

**From:** [Anderson \[SCo\], Joel](#)  
**To:** [Water Permits](#); [Ariel Wessel-Fuss](#); [DeWitt Logsdon](#)  
**Cc:** [Paige Miller \[SCo\]](#); [Michael Manning \[SCo\]](#)  
**Subject:** [EXTERNAL] Cytec Industries Inc. (NPDES No. TN0067415) - Biological Monitoring Report for July 2023 (Part 1 of 2)  
**Date:** Friday, September 1, 2023 4:59:20 PM

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Ms. Wessel-Fuss and Mr. Logsdon,

I apologize if this message reaches you multiple times since I am having resend the original email as it was too large with all of the attachments. This communication has been split into two separate messages in order to submit all of the proper documentation.

I have attached the Biological Monitoring Report and Chemical Monitoring data for each station associated with the study conducted in July 2023 by Pennington and Associates for the Big Big Creek. These documents will be submitted with the August DMR as well.

Regards,

Joel Anderson

--



**Joel Anderson**

Technology Solutions

HSE Manager

T: [931-379-1380](tel:931-379-1380) - M: [931-309-9853](tel:931-309-9853)

7910 Mt. Joy Road

Mt. Pleasant, TN 38474



| [www.solvay.com](http://www.solvay.com)

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**From:** [Anderson \[SCo\], Joel](#)  
**To:** [Water Permits](#); [Ariel Wessel-Fuss](#); [DeWitt Logsdon](#)  
**Cc:** [Paige Miller \[SCo\]](#); [Michael Manning \[SCo\]](#)  
**Subject:** [EXTERNAL] Cytec Industries Inc. (NPDES No. TN0067415) - Biological Monitoring Report for July 2023 (Part 2 of 2)  
**Date:** Friday, September 1, 2023 5:02:24 PM

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Ms. Wessel-Fuss and Mr. Logsdon,

I apologize if this message reaches you multiple times since I am having resend the original email as it was too large with all of the attachments. This communication has been split into two separate messages in order to submit all of the proper documentation.

I have attached the TDEC QSSOP SOP excel workbooks associated with the study conducted in July 2023 by Pennington and Associates for the Big Bigby Creek. These documents will be submitted with the August DMR as well.

Regards,

Joel Anderson

--



**Joel Anderson**

Technology Solutions  
HSE Manager

T: [931-379-1380](tel:931-379-1380) - M: [931-309-9853](tel:931-309-9853)

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**Cytec Solvay Group**

Sample Delivery Group: L1638828  
Samples Received: 07/25/2023  
Project Number: ANNUAL  
Description: Chemical Monitoring  
Site: BIG BIGBY CREEK  
Report To: Mr. Joel Anderson  
PO Box 152  
Mt. Pleasant, TN 38474

Entire Report Reviewed By:



Justin Carr  
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.

**Pace Analytical National**12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 [www.pacenational.com](http://www.pacenational.com)

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<sup>1</sup>Cp

<sup>2</sup>Tc

<sup>3</sup>Ss

<sup>4</sup>Cn

<sup>5</sup>Sr

<sup>6</sup>Qc

<sup>7</sup>Gl

<sup>8</sup>Al

<sup>9</sup>Sc

# SAMPLE SUMMARY

STATION 1A L1638828-01 WW

Collected by: Don Johnson  
 Collected date/time: 07/25/23 12:00  
 Received date/time: 07/25/23 15:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Calculated Results	WG2101313	1	08/02/23 23:05	08/02/23 23:05	LDT	Mt. Juliet, TN
Gravimetric Analysis by Method 2540 C-2011	WG2104682	1	07/31/23 12:28	07/31/23 15:17	MMF	Mt. Juliet, TN
Gravimetric Analysis by Method 2540 D-2015	WG2102782	1	07/27/23 14:24	07/27/23 16:07	ARD	Mt. Juliet, TN
Wet Chemistry by Method 300.0	WG2101890	1	07/26/23 12:38	07/26/23 12:38	GEB	Mt. Juliet, TN
Wet Chemistry by Method 351.2	WG2105124	1	08/02/23 16:00	08/02/23 23:05	LDT	Mt. Juliet, TN
Wet Chemistry by Method 353.2	WG2101313	1	07/26/23 19:32	07/26/23 19:32	AEC	Mt. Juliet, TN
Wet Chemistry by Method 365.4	WG2106707	1	08/02/23 16:00	08/02/23 23:14	LDT	Mt. Juliet, TN
Wet Chemistry by Method 420.4	WG2101994	1	07/26/23 16:27	07/27/23 11:23	UNP	Mt. Juliet, TN
Wet Chemistry by Method 4500CN E-2016	WG2101754	1	07/27/23 11:40	07/27/23 18:02	UNP	Mt. Juliet, TN
Metals (ICP) by Method 200.7	WG2101541	1	07/26/23 13:58	08/02/23 12:01	ZSA	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 624.1	WG2101936	1	07/26/23 12:37	07/26/23 12:37	TJJ	Mt. Juliet, TN

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 Gl
- 8 Al
- 9 Sc

# CASE NARRATIVE

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.



Justin Carr  
Project Manager

<sup>1</sup> Cp

<sup>2</sup> Tc

<sup>3</sup> Ss

<sup>4</sup> Cn

<sup>5</sup> Sr

<sup>6</sup> Qc

<sup>7</sup> Gl

<sup>8</sup> Al

<sup>9</sup> Sc

## Calculated Results

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Total Nitrogen	0.543		0.100	1	08/02/2023 23:05	<a href="#">WG2101313</a>

## Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	177		10.0	1	07/31/2023 15:17	<a href="#">WG2104682</a>

## Gravimetric Analysis by Method 2540 D-2015

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Suspended Solids	4.80		2.50	1	07/27/2023 16:07	<a href="#">WG2102782</a>

## Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Sulfate	15.1		5.00	1	07/26/2023 12:38	<a href="#">WG2101890</a>

## Wet Chemistry by Method 351.2

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Kjeldahl Nitrogen, TKN	ND	P1	0.250	1	08/02/2023 23:05	<a href="#">WG2105124</a>

## Wet Chemistry by Method 353.2

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Nitrate-Nitrite	0.543		0.100	1	07/26/2023 19:32	<a href="#">WG2101313</a>

## Wet Chemistry by Method 365.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Phosphorus, Total	0.350	B	0.100	1	08/02/2023 23:14	<a href="#">WG2106707</a>

## Wet Chemistry by Method 420.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Total Phenol by 4AAP	ND		0.0100	1	07/27/2023 11:23	<a href="#">WG2101994</a>

## Wet Chemistry by Method 4500CN E-2016

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Cyanide	ND		0.00500	1	07/27/2023 18:02	<a href="#">WG2101754</a>

