12	1

Lab Sample ID: LCS 240-345213/4
Matrix: Water
Analysis Batch: 345213

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	50.0	52.1		mg/L		104	90 - 110
Fluoride	2.50	2.57		mg/L		103	90 - 110

Lab Sample ID: LCS 240-345213/40
Matrix: Water
Analysis Batch: 345213

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	50.0	52.3		mg/L		105	90 - 110
Fluoride	2.50	2.64		mg/L		105	90 - 110

Method: 300.0 - Anions, Ion Chromatography (Continued)

Lab Sample ID: 240-101077-3 MS
Matrix: Water
Analysis Batch: 345213

Client Sample ID: MW-28A
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	87		50.0	135		mg/L		96	80 - 120
Fluoride	1.2		2.50	3.71		mg/L		101	80 - 120

Lab Sample ID: 240-101077-3 MSD
Matrix: Water
Analysis Batch: 345213

Client Sample ID: MW-28A
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	87		50.0	135		mg/L		97	80 - 120	1	15
Fluoride	1.2		2.50	3.76		mg/L		103	80 - 120	1	15

Lab Sample ID: MB 240-345415/3
Matrix: Water
Analysis Batch: 345415

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	1.0	U	1.0	0.28	mg/L			09/14/18 17:34	1
Fluoride	0.10	U	0.10	0.024	mg/L			09/14/18 17:34	1
Sulfate	2.0	U	2.0	0.35	mg/L			09/14/18 17:34	1

Lab Sample ID: LCS 240-345415/4
Matrix: Water
Analysis Batch: 345415

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	50.0	52.3		mg/L		105	90 - 110
Fluoride	2.50	2.64		mg/L		106	90 - 110
Sulfate	50.0	52.8		mg/L		106	90 - 110

Method: 7196A - Chromium, Hexavalent

Lab Sample ID: MB 240-344969/3
Matrix: Water
Analysis Batch: 344969

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Hexavalent chromium	0.020	U	0.020	0.0030	mg/L			09/12/18 11:19	1

Lab Sample ID: LCS 240-344969/4
Matrix: Water
Analysis Batch: 344969

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Hexavalent chromium	0.250	0.262		mg/L		105	80 - 123

QC Association Summary

Client: Cox-Colvin & Associates, Inc.
Project/Site: AKZ - RCRA Closure Q2 Monitoring

TestAmerica Job ID: 240-101077-1

Metals

Prep Batch: 345231

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-101077-1	MW-09DD	Total Recoverable	Water	3005A	
240-101077-2	MW-27A	Total Recoverable	Water	3005A	
240-101077-3	MW-28A	Total Recoverable	Water	3005A	
240-101077-4	MW-28B	Total Recoverable	Water	3005A	
240-101077-5	MW-09DDEB	Total Recoverable	Water	3005A	
240-101077-6	MW-28BA	Total Recoverable	Water	3005A	
MB 240-345231/1-A	Method Blank	Total Recoverable	Water	3005A	
LCS 240-345231/2-A	Lab Control Sample	Total Recoverable	Water	3005A	

Analysis Batch: 345484

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-101077-1	MW-09DD	Total Recoverable	Water	6010B	345231
240-101077-2	MW-27A	Total Recoverable	Water	6010B	345231
240-101077-3	MW-28A	Total Recoverable	Water	6010B	345231
240-101077-4	MW-28B	Total Recoverable	Water	6010B	345231
240-101077-5	MW-09DDEB	Total Recoverable	Water	6010B	345231
240-101077-6	MW-28BA	Total Recoverable	Water	6010B	345231
MB 240-345231/1-A	Method Blank	Total Recoverable	Water	6010B	345231
LCS 240-345231/2-A	Lab Control Sample	Total Recoverable	Water	6010B	345231

General Chemistry

Analysis Batch: 257383

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-101077-1	MW-09DD	Total/NA	Water	2310B-2011	
240-101077-2	MW-27A	Total/NA	Water	2310B-2011	
240-101077-3	MW-28A	Total/NA	Water	2310B-2011	
240-101077-4	MW-28B	Total/NA	Water	2310B-2011	
240-101077-5	MW-09DDEB	Total/NA	Water	2310B-2011	
240-101077-6	MW-28BA	Total/NA	Water	2310B-2011	
MB 180-257383/2	Method Blank	Total/NA	Water	2310B-2011	
LCS 180-257383/1	Lab Control Sample	Total/NA	Water	2310B-2011	

Analysis Batch: 344969

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-101077-1	MW-09DD	Total/NA	Water	7196A	
240-101077-2	MW-27A	Total/NA	Water	7196A	
240-101077-3	MW-28A	Total/NA	Water	7196A	
240-101077-4	MW-28B	Total/NA	Water	7196A	
240-101077-5	MW-09DDEB	Total/NA	Water	7196A	
240-101077-6	MW-28BA	Total/NA	Water	7196A	
MB 240-344969/3	Method Blank	Total/NA	Water	7196A	
LCS 240-344969/4	Lab Control Sample	Total/NA	Water	7196A	

Analysis Batch: 345213

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-101077-1	MW-09DD	Total/NA	Water	300.0	
240-101077-2	MW-27A	Total/NA	Water	300.0	
240-101077-3	MW-28A	Total/NA	Water	300.0	
240-101077-4	MW-28B	Total/NA	Water	300.0	

General Chemistry (Continued)

Analysis Batch: 345213 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-101077-5	MW-09DDEB	Total/NA	Water	300.0	
240-101077-6	MW-28BA	Total/NA	Water	300.0	
MB 240-345213/3	Method Blank	Total/NA	Water	300.0	
MB 240-345213/39	Method Blank	Total/NA	Water	300.0	
LCS 240-345213/4	Lab Control Sample	Total/NA	Water	300.0	
LCS 240-345213/40	Lab Control Sample	Total/NA	Water	300.0	
240-101077-3 MS	MW-28A	Total/NA	Water	300.0	
240-101077-3 MSD	MW-28A	Total/NA	Water	300.0	

Analysis Batch: 345363

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-101077-1	MW-09DD	Total/NA	Water	2320B-1997	
240-101077-2	MW-27A	Total/NA	Water	2320B-1997	
240-101077-3	MW-28A	Total/NA	Water	2320B-1997	
240-101077-4	MW-28B	Total/NA	Water	2320B-1997	
240-101077-5	MW-09DDEB	Total/NA	Water	2320B-1997	
240-101077-6	MW-28BA	Total/NA	Water	2320B-1997	
MB 240-345363/30	Method Blank	Total/NA	Water	2320B-1997	
MB 240-345363/4	Method Blank	Total/NA	Water	2320B-1997	
LCS 240-345363/29	Lab Control Sample	Total/NA	Water	2320B-1997	
LCS 240-345363/3	Lab Control Sample	Total/NA	Water	2320B-1997	
240-101077-3 DU	MW-28A	Total/NA	Water	2320B-1997	

Analysis Batch: 345415

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-101077-1	MW-09DD	Total/NA	Water	300.0	
240-101077-2	MW-27A	Total/NA	Water	300.0	
240-101077-3	MW-28A	Total/NA	Water	300.0	
240-101077-4	MW-28B	Total/NA	Water	300.0	
240-101077-5	MW-09DDEB	Total/NA	Water	300.0	
240-101077-6	MW-28BA	Total/NA	Water	300.0	
MB 240-345415/3	Method Blank	Total/NA	Water	300.0	
LCS 240-345415/4	Lab Control Sample	Total/NA	Water	300.0	

Lab Chronicle

Client: Cox-Colvin & Associates, Inc.
Project/Site: AKZ - RCRA Closure Q2 Monitoring

TestAmerica Job ID: 240-101077-1

Client Sample ID: MW-09DD

Lab Sample ID: 240-101077-1

Date Collected: 09/12/18 08:22
Matrix: Water
Date Received: 09/12/18 13:33

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			345231	09/13/18 14:00	MBB	TAL CAN
Total Recoverable	Analysis	6010B		1	345484	09/14/18 22:57	KLC	TAL CAN
Total/NA	Analysis	2310B-2011		1	257383	09/20/18 11:06	CLL	TAL PIT
Total/NA	Analysis	2320B-1997		1	345363	09/13/18 17:51	JESW	TAL CAN
Total/NA	Analysis	300.0		1	345415	09/14/18 20:41	LKG	TAL CAN
Total/NA	Analysis	300.0		1	345213	09/14/18 01:51	JESW	TAL CAN
Total/NA	Analysis	7196A		1	344969	09/12/18 11:19	ACR	TAL CAN

Client Sample ID: MW-27A

Lab Sample ID: 240-101077-2

Date Collected: 09/12/18 09:35
Matrix: Water
Date Received: 09/12/18 13:33

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			345231	09/13/18 14:00	MBB	TAL CAN
Total Recoverable	Analysis	6010B		1	345484	09/14/18 23:02	KLC	TAL CAN
Total/NA	Analysis	2310B-2011		1	257383	09/20/18 11:06	CLL	TAL PIT
Total/NA	Analysis	2320B-1997		1	345363	09/13/18 17:56	JESW	TAL CAN
Total/NA	Analysis	300.0		1	345415	09/14/18 21:43	LKG	TAL CAN
Total/NA	Analysis	300.0		1	345213	09/14/18 02:11	JESW	TAL CAN
Total/NA	Analysis	7196A		1	344969	09/12/18 11:19	ACR	TAL CAN