## Metals (ICP) by Method 200.7

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chromium	ND		0.0100	1	08/02/2023 12:01	<a href="#">WG2101541</a>
Copper	ND		0.0100	1	08/02/2023 12:01	<a href="#">WG2101541</a>
Lead	ND		0.00500	1	08/02/2023 12:01	<a href="#">WG2101541</a>
Nickel	ND		0.0100	1	08/02/2023 12:01	<a href="#">WG2101541</a>
Selenium	ND		0.0100	1	08/02/2023 12:01	<a href="#">WG2101541</a>
Zinc	ND		0.0500	1	08/02/2023 12:01	<a href="#">WG2101541</a>

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Volatile Organic Compounds (GC/MS) by Method 624.1

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Benzene	ND		0.00100	1	07/26/2023 12:37	<a href="#">WG2101936</a>
Ethylbenzene	ND	<u>J3</u>	0.00100	1	07/26/2023 12:37	<a href="#">WG2101936</a>
Toluene	ND		0.00100	1	07/26/2023 12:37	<a href="#">WG2101936</a>
Xylenes, Total	ND		0.00300	1	07/26/2023 12:37	<a href="#">WG2101936</a>
Naphthalene	ND		0.00500	1	07/26/2023 12:37	<a href="#">WG2101936</a>
<i>(S) Toluene-d8</i>	115		80.0-120		07/26/2023 12:37	<a href="#">WG2101936</a>
<i>(S) 4-Bromofluorobenzene</i>	108		80.0-120		07/26/2023 12:37	<a href="#">WG2101936</a>
<i>(S) 1,2-Dichloroethane-d4</i>	102		70.0-130		07/26/2023 12:37	<a href="#">WG2101936</a>

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 Gl
- 8 Al
- 9 Sc



Method Blank (MB)

(MB) R3956057-1 07/31/23 15:17

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
Dissolved Solids	U		10.0	10.0

<sup>1</sup>Cp

<sup>2</sup>Tc

<sup>3</sup>Ss

<sup>4</sup>Cn

<sup>5</sup>Sr

<sup>6</sup>Qc

<sup>7</sup>Gl

<sup>8</sup>Al

<sup>9</sup>Sc

L1639007-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1639007-01 07/31/23 15:17 • (DUP) R3956057-3 07/31/23 15:17

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Dissolved Solids	359	365	1	1.66		5

L1639065-03 Original Sample (OS) • Duplicate (DUP)

(OS) L1639065-03 07/31/23 15:17 • (DUP) R3956057-4 07/31/23 15:17

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Dissolved Solids	761	780	1	2.42		5

Laboratory Control Sample (LCS)

(LCS) R3956057-2 07/31/23 15:17

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Dissolved Solids	8800	8560	97.3	77.3-123	

Method Blank (MB)

(MB) R3954080-1 07/27/23 16:07

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
Suspended Solids	U		2.50	2.50

<sup>1</sup>Cp

<sup>2</sup>Tc

<sup>3</sup>Ss

<sup>4</sup>Cn

<sup>5</sup>Sr

<sup>6</sup>Qc

<sup>7</sup>Gl

<sup>8</sup>Al

<sup>9</sup>Sc

L1638689-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1638689-02 07/27/23 16:07 • (DUP) R3954080-3 07/27/23 16:07

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Suspended Solids	214	136	1	44.6	P1	5

L1638690-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1638690-01 07/27/23 16:07 • (DUP) R3954080-4 07/27/23 16:07

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Suspended Solids	12.0	12.3	1	2.39		5

Laboratory Control Sample (LCS)

(LCS) R3954080-2 07/27/23 16:07

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Suspended Solids	773	696	90.0	85.7-114	

Method Blank (MB)

(MB) R3953928-1 07/26/23 11:22

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
Sulfate	U		0.594	5.00

1 Cp

2 Tc

3 Ss

L1638828-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1638828-01 07/26/23 12:38 • (DUP) R3953928-3 07/26/23 12:51

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Sulfate	15.1	15.3	1	0.778		20

4 Cn

5 Sr

L1639167-05 Original Sample (OS) • Duplicate (DUP)

(OS) L1639167-05 07/26/23 17:59 • (DUP) R3953928-6 07/26/23 22:13

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Sulfate	10.5	10.7	1	1.37		20

6 Qc

7 Gl

8 Al

9 Sc

Laboratory Control Sample (LCS)

(LCS) R3953928-2 07/26/23 11:35

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Sulfate	40.0	40.9	102	90.0-110	

L1638828-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1638828-01 07/26/23 12:38 • (MS) R3953928-4 07/26/23 13:04 • (MSD) R3953928-5 07/26/23 13:20

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Sulfate	50.0	15.1	65.8	65.7	101	101	1	80.0-120			0.155	20

L1639167-05 Original Sample (OS) • Matrix Spike (MS)

(OS) L1639167-05 07/26/23 17:59 • (MS) R3953928-7 07/26/23 22:27

Analyte	Spike Amount	Original Result	MS Result	MS Rec.	Dilution	Rec. Limits	MS Qualifier
Sulfate	50.0	10.5	61.0	101	1	80.0-120	

Method Blank (MB)

(MB) R3956106-1 08/02/23 23:02

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
Kjeldahl Nitrogen, TKN	U		0.140	0.250

<sup>1</sup>Cp

<sup>2</sup>Tc

<sup>3</sup>Ss

L1638828-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1638828-01 08/02/23 23:05 • (DUP) R3956106-3 08/02/23 23:06

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Kjeldahl Nitrogen, TKN	ND	ND	1	200	P1	20

<sup>4</sup>Cn

<sup>5</sup>Sr

Laboratory Control Sample (LCS)

(LCS) R3956106-2 08/02/23 23:04

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Kjeldahl Nitrogen, TKN	12.0	13.0	109	75.2-120	

<sup>6</sup>Qc

<sup>7</sup>Gl

L1638937-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1638937-02 08/02/23 23:09 • (MS) R3956106-4 08/02/23 23:10 • (MSD) R3956106-5 08/02/23 23:11

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Kjeldahl Nitrogen, TKN	5.00	ND	5.67	5.32	110	103	1	90.0-110			6.37	20

<sup>8</sup>Al

<sup>9</sup>Sc

Method Blank (MB)

(MB) R3953155-1 07/26/23 19:14

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
Nitrate-Nitrite	U		0.0500	0.100

<sup>1</sup>Cp

<sup>2</sup>Tc

<sup>3</sup>Ss

<sup>4</sup>Cn

<sup>5</sup>Sr

<sup>6</sup>Qc

<sup>7</sup>Gl

<sup>8</sup>Al

<sup>9</sup>Sc

L1638644-07 Original Sample (OS) • Duplicate (DUP)

(OS) L1638644-07 07/26/23 19:22 • (DUP) R3953155-3 07/26/23 19:23

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Nitrate-Nitrite	0.443	0.438	1	1.14		20

L1639039-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1639039-01 07/26/23 21:03 • (DUP) R3953155-10 07/26/23 21:04

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Nitrate-Nitrite	2.44	2.44	2	0.000		20

Laboratory Control Sample (LCS)

(LCS) R3953155-2 07/26/23 19:15

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Nitrate-Nitrite	2.50	2.65	106	90.0-110	

L1638644-07 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1638644-07 07/26/23 19:22 • (MS) R3953155-4 07/26/23 19:24 • (MSD) R3953155-5 07/26/23 19:29

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Nitrate-Nitrite	2.50	0.443	3.08	3.07	105	105	1	90.0-110			0.325	20

L1639039-01 Original Sample (OS) • Matrix Spike (MS)

(OS) L1639039-01 07/26/23 21:03 • (MS) R3953155-11 07/26/23 21:05

Analyte	Spike Amount	Original Result	MS Result	MS Rec.	Dilution	Rec. Limits	MS Qualifier
Nitrate-Nitrite	2.50	2.44	5.08	106	2	90.0-110	

Method Blank (MB)

(MB) R3956109-5 08/02/23 23:44

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
Phosphorus,Total	0.0824	↓	0.0350	0.100

<sup>1</sup>Cp

<sup>2</sup>Tc

<sup>3</sup>Ss

L1638828-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1638828-01 08/02/23 23:14 • (DUP) R3956109-2 08/02/23 23:15

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Phosphorus,Total	0.350	0.366	1	4.47		20

<sup>4</sup>Cn

<sup>5</sup>Sr

Laboratory Control Sample (LCS)

(LCS) R3956109-1 08/02/23 23:13

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Phosphorus,Total	3.42	3.37	98.5	83.2-116	

<sup>6</sup>Qc

<sup>7</sup>Gl

<sup>8</sup>Al

L1638937-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1638937-02 08/02/23 23:18 • (MS) R3956109-3 08/02/23 23:19 • (MSD) R3956109-4 08/02/23 23:20

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Phosphorus,Total	2.50	0.113	2.52	2.37	96.3	90.3	1	90.0-110			6.13	20

<sup>9</sup>Sc

Method Blank (MB)

(MB) R3953404-1 07/27/23 11:20

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
Total Phenol by 4AAP	U		0.00800	0.0100

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

L1638735-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1638735-01 07/27/23 11:21 • (DUP) R3953404-3 07/27/23 11:22

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Total Phenol by 4AAP	ND	ND	1	200	P1	20

Laboratory Control Sample (LCS)

(LCS) R3953404-2 07/27/23 11:20

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Total Phenol by 4AAP	0.500	0.514	103	90.0-110	

L1638828-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1638828-01 07/27/23 11:23 • (MS) R3953404-4 07/27/23 11:23 • (MSD) R3953404-5 07/27/23 11:24

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Total Phenol by 4AAP	1.00	ND	0.979	0.976	97.9	97.6	1	90.0-110			0.327	20

Method Blank (MB)

(MB) R3953901-1 07/27/23 17:39

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
Cyanide	U		0.00180	0.00500

<sup>1</sup>Cp

<sup>2</sup>Tc

<sup>3</sup>Ss

<sup>4</sup>Cn

<sup>5</sup>Sr

<sup>6</sup>Qc

<sup>7</sup>Gl

<sup>8</sup>Al

<sup>9</sup>Sc

L1638828-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1638828-01 07/27/23 18:02 • (DUP) R3953901-4 07/27/23 18:03

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Cyanide	ND	ND	1	0.000		20

L1638848-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1638848-01 07/27/23 18:05 • (DUP) R3953901-5 07/27/23 18:06

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Cyanide	ND	ND	1	0.000		20

Laboratory Control Sample (LCS)

(LCS) R3953901-2 07/27/23 17:40

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Cyanide	0.100	0.106	106	87.1-120	

L1638849-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1638849-01 07/27/23 18:08 • (MS) R3953901-6 07/27/23 18:09 • (MSD) R3953901-7 07/27/23 18:15

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Cyanide	0.100	ND	0.0790	0.0921	79.0	92.1	1	90.0-110	J6		15.3	20



Method Blank (MB)

(MB) R3955851-1 08/02/23 11:25

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Chromium	U		0.00163	0.0100
Copper	U		0.00226	0.0100
Lead	U		0.00227	0.00500
Nickel	U		0.00182	0.0100
Selenium	U		0.00616	0.0100
Zinc	U		0.00578	0.0500

1  
Cp

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Tc

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Ss

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Cn

5  
Sr

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Qc

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Gl

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Al

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Sc

Laboratory Control Sample (LCS)

(LCS) R3955851-2 08/02/23 11:27

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
	mg/l	mg/l	%	%	
Chromium	1.00	1.05	105	85.0-115	
Copper	1.00	1.05	105	85.0-115	
Lead	1.00	1.08	108	85.0-115	
Nickel	1.00	1.06	106	85.0-115	
Selenium	1.00	1.13	113	85.0-115	
Zinc	1.00	1.04	104	85.0-115	

L1638576-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1638576-01 08/02/23 11:30 • (MS) R3955851-4 08/02/23 11:36 • (MSD) R3955851-5 08/02/23 11:39

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Chromium	1.00	ND	1.04	0.993	104	99.3	1	70.0-130			4.98	20
Copper	1.00	ND	1.11	1.03	110	102	1	70.0-130			7.31	20
Lead	1.00	ND	1.10	1.03	110	103	1	70.0-130			6.46	20
Nickel	1.00	ND	1.10	1.02	109	102	1	70.0-130			6.90	20
Selenium	1.00	ND	1.19	1.13	119	113	1	70.0-130			5.56	20
Zinc	1.00	ND	1.09	1.02	105	97.5	1	70.0-130			6.83	20

L1638578-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1638578-01 08/02/23 11:42 • (MS) R3955851-6 08/02/23 11:44 • (MSD) R3955851-7 08/02/23 11:47

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Chromium	1.00	ND	0.926	0.912	92.6	91.2	1	70.0-130			1.53	20
Copper	1.00	ND	0.984	0.967	98.4	96.7	1	70.0-130			1.72	20
Lead	1.00	ND	1.12	1.10	112	110	1	70.0-130			1.41	20

L1638578-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1638578-01 08/02/23 11:42 • (MS) R3955851-6 08/02/23 11:44 • (MSD) R3955851-7 08/02/23 11:47

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	<u>MS Qualifier</u>	<u>MSD Qualifier</u>	RPD %	RPD Limits %
Nickel	1.00	0.0194	1.14	1.12	112	110	1	70.0-130			1.66	20
Selenium	1.00	ND	1.11	1.10	111	110	1	70.0-130			1.15	20
Zinc	1.00	0.0875	1.03	1.06	94.7	97.5	1	70.0-130			2.61	20