Client Sample ID: MW-28A

Lab Sample ID: 240-101077-3

Date Collected: 09/12/18 10:12
Matrix: Water
Date Received: 09/12/18 13:33

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			345231	09/13/18 14:00	MBB	TAL CAN
Total Recoverable	Analysis	6010B		1	345484	09/14/18 23:06	KLC	TAL CAN
Total/NA	Analysis	2310B-2011		1	257383	09/20/18 11:06	CLL	TAL PIT
Total/NA	Analysis	2320B-1997		1	345363	09/13/18 18:14	JESW	TAL CAN
Total/NA	Analysis	300.0		1	345415	09/14/18 22:03	LKG	TAL CAN
Total/NA	Analysis	300.0		1	345213	09/14/18 03:52	JESW	TAL CAN
Total/NA	Analysis	7196A		1	344969	09/12/18 11:19	ACR	TAL CAN

Client Sample ID: MW-28B

Lab Sample ID: 240-101077-4

Date Collected: 09/12/18 10:36
Matrix: Water
Date Received: 09/12/18 13:33

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			345231	09/13/18 14:00	MBB	TAL CAN
Total Recoverable	Analysis	6010B		1	345484	09/14/18 23:11	KLC	TAL CAN

Lab Chronicle

Client: Cox-Colvin & Associates, Inc.
Project/Site: AKZ - RCRA Closure Q2 Monitoring

TestAmerica Job ID: 240-101077-1

Client Sample ID: MW-28B

Date Collected: 09/12/18 10:36
Date Received: 09/12/18 13:33

Lab Sample ID: 240-101077-4
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	2310B-2011		1	257383	09/20/18 11:06	CLL	TAL PIT
Total/NA	Analysis	2320B-1997		1	345363	09/13/18 18:19	JESW	TAL CAN
Total/NA	Analysis	300.0		1	345415	09/14/18 22:24	LKG	TAL CAN
Total/NA	Analysis	300.0		1	345213	09/14/18 04:53	JESW	TAL CAN
Total/NA	Analysis	7196A		1	344969	09/12/18 11:19	ACR	TAL CAN

Client Sample ID: MW-09DDEB

Date Collected: 09/12/18 08:38
Date Received: 09/12/18 13:33

Lab Sample ID: 240-101077-5
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			345231	09/13/18 14:00	MBB	TAL CAN
Total Recoverable	Analysis	6010B		1	345484	09/14/18 23:16	KLC	TAL CAN
Total/NA	Analysis	2310B-2011		1	257383	09/20/18 11:06	CLL	TAL PIT
Total/NA	Analysis	2320B-1997		1	345363	09/13/18 18:23	JESW	TAL CAN
Total/NA	Analysis	300.0		1	345415	09/14/18 23:06	LKG	TAL CAN
Total/NA	Analysis	300.0		1	345213	09/14/18 05:13	JESW	TAL CAN
Total/NA	Analysis	7196A		1	344969	09/12/18 11:19	ACR	TAL CAN

Client Sample ID: MW-28BA

Date Collected: 09/12/18 10:36
Date Received: 09/12/18 13:33

Lab Sample ID: 240-101077-6
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			345231	09/13/18 14:00	MBB	TAL CAN
Total Recoverable	Analysis	6010B		1	345484	09/14/18 23:21	KLC	TAL CAN
Total/NA	Analysis	2310B-2011		1	257383	09/20/18 11:06	CLL	TAL PIT
Total/NA	Analysis	2320B-1997		1	345363	09/13/18 18:31	JESW	TAL CAN
Total/NA	Analysis	300.0		1	345415	09/14/18 23:26	LKG	TAL CAN
Total/NA	Analysis	300.0		1	345213	09/14/18 05:33	JESW	TAL CAN
Total/NA	Analysis	7196A		1	344969	09/12/18 11:19	ACR	TAL CAN

Laboratory References:

TAL CAN = TestAmerica Canton, 4101 Shuffel Street NW, North Canton, OH 44720, TEL (330)497-9396

TAL PIT = TestAmerica Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058

Accreditation/Certification Summary

Client: Cox-Colvin & Associates, Inc. TestAmerica Job ID: 240-101077-1
Project/Site: AKZ - RCRA Closure Q2 Monitoring

Laboratory: TestAmerica Canton

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
California	State Program	9	2927	02-23-19
Connecticut	State Program	1	PH-0590	12-31-19
Florida	NELAP	4	E87225	06-30-19
Illinois	NELAP	5	200004	07-31-19
Kansas	NELAP	7	E-10336	01-31-19
Kentucky (UST)	State Program	4	58	02-23-19
Kentucky (WW)	State Program	4	98016	12-31-18
Minnesota	NELAP	5	039-999-348	12-31-18
Minnesota (Petrofund)	State Program	1	3506	07-31-19
Nevada	State Program	9	OH00048	07-31-19
New Jersey	NELAP	2	OH001	06-30-19
New York	NELAP	2	10975	03-31-19
Ohio VAP	State Program	5	CL0024	09-06-19
Oregon	NELAP	10	4062	02-23-19
Pennsylvania	NELAP	3	68-00340	08-31-19 *
Texas	NELAP	6	T104704517-17-9	08-31-19
USDA	Federal		P330-16-00404	12-28-19
Virginia	NELAP	3	460175	09-14-19
Washington	State Program	10	C971	01-12-19
West Virginia DEP	State Program	3	210	12-31-18

Laboratory: TestAmerica Pittsburgh

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Arkansas DEQ	State Program	6	88-0690	06-27-19
California	State Program	9	2891	04-30-19
Connecticut	State Program	1	PH-0688	09-30-18
Florida	NELAP	4	E871008	06-30-19
Illinois	NELAP	5	200005	06-30-19
Kansas	NELAP	7	E-10350	01-31-19
Louisiana	NELAP	6	04041	06-30-19
Nevada	State Program	9	PA00164	07-31-19
New Hampshire	NELAP	1	2030	04-04-19
New Jersey	NELAP	2	PA005	06-30-19
New York	NELAP	2	11182	03-31-19
North Carolina (WW/SW)	State Program	4	434	12-31-18
Oregon	NELAP	10	PA-2151	01-28-19
Pennsylvania	NELAP	3	02-00416	04-30-19
South Carolina	State Program	4	89014	04-30-19
Texas	NELAP	6	T104704528-15-2	03-31-19
US Fish & Wildlife	Federal		LE94312A-1	07-31-19
USDA	Federal		P330-16-00211	06-26-19
Utah	NELAP	8	PA001462015-4	05-31-19
Virginia	NELAP	3	460189	09-14-18 *
West Virginia DEP	State Program	3	142	01-31-19
Wisconsin	State Program	5	998027800	08-31-18 *

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

TestAmerica Canton
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North Canton, OH 44720
Phone (330) 497-9396 Fax (330) 497-0772

CAMBRIDGE 240506

1.8/2.7

Chain of Custody Record

CAMBRIDGE 240506

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information	Sampler: CBC, ELC	Lab PM: Johnson, Opal	Carrier Tracking No(s):	COC No: 240-54189-23330.1
Client Contact: Nick Petruzzi	Phone: (614)-526-2042	E-Mail: opal.johnson@testamericainc.com		Page: Page 1 of 1
Company: Cox-Colvin & Associates, Inc.				Job #:
Address: 7750 Corporate Blvd.	Due Date Requested: Standard			
City: Plain City	TAT Requested (days): Standard 2 week			
State, Zip: OH, 43064				
Phone: 614-204-4485	PO #: Purchase Order not required			
Email: nick_petruzzi@coxcolvin.com	WO #:			
Project Name: AKZ - RCRA Closure Q2 Monitoring	Project #: 24005530			
Site:	SSOW#:			

Analysis Requested

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	SM2310B - Acidity	2320B - Alkalinity	6010B - 6010B, Total Cd, Cr, Pb	300.0_28D, 7196A	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N	D	N		
MW-09DD	09/12/18	0822	G	Water			X	X	X	X		
MW-27A	09/12/18	0935	G	Water			X	X	X	X		
MW-28A	09/12/18	1012	G	Water			X	X	X	X		
MW-28B	09/12/18	1036	G	Water			X	X	X	X		
MW-09DDEB	09/12/18	0838	G	Water			X	X	X	X		Sample time: 0838
MW-28BA	09/12/18	1036	G	Water			X	X	X	X		
				Water								
				Water								
				Water								
				Water								
				Water								

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2O3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - pH 4-5
L - EDA	Z - other (specify)

Other:

Possible Hazard Identification
☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☒ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements: 24 hr hold HEX Chrome

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
1		9/12/18 1103	CCA	B Bidwell	9/12/18 1103	TA
2	B Bidwell	9/12/18 1200	TA		9/12/18 1218	TA-240
3		9/12/18 1333	240	BOR	9/12/18 1333	TAL