<sup>1</sup>Cp

<sup>2</sup>Tc

<sup>3</sup>Ss

<sup>4</sup>Cn

<sup>5</sup>Sr

<sup>6</sup>Qc

<sup>7</sup>Gl

<sup>8</sup>Al

<sup>9</sup>Sc

Method Blank (MB)

(MB) R3954563-3 07/26/23 09:35

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Benzene	U		0.0000941	0.00100
Ethylbenzene	U		0.000137	0.00100
Toluene	U		0.000278	0.00100
Xylenes, Total	U		0.000174	0.00300
Naphthalene	U		0.00100	0.00500
<i>(S) Toluene-d8</i>	116			80.0-120
<i>(S) 4-Bromofluorobenzene</i>	108			80.0-120
<i>(S) 1,2-Dichloroethane-d4</i>	101			70.0-130

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3954563-1 07/26/23 08:31 • (LCSD) R3954563-2 07/26/23 08:52

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzene	0.00500	0.00529	0.00437	106	87.4	65.0-135			19.0	20
Ethylbenzene	0.00500	0.00573	0.00465	115	93.0	60.0-140		J3	20.8	20
Toluene	0.00500	0.00538	0.00446	108	89.2	70.0-130			18.7	20
Xylenes, Total	0.0150	0.0160	0.0135	107	90.0	77.0-120			16.9	20
Naphthalene	0.00500	0.00451	0.00403	90.2	80.6	62.0-128			11.2	20
<i>(S) Toluene-d8</i>				112	114	80.0-120				
<i>(S) 4-Bromofluorobenzene</i>				105	107	80.0-120				
<i>(S) 1,2-Dichloroethane-d4</i>				101	99.7	70.0-130				

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

# GLOSSARY OF TERMS

## Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

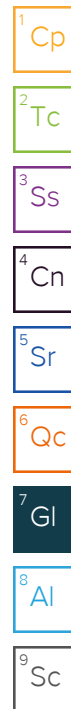
Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

### Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state "ND" (Not Detected) or "BDL" (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

### Qualifier Description

B	The same analyte is found in the associated blank.
J	The identification of the analyte is acceptable; the reported value is an estimate.
J3	The associated batch QC was outside the established quality control range for precision.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.
P1	RPD value not applicable for sample concentrations less than 5 times the reporting limit.



# ACCREDITATIONS & LOCATIONS

## Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico <sup>1</sup>	TN00003
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina <sup>1</sup>	DW21704
Georgia	NELAP	North Carolina <sup>3</sup>	41
Georgia <sup>1</sup>	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LA000356
Kentucky <sup>1,6</sup>	KY90010	South Carolina	84004002
Kentucky <sup>2</sup>	16	South Dakota	n/a
Louisiana	AI30792	Tennessee <sup>1,4</sup>	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas <sup>5</sup>	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA
A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 <sup>5</sup>	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

<sup>1</sup> Drinking Water <sup>2</sup> Underground Storage Tanks <sup>3</sup> Aquatic Toxicity <sup>4</sup> Chemical/Microbiological <sup>5</sup> Mold <sup>6</sup> Wastewater n/a Accreditation not applicable

\* Not all certifications held by the laboratory are applicable to the results reported in the attached report.


\* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace Analytical.



Company Name/Address:  
**Cytec Solvay Group**  
 PO Box 152  
 Mt. Pleasant, TN 38474

Billing Information:  
**Accounts Payable**  
 504 Carnegie Center  
 Princeton, NJ 08540

Pres Chk	Analysis / Container / Preservative									
	7/25/23	22	22							22

Chain of Custody Page \_\_\_ of \_\_\_  
  
 PEOPLE ADVANCING SCIENCE

Report to:  
**Mr. Joel Anderson**

Email To:  
 jason.Rettinger@cytec.com;Joel.Anderson@solv

Project Description:  
**Chemical Monitoring**

City/State Collected:  
**MTD**

Please Circle:  
 PT MT CT ET

Phone: **931-379-1744**

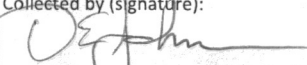
Client Project #  
**ANNUAL**

Lab Project #  
**EMPEAV-BIOSURVEY**

Collected by (print):  
**Don Johnson**

Site/Facility ID #  
**BIG BIGBY CREEK**

P.O. #

Collected by (signature):  


Rush? (Lab MUST Be Notified)  
 \_\_\_ Same Day \_\_\_ Five Day  
 \_\_\_ Next Day \_\_\_ 5 Day (Rad Only)  
 \_\_\_ Two Day \_\_\_ 10 Day (Rad Only)  
 \_\_\_ Three Day

Quote #  
**2023 PD**

Immediately Packed on Ice N \_\_\_ Y \_\_\_

Date Results Needed  
**STD**

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs
GRAB		WW				9
STATION 1A	Grab	WW	N/A	7/25/23	12:00P	9

CN 250mlHDPEAmb-NaOH	Metals 250mlHDPE-HNO3	PHT 250mlAmb-H2SO4	TDS, SULFATE 250mlHDPE-NoPres	TSS 1L-HDPE NoPres	Total Nit., PT 250mlHDPE-H2SO4	V624.1BTEXN 40mlAmb HCl
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**MT JULIET, TN**  
 12065 Lebanon Rd Mount Juliet, TN 37122  
 Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at: <https://info.pacelabs.com/hubfs/pas-standard-terms.pdf>

SDG # **21638828**  
**H005**

Acctnum: **EMPEAV**  
 Template: **T152637**  
 Prelogin: **P1009565**  
 PM: **807 - Justin Carr**  
 PB: **BW 4/30**

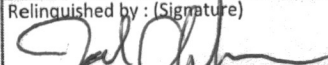
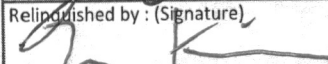
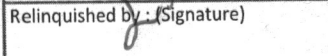
Shipped Via: **Courier**  
 Remarks Sample # (lab only)

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	CN 250mlHDPEAmb-NaOH	Metals 250mlHDPE-HNO3	PHT 250mlAmb-H2SO4	TDS, SULFATE 250mlHDPE-NoPres	TSS 1L-HDPE NoPres	Total Nit., PT 250mlHDPE-H2SO4	V624.1BTEXN 40mlAmb HCl
GRAB		WW				9	X	X	X	X	X	X	X
STATION 1A	Grab	WW	N/A	7/25/23	12:00P	9	X	X	X	X	X	X	X

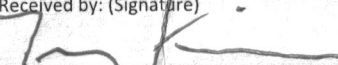
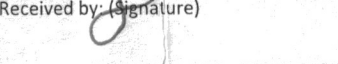
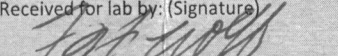
\* Matrix:  
 SS - Soil AIR - Air F - Filter  
 GW - Groundwater B - Bioassay  
 WW - WasteWater  
 DW - Drinking Water  
 OT - Other