Custody Seals Intact: ☐ Yes ☐ No | Custody Seal No.:

Cooler Temperature(s) °C and Other Remarks:

Ver: 08/04/2016

TestAmerica Canton Sample Receipt Form/Narrative **Login # : 101077**
Canton Facility

Client Cox+Calvin Site Name —

Cooler Received on 9-12-18 Opened on 9-12-18

Cooler unpacked by: BOP

FedEx: 1st Grd Exp UPS FAS Clipper Client Drop Off (TestAmerica Courier) Other

Receipt After-hours: Drop-off Date/Time Storage Location

TestAmerica Cooler # TA Foam Box Client Cooler Box Other

Packing material used: Bubble Wrap Foam (Plastic Bag) None Other

COOLANT: (Wet Ice) Blue Ice Dry Ice Water None

1. Cooler temperature upon receipt ☐ See Multiple Cooler Form
   IR GUN# IR-8 (CF +0.9 °C) Observed Cooler Temp. 1.8 °C Corrected Cooler Temp. 2.7 °C
   IR GUN #36 (CF +0.6°C) Observed Cooler Temp. ____ °C Corrected Cooler Temp. ____ °C

2. Were tamper/custody seals on the outside of the cooler(s)? If Yes Quantity 1	(Yes) No	
-Were the seals on the outside of the cooler(s) signed & dated?	(Yes) No	NA
-Were tamper/custody seals on the bottle(s) or bottle kits (LLHg/MeHg)?	Yes (No)	
-Were tamper/custody seals intact and uncompromised?	(Yes) No	NA
3. Shippers' packing slip attached to the cooler(s)?	Yes (No)	
4. Did custody papers accompany the sample(s)?	(Yes) No	
5. Were the custody papers relinquished & signed in the appropriate place?	(Yes) No	
6. Was/were the person(s) who collected the samples clearly identified on the COC?	(Yes) No	
7. Did all bottles arrive in good condition (Unbroken)?	(Yes) No	
8. Could all bottle labels be reconciled with the COC?	(Yes) No	
9. Were correct bottle(s) used for the test(s) indicated?	(Yes) No	
10. Sufficient quantity received to perform indicated analyses?	(Yes) No	
11. Are these work share samples?	Yes (No)	
If yes, Questions 12-16 have been checked at the originating laboratory.		
12. Were all preserved sample(s) at the correct pH upon receipt?	(Yes) No	NA pH Strip Lot# **HC849161**
13. Were VOAs on the COC?	Yes (No)	
14. Were air bubbles >6 mm in any VOA vials? ● ⬅ Larger than this.	Yes No	(NA)
15. Was a VOA trip blank present in the cooler(s)? Trip Blank Lot # ____	Yes (No)	
16. Was a LL Hg or Me Hg trip blank present? ____	Yes (No)	

Tests that are not checked for pH by Receiving:

VOAs
Oil and Grease
TOC

Contacted PM ____ Date ____ by ____ via Verbal Voice Mail Other

Concerning ____

17. CHAIN OF CUSTODY & SAMPLE DISCREPANCIES

Samples processed by: PG

18. SAMPLE CONDITION

Sample(s) ____ were received after the recommended holding time had expired.
Sample(s) ____ were received in a broken container.
Sample(s) ____ were received with bubble >6 mm in diameter. (Notify PM)

19. SAMPLE PRESERVATION

Sample(s) ____ were further preserved in the laboratory.
Time preserved: ____ Preservative(s) added/Lot number(s): ____

Login Container Summary Report

Temperature readings: _____

Client Sample ID	Lab ID	Container Type	Container pH	Preservative Added (mls)	Lot #
MW-09DD	240-101077-D-1	Plastic 500ml - with Nitric Acid	<2	_____	_____
MW-27A	240-101077-D-2	Plastic 500ml - with Nitric Acid	<2	_____	_____
MW-28A	240-101077-D-3	Plastic 500ml - with Nitric Acid	<2	_____	_____
MW-28B	240-101077-D-4	Plastic 500ml - with Nitric Acid	<2	_____	_____
MW-09DDEB	240-101077-D-5	Plastic 500ml - with Nitric Acid	<2	_____	_____
MW-28BA	240-101077-D-6	Plastic 500ml - with Nitric Acid	<2	_____	_____

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SBB

Chain of Custody Record

240-101077 Chain of Custody

TestAmerica
LEADER IN ENVIRONMENTAL TESTING

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Johnson, Opal	No: 92413.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: opal.johnson@testamericainc.com	State of Origin: Ohio
Company: TestAmerica Laboratories, Inc.		Accreditations Required (See note):	Page: Page 1 of 1
Address: 301 Alpha Drive, RIDC Park,	Due Date Requested: 9/24/2018		Job #: 240-101077-1
City: Pittsburgh	TAT Requested (days):		
State, Zip: PA, 15238			
Phone: 412-963-7058(Tel) 412-963-2468(Fax)	PO #:		
Email:	WO #:		
Project Name: AKZ - RCRA Closure QTRLY Mon	Project #: 24005530		
Site:	SSOW#:		

Analysis Requested

Preservation Codes:

A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)

Other:

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	SM2310B/ Acidity	Total Number of containers	Special Instructions/Note:
			Preservation Code:						
MW-09DD (240-101077-1)	9/12/18	08:22 Eastern		Water			X	1	
MW-27A (240-101077-2)	9/12/18	09:35 Eastern		Water			X	1	
MW-28A (240-101077-3)	9/12/18	10:12 Eastern		Water			X	1	
MW-28B (240-101077-4)	9/12/18	10:36 Eastern		Water			X	1	
MW-09DDEB (240-101077-5)	9/12/18	08:08 Eastern		Water			X	1	
MW-28BA (240-101077-6)	9/12/18	10:36 Eastern		Water			X	1	

Note: Since laboratory accreditations are subject to change, TestAmerica Laboratories, Inc. places the ownership of method, analyte & accreditation compliance upon out subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the TestAmerica laboratory or other instructions will be provided. Any changes to accreditation status should be brought to TestAmerica Laboratories, Inc. attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said complicance to TestAmerica Laboratories, Inc.

Possible Hazard Identification *Unconfirmed*	***Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)*** ☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* _____ *Months*
Deliverable Requested: I, II, III, IV, Other (specify) Primary Deliverable Rank: 2	Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by: Charles Hewitt	Date/Time: 9-12-18 15:40	Company 240	Received by:	Date/Time: 9/13/18 900	Company MPitt
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks:

Ver: 09/20/2016

Login Sample Receipt Checklist

Client: Cox-Colvin & Associates, Inc.

Job Number: 240-101077-1

Login Number: 101077
List Number: 2
Creator: Say, Thomas C

List Source: TestAmerica Pittsburgh
List Creation: 09/13/18 03:25 PM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Data Validation Memorandums

240-101077

Cox-Colvin & Associates, Inc.

Validation Memorandum

Project: AK Zanesville
Data Report: 280-101077
Laboratory: TestAmerica
Prepared by: Kathleen M. Sarver, Cox-Colvin & Associates
Date: October 10, 2018

The laboratory data report noted above has been reviewed and the quality assurance and performance data summarized. The data review included:

No. of Samples	4 (& QA)	Sampling Date(s)	12SEP2018
Matrix	Aqueous	Shipping Date(s)	12SEP2018 (courier)
Lab Quote	24005530	Date received by Lab	12SEP2018

Samples: MW-09DD, MW-27A, MW-28A, MW-28B

Field Duplicates: MW-28BA

Equipment Rinsate Blank: MW-09DDEB

Validation Summary

Cox-Colvin & Associates, Inc. (Cox-Colvin) collected four groundwater samples and associated QA samples on September 12, 2018 from wells at the AK Steel – Zanesville Works facility in Zanesville, Ohio. The samples were collected as part of the RCRA closure groundwater monitoring program. The samples were delivered by laboratory courier to TestAmerica Laboratories (TestAmerica) in North Canton, Ohio for analysis of metals (6010B); acidity (SM 2310B-2011); alkalinity (SM 2320B-1997); chloride, fluoride, and sulfate (300.0); and hexavalent chromium (7196A). All results were reported to the method detection limit (MDL).

Cox-Colvin received the analytical data report from TestAmerica on September 24, 2018 and a revised report (rev. 1) on October 10, 2018. Cox-Colvin reviewed and validated TestAmerica's analytical data for compliance with method quality control requirements following appropriate guidelines outlined in the Ohio EPA Tier I Data Validation Manual, combined with professional judgement. Data qualifiers determined during validation were recorded directly on the analytical report and entered into the project environmental database. A summary of qualified sample results for the data report referenced above, as determined during data validation, is provided in Table 1. Table 2 lists and explains typical validation qualifiers.

The analytical results, properly qualified as indicated in Table 1 below, are valid and acceptable for their intended use.