Remarks:  
 pH \_\_\_\_\_ Temp \_\_\_\_\_  
 Flow \_\_\_\_\_ Other \_\_\_\_\_  
 Samples returned via:  
 \_\_\_ UPS \_\_\_ FedEx \_\_\_ Courier  
 Tracking # **44**

Sample Receipt Checklist	
COC Seal Present/Intact: ___ NP	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N
COC Signed/Accurate:	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N
Bottles arrive intact:	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N
Correct bottles used:	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N
Sufficient volume sent:	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N
If Applicable	
VOA Zero Headspace:	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N
Preservation Correct/Checked:	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N
RAD Screen <0.5 mR/hr:	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N

Relinquished by: (Signature)  
  
 Relinquished by: (Signature)  
  
 Relinquished by: (Signature)  


Date: **7/25/23**  
 Time: **12:00P**  
 Date: **7-25-23**  
 Time: **1545**  
 Date: **7/25/23**  
 Time: **15:45**

Received by: (Signature)  
  
 Received by: (Signature)  
  
 Received for lab by: (Signature)  


Trip Blank Received: Yes  No   
 HCL / MeOH  
 TBR  
 Temp: \_\_\_\_\_ °C  
 Bottles Received: **GRAB 7+03.7**  
 Date: **7/25/23** Time: **15:45**

If preservation required by Login: Date/Time  
 PH-10BDH4321 TRC-21441-  
 CR6-2022 IV  
 Condition: **NCF / OK**

Complete	DWR Station ID:	BBIGB016.2MY	Organization:	Pennington and Associates Inc.	PAI
	Date:	7/25/2023	Time:	1153	
Instructions	Samplers:	WLP, DEJ, MJ, KD	Index Period:	FALL	S
	Project Purpose:	NPDES Permit	DWR Project ID:	TNPR0053	
	Activity Type:	Sample-Routine			
	DWR Permit Number:		Field Log Number:	57107	
	Monitoring Location Name:	STA 1A	Watershed Group:	Duck River	C
	Monitoring Location:	Big Bigby Creek below Mt. Joy Road			
	County:	Maury	Drainage Area:	30 sq. miles	
	Ecoregion:	71h	u/s ECO:		
	Latitude:	N35.52043	Longitude:	W87.23805	
	HUC:	6040003	WBID:		

Save with a unique To search for existing DWR Stations consult [DWR Public Viewer Map](#) or

If the station is not available in the dropdown box above, complete the following information. After the new station information is completed, the DWR Station

**New Stations** Stations last updated 7/01/2020. Add new stations below.

DWR Station ID:		See Protocol B:	<a href="#">Macroinvertebrate SOP</a>
Monitoring Location Name:			
Monitoring Location:			
County:		DWR Abbreviation:	
River Mile:			
Latitude:			
Longitude:			
<u>Ecoregion:</u>		Ecoregion Name:	
<u>u/s ECO:</u>		Ecoregion Name:	
<u>HUC 8:</u>		HUC Name:	
Watershed Group:			
Waterbody ID:		Find here:	<a href="https://tdeconline.tn.gov/dwr/">https://tdeconline.tn.gov/dwr/</a>
HUC 12:		Find here:	<a href="https://tdeconline.tn.gov/dwr/">https://tdeconline.tn.gov/dwr/</a>
Drainage Area:		Calculate here:	<a href="https://streamstats.usgs.gov/ss/">https://streamstats.usgs.gov/ss/</a>
Organization:			
State Name:			
Reservoir Name:			
Water Type:			

U

Comments	
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Scroll back to the top of this workbook and new station will available at the bottom of the DWR Station ID list or by typing the new



# TDEC-DWR Stream Survey Field Sheet

## STREAM SURVEY INFORMATION (Revised 7/15/2020)

DWR Station ID: <b>BBIGB016.2MY</b>	Date: 7/25/2023	Time: 1153
Samplers: WLP, DEJ, MJ, KD	Organization: PAI	
Project Name: NPDES Permit	Activity Type: Sample-Routine	
Field Log Number: 57107	Ecoregion: 71h	
Monitoring Location Name: STA 1A		
Monitoring Location: Big Bigby Creek below Mt. Joy Road		

See most recent [Macroinvertebrate SOP](#) Protocol E for specific instruction for completing this information.

<b>Sample Status:</b>	Collected	If not collected do you plan to revisit?	
<b>Flow Condition:</b>	Moderate		
<b>Samples Collected:</b>	"Yes" if collected:		
SQKICK:	Yes	SQBANK:	

Complete blue cells

Green cells optional or additional information.

**Field Parameters:** (Note: mg/L = ppm) **Meters Used:** YSI Pro Plus  
 1<sup>st</sup> 2<sup>nd</sup>  if Validated. Describe meter problems.

<b>pH (su):</b>	7.81		<input type="checkbox"/>	
<b>Conductivity (umhos):</b>	277.3		<input type="checkbox"/>	
<b>Temperature (C°):</b>	22.4		<input type="checkbox"/>	
<b>Dissolved Oxygen (mg/L):</b>	7.41		<input type="checkbox"/>	
Dissolved Oxygen %:	85.4			
Turbidity (NTU):	2.08			
TDS (mg/L):	138			
Flow (cfs):	18.980			

**Weather:**

Previous 48 hours precipitation: None      Approx. Air Temperature (F°):

**Physical Characteristics:**

<b>Gradient:</b> Moderate	<b>Avg. Stream Width:</b> Medium (3-10 yd.)
	<b>Max. Stream Depth:</b> Medium (0.3-0.6 yd.)

**Light Penetration:**

<b>% Canopy Cover Estimated for Reach:</b>		%							
<b>% Canopy Cover Measured (mid-reach) with spherical crown densiometer:</b>									
	62	u/s +	46	d/s +	77	LDB +	94	RDB =	73

**Channel Characteristics:**

<b>Bank Height:</b> 4.0 yards	<b>High Water Mark:</b> 4.0 yards
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**Stream/Channel Characteristics:**

In the sections below select all that apply:

	Characteristic 1	Characteristic 2	Characteristic 3	Characteristic 4
<b>LDB Bank Slope:</b>	Sloughing			
<b>RDB Bank Slope:</b>	Deeply incised			
<b>Manmade Modifications:</b>	Dam			
<b>Sediment Deposits:</b>	None	Does this match sediment deposition in habitat?		
<b>Sediment Type:</b>	None			
<b>Turbidity:</b>	Clear			
<b>Foam/Surface Sheen:</b>	None			
<b>Algae:</b>	Slight			
<b>Algae Type:</b>	Diatoms	Green		

**Dominate Substrate:** ( $\geq 25\%$ ) Select up to 4:

	Riffle	Run	Pool
<b>Dominate 1:</b>	Cobble	Cobble	Cobble
<b>Dominate 2:</b>	Gravel	Gravel	Gravel
<b>Dominate 3:</b>			
<b>Dominate 4:</b>			

**Surrounding Land Uses** (Select up to 4):

Landuse 1	Landuse 2	Landuse 3	Landuse 4
Forest	Hay; Field	Industry	Road; Hwy; RR

If applicable, choose up to 4 disturbances from the dropdown boxes below the appropriate severity of the impact.

<b>Observed Human Disturbances:</b>	Slight	Moderate	High	
<b>Disturbance 1:</b>			Row Crops	
<b>Disturbance 2:</b>	Industry			
<b>Disturbance 3:</b>	Road; Hwy; RR			
<b>Disturbance 4:</b>	Impoundment			

**Other Stream Information and Stressors:**

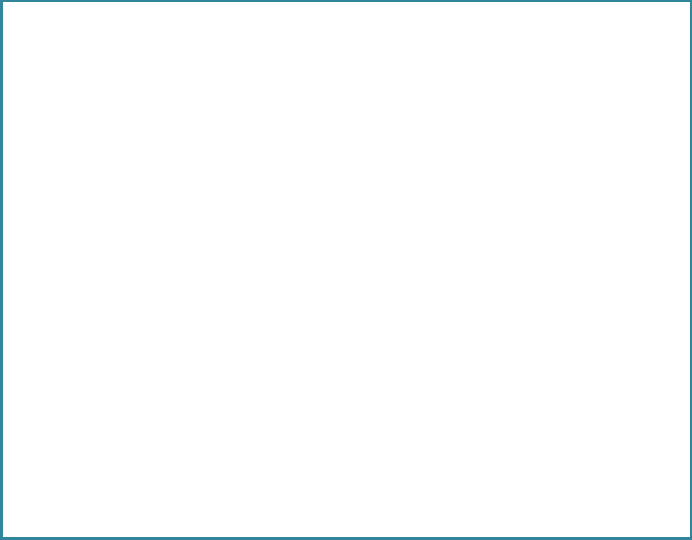
**Photos and descriptions may be attached below:**

Photos Taken?	Photo Description:	

**Save!**

Copy and paste pictures below and add descriptive labels under pictures.

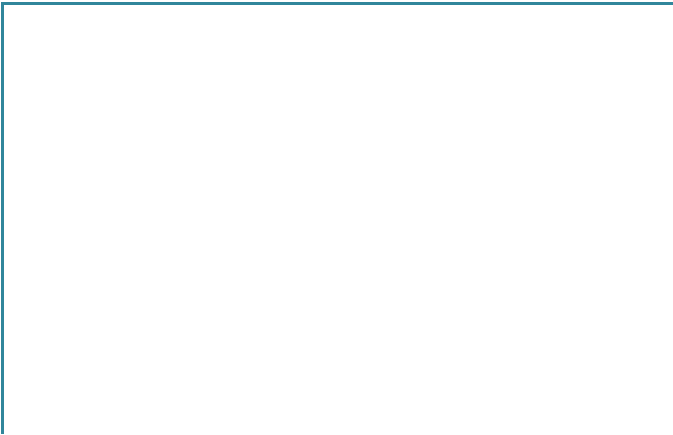
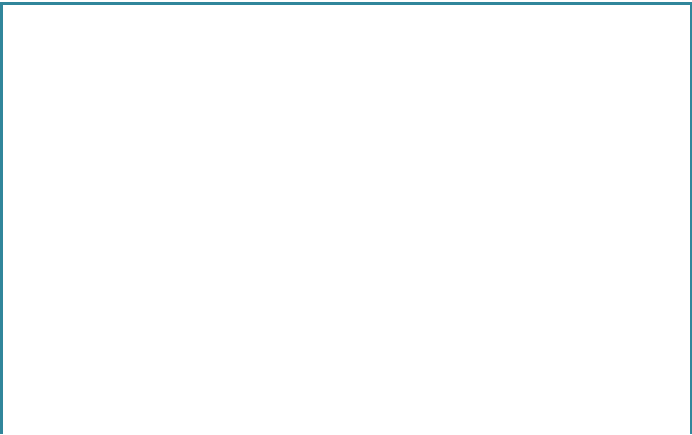
Insert and label pictures below:



Label: \_\_\_\_\_  
Notes: \_\_\_\_\_



Label: \_\_\_\_\_  
Notes: \_\_\_\_\_



Label:

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Notes:

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Label:

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Notes:

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## HABITAT ASSESSMENT FIELD SHEET- MODERATE TO HIGH GRADIENT STREAMS

Complete this habitat assessment if **SQKICK** is collected.

(See Macroinvertebrate SOP - Protocol E for detailed descriptions and rank information)

DWR Station ID:	BBIGB016.2MY				Habitat Assessment By:							
Monitoring Location Name:	STA 1A				Date:	7/25/2023			Time:			
Monitoring Location:	Big Bigby Creek below Mt. Joy Road				Field Log Number:				57107			
HUC:	6040003	WS Group:	Duck River	Ecoregion:	71h	QC:		<input type="checkbox"/>	Consensus			

Habitat Type: HG

If QA/QC 2 habitats are completed independently, check box above.

See most recent [Macroinvertebrate SOP](#) Protocol D-1 for specific instructions for completing this information.

For each habitat parameter, type score or select from blue dropdown box. Add comments if needed in row below score.

		Optimal					Suboptimal					Marginal					Poor				
<b>1. Epifaunal Substrate/ Available Cover</b>		Over 70% of stream reach has natural stable habitat suitable for colonization by fish and/or macroinvertebrates. Four or more productive habitats are present.					Natural stable habitat covers 40-70% of stream reach. Three or more productive habitats present. (If near 70% and more than 3 go to optimal.)					Natural stable habitat covers 20 -40% of stream reach or only 1-2 productive habitats present. (If near 40% and more than 2 go to suboptimal.)					Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.				
Score	<b>19</b>	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Comment																					
<b>2. Embeddedness of Riffles</b>		Gravel, cobble, and boulders 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space. If near 25% drop to suboptimal if riffle not layered cobble.					Gravel, cobble and boulders 25-50% surrounded by fine sediment. Niches in bottom layers of cobble compromised. If near 50% & riffles not layered cobble drop to marginal.					Gravel, cobble, and boulders are 50-75% surrounded by fine sediment. Niche space in middle layers of cobble is starting to fill with fine sediment.					Gravel, cobble, and boulders are more than 75% surrounded by fine sediment. Niche space is reduced to a single layer or is absent.				
Score	<b>18</b>	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Comment																					
<b>3. Velocity/ Depth Regime</b>		All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow).					Only 3 of the 4 regimes present (if fast-shallow is missing score lower). If slow-deep missing score 15.					Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).					Dominated by 1 velocity/depth regime. Others regimes too small or infrequent to support aquatic populations.				
Score	<b>18</b>	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Comment																					
<b>4. Sediment Deposition</b>	Does this rating match sed. desc. in SS?	Sediment deposition affects less than 5% of stream bottom in quiet areas. New deposition on islands and point bars is absent or minimal.					Sediment deposition affects 5-30% of stream bottom. Slight deposition in pool or slow areas. Some new deposition on islands and point bars. Move to marginal if build-up approaches 30%.					Sediment deposition affects 30-50% of stream bottom. Sediment deposits at obstruction, constrictions and bends. Moderate pool deposition.					Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.				
Score	<b>12</b>	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Comment																					
<b>5. Channel Flow Status</b>		Water reaches base of both lower banks and streambed is covered by water throughout reach. Minimal productive habitat is exposed.					Water covers > 75% of streambed or 25% of productive habitat is exposed.					Water covers 25-75% of streambed and/or productive habitat is mostly exposed.					Very little water in channel and mostly present as standing pools. Little or no productive habitat due to lack of water.				
Score	<b>17</b>	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Comment																					

<p><b>6. Channel Alteration</b></p>		<p>Channelization, dredging or rock removal or 4-wheel activity (past or present) absent or minimal; natural meander pattern. NO artificial structures in reach. Upstream or downstream structures do not affect reach.</p>	<p>Channelization, dredging or 4-wheel activity up to 40%. Channel has stabilized. If larger reach, channelization is historic and stable. Artificial structures in or out of reach do not affect natural flow patterns.</p>	<p>Channelization, dredging or 4-wheel activity 40-80% (or less that has not stabilized.) Artificial structures in or out of reach may have slight affect.</p>	<p>Over 80% of reach channelized, dredged or affected by 4-wheelers. Instream habitat greatly altered or removed. Artificial structures have greatly affected flow pattern.</p>																	
<p>Score</p>	<p><b>16</b></p>	<p>20</p>	<p>19</p>	<p>18</p>	<p>17</p>	<p>16</p>	<p>15</p>	<p>14</p>	<p>13</p>	<p>12</p>	<p>11</p>	<p>10</p>	<p>9</p>	<p>8</p>	<p>7</p>	<p>6</p>	<p>5</p>	<p>4</p>	<p>3</p>	<p>2</p>	<p>1</p>	
<p>Comment</p>																						
<p><b>7. Frequency of re-oxygenation zones</b> Use frequency of riffle or bends for category. Rank by quality.</p>		<p>Occurrence of re-oxygenation zones relatively frequent; ratio of distance between areas divided by average stream width &lt;7:1.</p>	<p>Occurrence of re-oxygenation zones infrequent; distance between areas divided by average stream width is 7 - 15.</p>	<p>Occasional re-oxygenation area. The distance between areas divided by average stream width is over 15 and up to 25.</p>	<p>Generally all flat water or flat bedrock; little opportunity for re-oxygenation. Distance between areas divided by average stream width &gt;25.</p>																	
<p>Score</p>	<p><b>15</b></p>	<p>20</p>	<p>19</p>	<p>18</p>	<p>17</p>	<p>16</p>	<p>15</p>	<p>14</p>	<p>13</p>	<p>12</p>	<p>11</p>	<p>10</p>	<p>9</p>	<p>8</p>	<p>7</p>	<p>6</p>	<p>5</p>	<p>4</p>	<p>3</p>	<p>2</p>	<p>1</p>	
<p>Comment</p>																						
<p><b>8. Bank Stability</b> (score each bank) Determine left or right side by facing downstream.</p>		<p>Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems &lt;5% of bank affected.</p>	<p>Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion. If approaching 30% score marginal if banks steep.</p>	<p>Moderately unstable; 30-60 % of bank in reach has areas of erosion; high erosion potential during floods, If approaching 60% score poor if banks steep.</p>	<p>Unstable; many eroded area; raw areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.</p>																	
<p>Score (Left Bank)</p>	<p><b>9</b></p>	<p></p>	<p>10</p>	<p></p>	<p>9</p>	<p></p>	<p>8</p>	<p></p>	<p>7</p>	<p></p>	<p>6</p>	<p>5</p>	<p></p>	<p>4</p>	<p></p>	<p>3</p>	<p>2</p>	<p></p>	<p>1</p>	<p></p>	<p>0</p>	
<p>Score (Right Bank)</p>	<p><b>3</b></p>	<p></p>	<p>10</p>	<p></p>	<p>9</p>	<p></p>	<p>8</p>	<p></p>	<p>7</p>	<p></p>	<p>6</p>	<p>5</p>	<p></p>	<p>4</p>	<p></p>	<p>3</p>	<p>2</p>	<p></p>	<p>1</p>	<p></p>	<p>0</p>	
<p>Comment</p>																						



<b>9. Vegetative Protective</b> (score each bank) includes vegetation from top of bank to base of bank. Determine left or right side by facing downstream.	More than 90% of the bank covered by undisturbed vegetation. All 4 classes (mature trees, understory trees, shrubs, groundcover) are represented and allowed to grow naturally. All plants are native.				70-90% of the bank covered by undisturbed vegetation. One class may not be well represented. Disruption evident but not effecting full plant growth. Non-natives are rare (< 30%)				50-70% of the bank covered by undisturbed vegetation. Two classes of vegetation may not be well represented. Non-native vegetation may be common (30-50%).				Less than 50% of the bank covered by undisturbed vegetation or more than 2 classes are not well represented or most vegetation has been cropped. Non-native vegetation may dominate (> 50%)			
	Score (Left Bank)	<b>5</b>	10	9	8	7	6	5	4	3	2	1	0			
	Score (Right Bank)	<b>5</b>	10	9	8	7	6	5	4	3	2	1	0			
	Comment															
<b>10. Riparian Vegetative Zone Width</b> (score each bank.) Zone begins at top of bank.	Average width of riparian zone > 18 meters. Unpaved footpaths may score 9 if run-off potential is negligible.				Average width of riparian zone 12-18 meters. Score high if areas < 18 meters are small or are minimally disturbed.				Average width of riparian zone 6-11 meters. Score high if areas less than 12 meters are small or are minimally disturbed.				Average width of riparian zone <6 meters. Score high if areas less than 6 meters are small or are minimally disturbed.			
	Score (Left Bank)	<b>9</b>	10	9	8	7	6	5	4	3	2	1	0			
	Score (Right Bank)	<b>9</b>	10	9	8	7	6	5	4	3	2	1	0			
	Comment															

Total Score: **155**      Ecoregion: 71h      Drainage Area: 30 sq. mile

Comparison to Ecoregion Guidelines:       Above       Below  
 If score is below guidelines, result of       Natural Condition       Human Disturbance      Describe:

**Save!**

**HABITAT ASSESSMENT FIELD SHEET - LOW GRADIENT STREAMS**

Complete this habitat assessment if **SQBANK** is collected.

(See Macroinvertebrate SOP - Protocol E for detailed descriptions and rank information)

DWR Station ID:	<b>BBIGB016.2MY</b>		Habitat Assessment By:		
Monitoring Location Name:	STA 1A	Date:	#####	Time:	
Monitoring Location:	Big Bigby Creek below Mt. Joy Road		Field Log No:	57107	
HUC:	6040003	WS Group:	Duck River	Ecoregion:	71h
Habitat Type: LG		QC: <input type="checkbox"/> rnsnst <input type="checkbox"/> rnsnst			

If QA/QC 2 habitats are completed independently, check box above.

See most recent [Macroinvertebrate SOP](#) Protocol D-2 for specific instructions for completing this

**For each habitat parameter, type score or select from blue dropdown box. Add comments if needed in row**

	Optimal	Suboptimal	Marginal	Poor
<b>1. Epifaunal Substrate/ Available Cover</b>	Over 50% of reach has natural, stable habitat for colonization by macroinvertebrates and/or	Natural stable habitat covers 30-50% of stream reach or less than	Natural stable habitat 10-30% of stream reach. Availability less than desirable, substrate frequently disturbed or	Less than 10% stable habitat; lack of habitat is
Score	20   19   18   17   16	15   14   13   12   11	10   9   8   7   6	5   4   3   2   1
Comments				
<b>2. Channel Substrate Characterization</b>	Good mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged	Mixture of soft sand, mud or clay; or substrate is fissured bedrock,	All mud, clay, soft sand or fissured bedrock bottom, little or no root mat, no submerged vegetation present.	Hard-pan clay, conglomerate or
Score	20   19   18   17   16	15   14   13   12   11	10   9   8   7   6	5   4   3   2   1
Comments				
<b>3. Pool Variability</b>	Even mix of large-shallow, large-deep, small-shallow,	Majority of pools are large-deep very	Shallow pools much more prevalent than deep pools.	Majority of pools small-
Score	20   19   18   17   16	15   14   13   12   11	10   9   8   7   6	5   4   3   2   1
Comments				
<b>4. Sediment Deposition</b>	Does this rating match sed. desc. in SS? Sediment deposition affects less than 20% of stream bottom in quiet areas. New deposition on islands and	Some new increase in bar formation, mostly from gravel, sand or fine	Moderate deposition of fine material on old and new bars, 50-80% of bottom affected; sediment deposits at	Heavy deposits of fine material, increased
Score		20   19   18   17   16	15   14   13   12   11	10   9   8   7   6
Comments				
<b>5. Channel Flow Status</b>	If water backed up by obstructions ( beaver dam, log jams, bedrock during low flow) move assessment reach above or below affected area or consider postponing sampling until accurate assessment of stream can be achieved.	Water reaches base of both lower banks throughout reach. Streambed is covered. Minimal productive habitat is exposed.	Water covers > 75% of streambed and/or < 25% of productive habitat is exposed.	Water covers 25-75% of streambed and/or stable habitat is mostly exposed.
Score		20   19   18   17   16	15   14   13   12   11	10   9   8   7   6
Comments	Very little water in channel and mostly present as standing pools. Little or no productive habitat due to lack of water.			
<b>6. Channel Alteration</b>	Channelization, dredging or 4-wheel activity absent or	Channelization, dredging or 4-wheel	Channelization, dredging or 4-wheel activity 40-80% (or less	Over 80% of reach
Score	20   19   18   17   16	15   14   13   12   11	10   9   8   7   6	5   4   3   2   1
Comments				

<p><b>7. Channel Sinuosity</b> (Entire meander sequence not limited to sampling reach)</p>		<p>The bends in the stream increase the stream length 3-4 times longer than if it was in a straight line.</p>	<p>The bends in the stream increase the stream length 2-3 times longer than if it was in a straight line.</p>	<p>The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.</p>	<p>Channel straight; waterway has been channelized for a long</p>																	
Score		20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	
Comments																						
<p><b>8. Bank Stability</b> (score each bank) Determine left or right side by facing downstream.</p>		<p>Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems &lt;5% of bank affected.</p>	<p>Moderately stable; infrequent, small areas of erosion 5-30% of bank eroded. If approaching 30% score marginal if</p>	<p>Moderately unstable; 30-60 % of bank in reach has areas of erosion; high erosion potential during floods, If approaching 60% score poor if banks steep.</p>	<p>Unstable; many eroded area; raw areas frequent along straight</p>																	
Score (Left Bank)		10	9	8	7	6	5	4	3	2	1	0										
Score (Right Bank)		10	9	8	7	6	5	4	3	2	1	0										
Comments																						
<p><b>9. Vegetative Protective</b> (score each bank) includes vegetation from top of bank to base of bank. Determine left or right side by facing downstream.</p>		<p>More than 90% of the bank covered by undisturbed vegetation. All 4 classes (mature trees, understory trees, shrubs, groundcover) are represented and allowed to grow naturally. All plants are native.</p>	<p>70-90% of the bank covered by undisturbed vegetation. One class may not be well represented. Disruption evident but not effecting full plant growth. Non-natives are rare (&lt; 30%).</p>	<p>50-70% of the bank covered by undisturbed vegetation. Two classes of vegetation may not be well represented. Non-native vegetation may be common (30-50%).</p>	<p>Less than 50% of the bank covered by undisturbed vegetation or more than 2 classes are not well represented or most</p>																	
Score (Left Bank)		10	9	8	7	6	5	4	3	2	1	0										
Score (Right Bank)		10	9	8	7	6	5	4	3	2	1	0										
Comments																						
<p><b>10. Riparian Vegetative Zone Width</b> (score each bank.) Zone begins at top of bank.</p>		<p>Average width of riparian zone &gt; 18 meters. Unpaved footpaths may score 9 if run-off potential is negligible.</p>	<p>Average width of riparian zone 12-18 meters. Score high if areas &lt; 18 meters are small or are minimally disturbed.</p>	<p>Average width of riparian zone 6-11 meters. Score high if areas less than 12 meters are small or are minimally disturbed.</p>	<p>Average width of riparian zone &lt;6 meters. Score high if areas less than 6</p>																	
Score (Left Bank)		10	9	8	7	6	5	4	3	2	1	0										
Score (Right Bank)		10	9	8	7	6	5	4	3	2	1	0										
Comments																						

**Total Score:**

**Skipped One**

Ecoregion: 71h

Drainage Area:

30 sq

Comparison to Ecoregion Guidelines:

Above  Below

If score is below guidelines, result of

Natural Condition  Human Disturbance

**Save!**