Table 1. Summary of Data Qualified Based on Validation

Sample	Date sampled	Parameter	Result	Val Flag	RL	MDL	Units
MW-09DD	9/12/2018	Cadmium	0.00048	J	0.002	0.0002	mg/L
MW-27A	9/12/2018	Cadmium	0.00037	J	0.002	0.0002	mg/L
MW-27A	9/12/2018	Chromium	0.0012	J	0.005	0.00063	mg/L
MW-28A	9/12/2018	Cadmium	0.00039	J	0.002	0.0002	mg/L
MW-28B	9/12/2018	Cadmium	0.00056	J	0.002	0.0002	mg/L
MW-28BA	9/12/2018	Cadmium	0.00034	J	0.002	0.0002	mg/L

Table 2. Typical Validation Qualifier Flags and Explanation

QUALIFIER	EXPLANATION
U	The analyte was not detected above the reported quantitation limit.
J	The result is estimated. The associated numerical value is the approximate concentration of the analyte in the sample.
UJ	The analyte was not detected above the reported quantitation limit; however, the quantitation limit is approximate.
J+	The result is an estimated quantity and may be biased high.
J-	The result is an estimated quantity and may be biased low.
R	The sample result is rejected due to serious deficiencies. The presence or absence of the analyte cannot be verified.

Review of Inorganic Data

Review Elements

The data were evaluated based on the following items (where applicable to the method):

✓ Data package completeness (chain-of-custody/sample integrity)
✓ Holding times and sample preservation
NA Initial Calibration/Continuing Calibration Verification
✓ Blanks
✓ Laboratory control sample (LCS)
NA Interference Check Sample
✓ Matrix spike (MS) and/or matrix spike duplicate (MSD)
✓ Field duplicates
NA Serial dilution
✓ Quantitation

A ✓ indicates the item was evaluated, and there were no QC deficiencies that required qualification of data. An ✕ indicates that a QC nonconformance resulted in data qualification. NA indicates the item was not included as part of this data set or was not applicable to this validation and was not reviewed.

Results

Data Package Completeness
TestAmerica indicated the samples were received at the laboratory intact, in the appropriate sample bottles, showing no evidence of tampering. The sample integrity criteria for this data set have been met. The data package was reviewed and found to meet acceptance criteria for completeness. A signed statement from TestAmerica attests to the validity of the data.

Holding times and sample preservation
The holding time and sample preservation criteria for this data set were met; thus, no data qualifiers were applied.

Blank Results
Laboratory Blanks
No analytes were detected in any of the laboratory method blanks. The blank criteria for this data set were met; thus, no data qualifiers were applied.

Equipment Rinsate Blanks
The blank criteria for this data set were met; thus, no data qualifiers were applied.

Laboratory Control Sample (LCS)
The LCS recovery criteria for this data set were met; thus, no data qualifiers were applied.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)
Project-specific sample MW-28A (chloride & fluoride, batch 345213) was used for MS/MSD analyses in association with this data set. All project-specific MS/MSD recoveries and RPDs were within QC limits; thus, no data qualifiers were applied.

Field Duplicate Results
One field duplicate pair was collected in association with this data set. The table below summarizes analytes detected in sample MW-28B and its field duplicate (MW-28BA). The validation guidance does not provide acceptance criteria for field duplicate precision; therefore, guidelines developed internally by Cox-Colvin were used to evaluate field duplicate results. The field duplicate precision criteria were met; thus, no data qualifiers were applied.

ANALYTE	MW-28B (mg/L)	MW-28BA (mg/L)	RPD (%)	RL (mg/L)	MDL (mg/L)
Cadmium	0.00056[a]	0.00034[a]	NC	0.0020	0.00020
Acidity	-167	-161	3.7	5.0	5.0
Alkalinity	220	220	0.0	5.0	2.6
Chloride	82	82	0.0	1.0	0.28
Fluoride	3.8	3.8	0.0	0.10	0.024
Sulfate	120	120	0.0	2.0	0.35

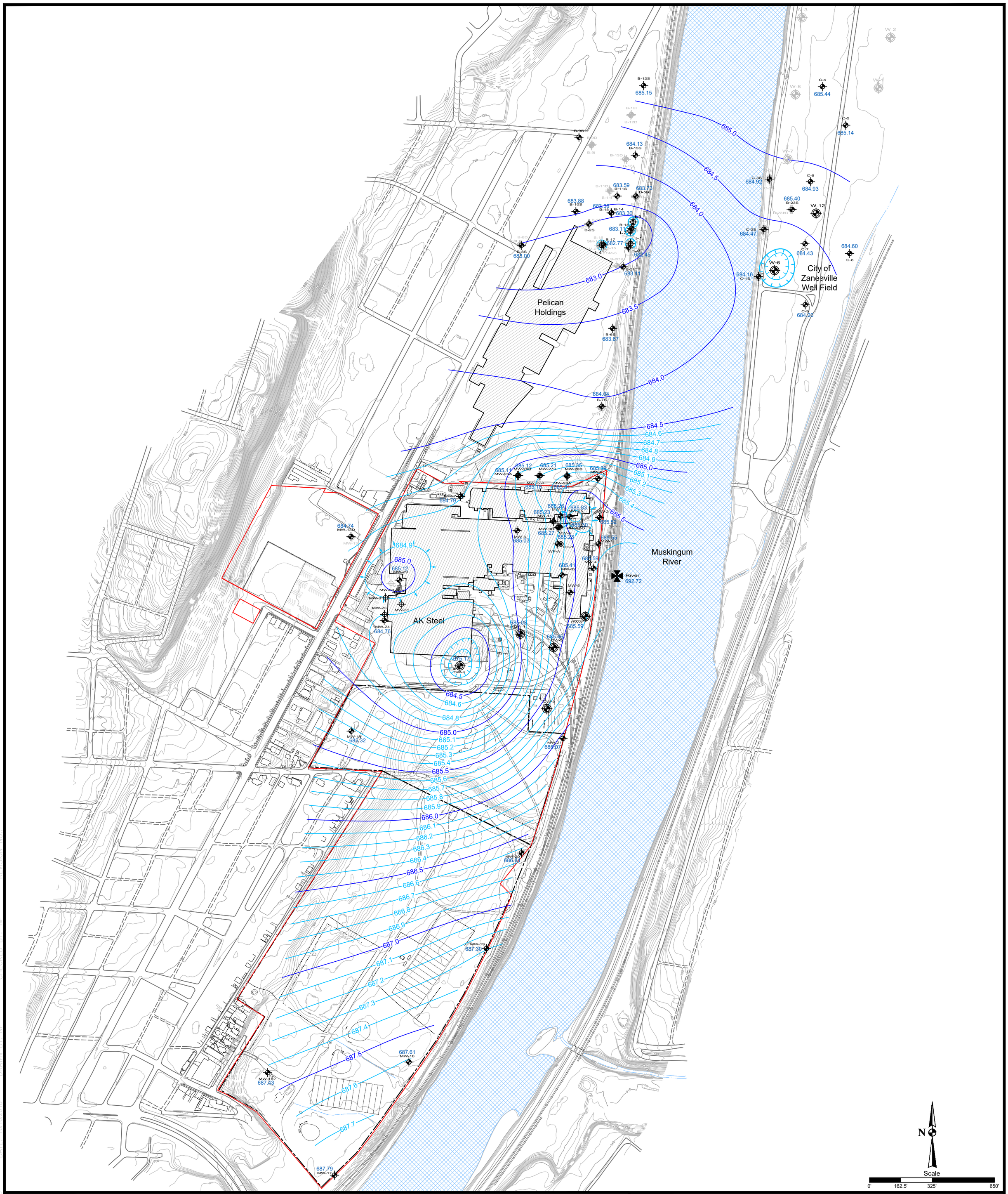
[a]Estimated value between the RL and MDL.

NC: Not calculated; at least one of the results was < RL.

Quantitation
All results met appropriate quantitation limits, accounting for dilution and other required adjustments. Results were reported to the MDL.

K:\CCA\PROJECTS\AKZanesville\Validation\240-101077 2018 Sept\Validation Memo 240-101077.docx

Plate



Legend

- DW-2 — Production Well
- MW-1 — Aquifer Monitor Well
- MW-12 — Perched Zone Monitor Well (Not used for flow map)
- CP-1 — Recovery Well
- AK Steel Property Line
- Localized Cone of Depression
- Localized Mounding

Contour interval: 0.1 foot on AK Steel property and 1.0 foot north of AK Steel property.
The topographic and structural information provided on this map is based on aerial photography completed in November 2002.

Note: AK Steel production well DW-4 was pumping and recovery well CP-1 was operating during water level collection and groundwater sampling.

City of Zanesville diversion well W-6 and UTC remediation wells I-1, I-2, I-3, and I-4 were pumping during water level collection and groundwater sampling.

B-23S may be an anomalous water level due to a loose casing and was therefore not contoured.

Regional Aquifer Groundwater Flow Map - September 11, 2018,
AK Steel Corporation - Zanesville Works,
Zanesville, Ohio

Cox-Colvin & ASSOCIATES, INC. ENVIRONMENTAL SERVICES

Plate
1

DWG. NAME: wellov09112018 DATE: 10/16/2018 DRAWN BY: NP CHECKED BY: NP REVISION NO.: