



Villanova CICD CARE Group
Radnorshire Room in Radnor Township Building
June 20, 2017, 6:00 PM
Agenda

- 1) Pledge of Allegiance
- 2) Adoption of Agenda
- 3) Approval of Minutes
- 4) Chair Report

- 5) Review
 - a. West Lancaster Avenue lot – final follow-up on lighting actions
 - b. Overview of Recent Construction Activity (RT)

- 6) Communication (VU)
 - a. Update on phases and project
 - i. Residence Halls
 - ii. Pedestrian Bridge

- 7) Planning
 - a. Discussion of Radnor Township testing by Rettew
 - i. Main Lot asphalt and soil by Rettew
 - ii. Valley Run by Rettew

- 8) New Business
- 9) Public Comment
- 10) Set Next Meeting Date –

Limited Asphalt and Soil Quality Investigation Report Villanova Parking Lot
<http://www.radnor.com/DocumentCenter/View/16350>

Stream Assessment and Monitoring Headwaters of Valley Run
(located on CARE webpage)
<http://www.radnor.com/923/Villanova-Project-Communication-Review-C>

Note: Villanova's latest Phase Update and Information is located at
<http://designconceptforlancastravenue.com/news-updates/>



TOWNSHIP OF RADNOR
Villanova CICD CARE Group
Minutes of the Meeting of April 6, 2017

The Villanova CICD CARE Group met at 6:30 PM at Villanova University, Charles Widger School of Law Building, Room 101, 299 N. Spring Mill Road, Villanova, PA 19085.

Present

Philip Ahr, Chair
Chris Kovolski
Marilou Smith
Jane Galli
Rick Leonardi
Stephen Norcini, P.E.

Absent

Robert Zienkowski, Vice-Chair

Also Present: members of the public; and, Leah McVeigh, Administrative Assistant.

Phil Ahr called the meeting to order and led the assembly in the Pledge of Allegiance

Adoption of Agenda

Jane Galli made a motion to adopt the agenda, seconded by Steve Norcini. Motion passed 6-0.

Approval of Minutes

Phil Ahr made a motion to adopt, seconded by Jane Galli. Motion passed 6-0.

Chair Report

Phil Ahr welcomed everyone to the meeting, and thanked Villanova University for hosting the meeting. He explained that the meeting is not being aired live on television but is being recorded by Villanova staff, and will be available on the Township website for viewing.

Review

a. West Lancaster Avenue Lot

i. Follow Up on Lighting Report Actions

1. Fixtures – Reported by Steve Norcini – A meeting was held between Steve, the Township Solicitor (John Rice), FXB Lighting, Marilou Smith, Villanova’s Light Consultant and their attorney. It was noted that in Mr. Rice’s opinion VU was always and is now in compliance with the approved plans for the West Lancaster Avenue Lot; however, VU has agreed to put frosting on the lamp lenses, and to install 75 ft of a 6’ high fence along St. Thomas Way. Both of these items will be installed by mid-June. Jane Galli and Rick Leonardi both commented positively regarding these good faith gestures by VU.

2. St. Thomas Way Fence – Phil Ahr explained the location of the fence which VU has agreed to install at St. Thomas Way to help relieve the headlights coming in from the new roadway. Marilou Smith wanted to be clear that the installation of the 75 feet of fence will not eliminate the lights from the

headlights completely and the neighbors may still see headlights. Phil Ahr explained this as well and is hopeful that with the growth of the buffer that together with the fence will help the neighbors with most of the lights. Additional shields have also been put on the line of light fixtures along the back side of the parking lot.

- Randy Maude, resident of Aldwyn Lane, asked if an 8' fence could be considered. Chris Kovolski explained that that the Township Ordinance only allows for a 6' high fence. Discussion continued with Rick Leonard asking if the ordinance could be changed to allow for an 8' high fence along a utility. Steve Norcini explained the steps in having an ordinance changed which would take months. Mr. Kovolski noted that VU is willing to put up 75 feet of 6' fence on Villanova's property.

3. Basketball Court Light – the light has been turned off, and this item is closed on the agenda.

b. Overview of Construction Activity (RT)

- Steve Norcini explained that the currently the Township is only inspecting E & S items (erosion and sediment control) and there are currently no issues or complaints.

c. Status of Radnor Township Testing of Main Lot asphalt and soil by RETTEW approved by the BOC

- Steve Norcini that RETTEW will be performing soil testing on the Main Lot. Locations will be selected, sites staked out, and borings will take place with results of the tests to be received by mid-May.

- Steve Norcini also reported that RETTEW will also be testing Valley Run with a report expected to the Board of Commissioners by mid-June.

- Phil Ahr thanked VU for providing access to their site for this testing to take place.

Communication

a. Update on phases and project

- Marilou Smith provided the group with an update on the project work.
- i. Residence Halls – Excavation is continuing for the residence halls. Three basements have been dug out and foundations and footers poured, and the fourth basement will be dug out and poured by mid-May. Marilou Smith explained how construction will move forward with the project being built west to east.
- Jane Galli asked about anticipated noise during construction which was then discussed.
- ii. Pedestrian Bridge – Bridge construction began the end of February with the removal of the stone caps with crosses and Villanova College engraved in them, which will be stored, and used during the final phase of the bridge project. PENNDOT has started their notifications of upcoming potential lane closures which is their requirement. As the actual dates of the lane closures get closer, VU and Radnor Township will make notifications as well.

Planning

a. Parking Concerns – Graduation

- Phil Ahr asked about VU's plan for graduation in regards to construction. Chris Kovolski explained the plan as VU anticipates many parents and friends during the graduation events, and is addressing and giving as much advance information to visitors as possible.

New Business

a. Rettew Study of Valley Run

- Phil Ahr reported that the Board of Commissioners approved the monitoring of Valley Run downstream from the VU construction project as well as downstream from the Clem Macrone Park project. A sampling visit will occur the 2nd week of May with baseline results to be reported to the BOC in mid-June. In roughly a year the tests will be performed again to determine how these projects are effecting the stream. As a major stream flowing through the residential neighborhoods it is the Township's duty to check the health of the stream to be sure it is not being adversely effected by these projects.
- Rick Leonardi asked why the tests were being done, and asked for acknowledgement that the water from the main lot does communicate with the water on the south side. He is also in complete agreement that these tests are warranted, but would like to see the tests expanded to below ground level as well.
- Jane Galli asked if Rettew would use any portion of the Delaware Riverkeepers Report and she would like this testing to be done in regards to all of the projects in Radnor near streams.

Public Comment

Roberta Winters spoke to the Board regarding hydrological testing and including other groups such as the EAC, the Delaware Riverkeepers Network, and the Radnor Middle School Watershed program. There is a water reporter app available for cell phones which could be a useful app for the public to report stream concerns.

Steve Norcini expressed that if stream testing becomes a requirement, a protocol will need to be established.

Mrs. Winters recommended that Phil Ahr and Steve Norcini go to the EAC and make a recommendation to them that all the streams be tested.

Chris Kovolski explained that currently construction is moving along and asked if we could schedule the next meeting after VU's graduation. The committee discussed and decided to postpone the next meeting until at least June 15. The June meeting date will be determined.

Randy Maude is still seeing out of licenses on cars in the SEPTA lot. He also pointed out the construction along the R-5 tracks and the noise from generators. Steve Norcini explained that the Police enforce the noise and work hours.

Mrs. Winters spoke about including the Township Boards such as the Board of Health and the EAC in issues that are of interest to residents.

Set Next Meeting Date-

- The committee set the next meeting date to Thursday, June 15 (this was changed during the month to Tuesday, June 20).
- The committee discussed the monthly meeting scheduled and determined that during this part of the project it would only be necessary to meet bi-monthly or possibly even quarterly. If a need

April 6, 2017

arose, the committee would return to monthly meetings. The next meeting will be in June and then September, and then most likely November.

There being no further business, the meeting adjourned on a motion duly made and seconded.

Respectfully submitted,



Leah McVeigh

**Stream Assessment and Monitoring
Headwaters of Valley Run**

RETTEW Project No. 101442012/Phase 441

Located In:

Radnor Township
Delaware County
Pennsylvania

Prepared for:

Radnor Township
301 Iven Avenue
Wayne, PA 19087

Prepared by:

RETTEWSM

Natural Sciences Service Area
3020 Columbia Avenue
Lancaster, PA 17603
(717) 394-3721

May 2017

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- IX. PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION
(eMapPA – Valley Run 303(d) listing)

I. ASSESSMENT AND MONITORING DESCRIPTION

ASSESSMENT AND MONITORING DESCRIPTION

In May of 2017, RETTEW Associates, Inc. conducted a stream assessment within the headwaters of Valley Run. RETTEW was hired by Radnor Township to investigate stream conditions concerned with construction activities at Villanova University. *See Section III for Location Map identifying the general area of the assessment.*

The Township wanted a better understanding of how the planned conversion of a 7.3-acre paved parking lot into a parking garage, dormitory and other accessory use buildings might impact Valley Run. With this in mind, RETTEW began its investigation at the subject Villanova University parking lot and terminated the investigation just downstream of Macrone Park near Yorkshire Road.

As part of the assessment process, RETTEW established four sampling locations. They are as follows: *See Section IV for aerial photograph depicting sampling locations.*

1. **RT-1** – Located on the south, downstream side of the SEPTA railbed where the stream exits a culvert from underneath the railbed. This location is also south and downstream of the subject parking lot.
2. **RT-2** – Located just upstream and north of a road culvert underneath South Ithan Avenue in an area referred to as the Aldwyn Triangle.
3. **RT-3** – Located just downstream and south of a road culvert underneath Brooklea Road.
4. **RT-4** – Located within Macrone Park downstream of the tennis courts, and northeast of Yorkshire Road.

To assess current stream conditions, RETTEW utilized the Pennsylvania Department of Environmental Protection's (PADEP) In-stream Comprehensive Evaluation (ICE) Survey protocol on May 9, 2017. The assessment consists of the following:

1. Physical Characterization (in field) – *See Sections VI and VII for field data sheets*
2. In-stream Macroinvertebrate Community (collected in field and identified in lab) – *See Section V for completed macroinvertebrate metrics.*
3. Water Quality Parameters/Chemistry – *See Sections VI and VIII for field and lab results.*
 - a. Temperature, dissolved oxygen, pH and specific conductance (in field)
 - b. Dissolved solids, oil and grease, turbidity, acidity, alkalinity, chloride, nitrate, nitrite, sulfate, total phosphorus, pH, dissolved oxygen, total organic carbon, barium, calcium, iron, magnesium, potassium, sodium, methane, ethane, and ethene (in lab)
 - *Note - Dissolved oxygen and pH (in both field and lab)*

Photographs were also taken at each sampling location. *See Section IV.*

II. RESULTS/FINDINGS

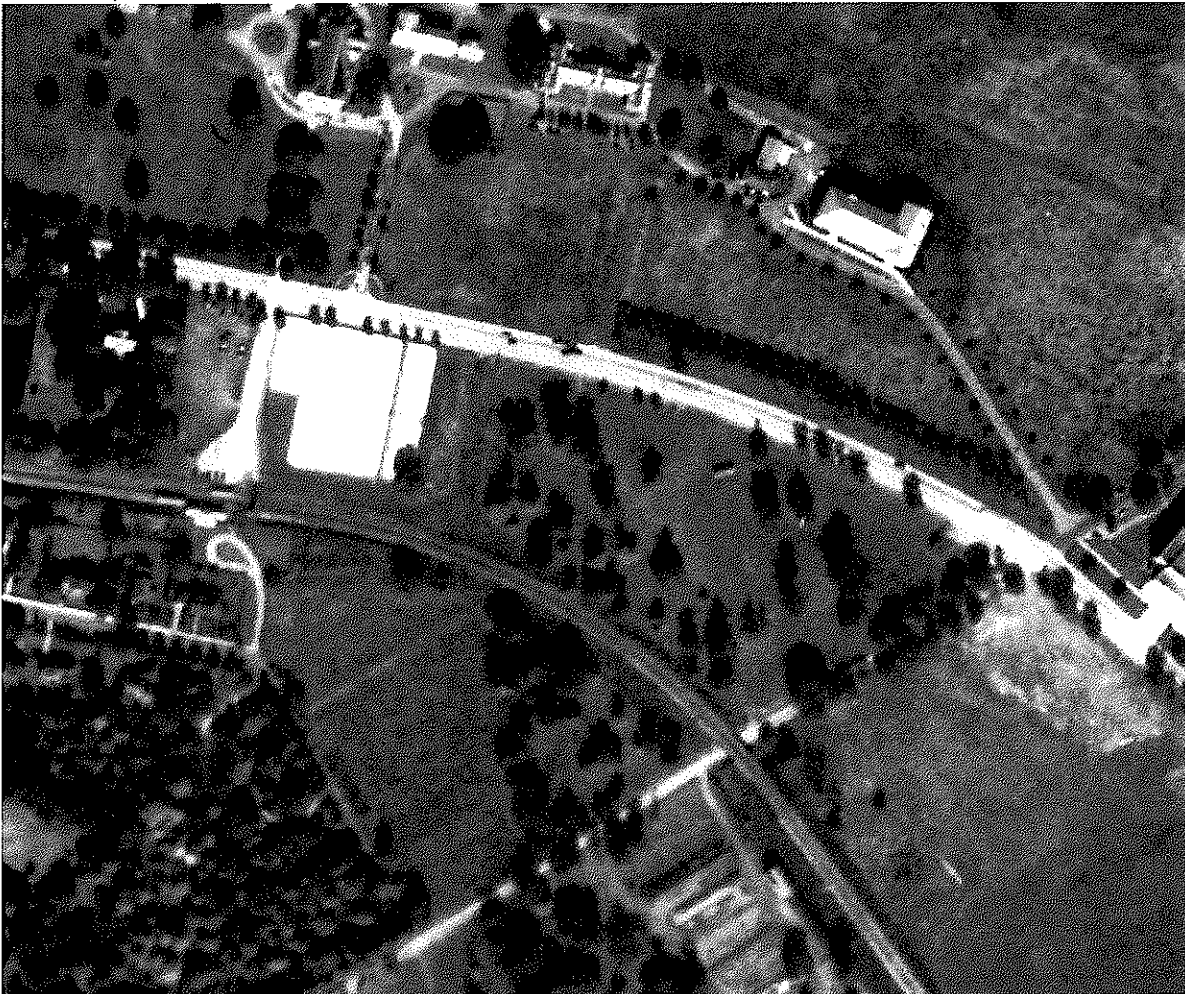
RESULTS/FINDINGS

Sampling locations RT-1 through RT-4 are located within the Valley Run Watershed. According to Pennsylvania Department of Environmental Protection (PADEP) mapping available through the Commonwealth's eMapPA service, the subject parking lot at Villanova University is also considered to be within the Valley Run Watershed. Stormwater management facilities for the proposed University improvements (now under construction) at the parking lot are contributory to Valley Run. Additionally, some 1,128 feet of SEPTA rail (located immediately adjacent and south of the subject parking lot) is within the Valley Run Watershed.

Whether Valley Run exists or existed within the subject parking lot, RETTEW offers the following opinion.

Examinations of historical photographs available through Penn State University's PENN PILOT database provide some interesting clues. As can be seen below in the October 8, 1942 aerial photograph, Route 30 and a railroad (now SEPTA) pre-date the subject parking lot.

October 8, 1942

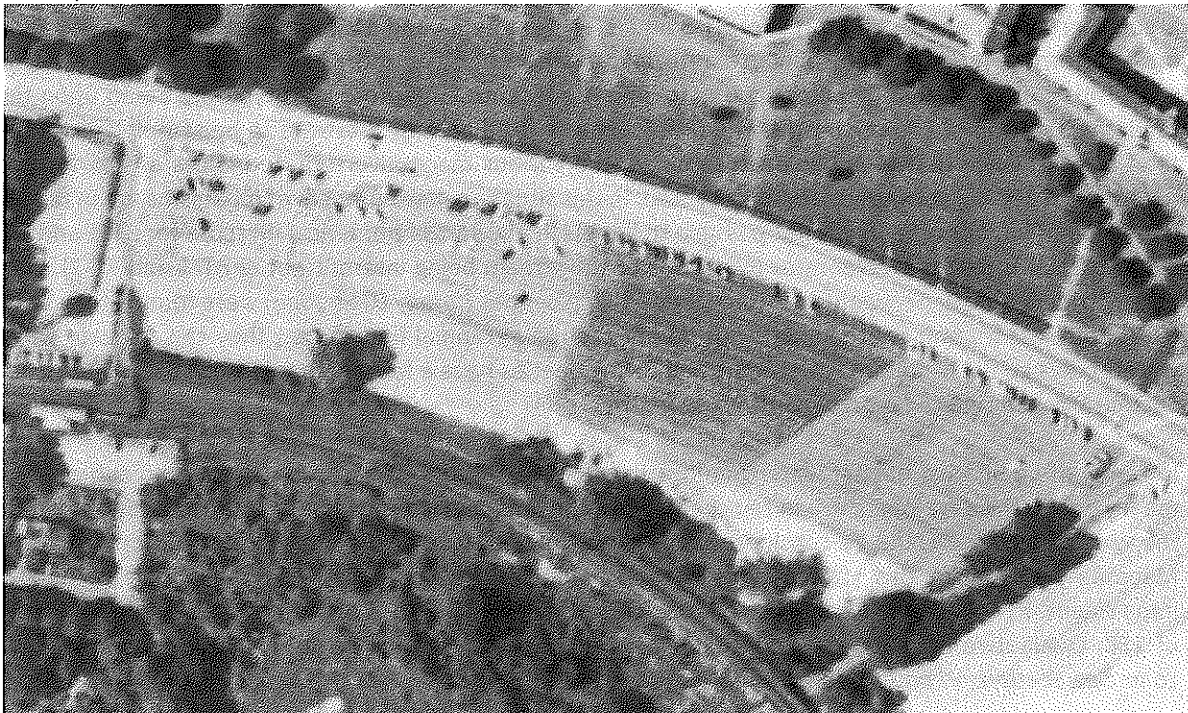


It appears the parking lot area was comprised of pastureland or some sort of grassed area with various trees and shrubs at the time. One can assume stormwater flow generated from upland areas (like Route 30) flowed downslope through what is now the present day parking lot footprint. Though it is impossible to see a clearly defined stream channel within the parking lot area on this 1942 photograph, one can see land use and tree patterns within the Aldwyn Triangle area south of the railroad are much like present day conditions. It would appear the western tree line and land use within the Aldwyn Triangle area in 1942 accommodates a culvert location under the railroad – much like present day conditions. RETTEW assumes there was a culvert underneath the railroad in 1942 more or less where a culvert exists present day. And if a culvert was present in 1942, then there was obviously a reason for it; that being a means of transporting water from the north side of the railroad bed to the south side of the railroad bed.

Present day, there is definitely a stream channel present within the Aldwyn Triangle area and it was very likely present in 1942. However, that does not mean there was a defined stream channel north of the railroad bed in 1942. It stands to reason there was water that needed to travel underneath the railroad bed (north to south), but said water may have been simply stormwater runoff.

By at least June 7, 1958, the parking lot area in question was indeed being used as a parking lot (as can be seen in the aerial photograph below). At this point in time, one can assume the parking lot contained a means of dealing with generated stormwater via piping and inlets. RETTEW assumes these stormwater facilities eventually drained to and through the same spots at the railroad bed similar to the 1942 drainage patterns. If there had been a historic stream channel(s) within the subject parking lot area, it is a fairly safe assumption those streams were incorporated into the stormwater piping systems.

June 7, 1958



Present day, there are not any natural, open stream channels within the subject parking area. Prior to beginning the current construction activity, all stormwater was collected in inlets and transported in piping to drainage points north of the SEPTA rail. A drainage swale then transported flows along the north side of the rail to the culvert at sampling location RT-1. RETTEW is aware that the U.S. Army Corps of Engineers was called upon to make a determination as to whether the Corps considers water within the parking lot's stormwater system a "stream". The Corps does not consider the water within the parking lot's stormwater system to be a stream in the sense they would regulate it as a natural stream channel.

In regards to the health of Valley Run, the PADEP considers the stream currently impaired – meaning the stream does not meet an acceptable water quality standard as per criteria established by the Federal Clean Water Act. In this case, PCBs (polychlorinated biphenyl) are listed as the source/cause of the impairment. PCBs are man-made compounds. Prior to banning in 1979 under the Toxic Substances Control Act, PCBs were used in coolants and lubricants, dust control, pesticides, paints, printing inks, protective coatings, and fire retardants. PCBs can accumulate in sediments and be continuously re-suspended in a stream system. Also worth noting is the PADEP's mapping of Valley Run (the reach of stream assessed) only begins at Brooklea Road (the location of sampling point RT-3). It is likely the PADEP does not consider Valley Run upstream of Brooklea Road to be perennial. ***See Section IX for Pennsylvania Department of Environmental Protection eMapPa – Valley Run 303(d) listing regarding stream impairment.***

In using applicable portions of the PADEP's In-stream Comprehensive Evaluation (ICE) Survey protocol on May 9, 2017, RETTEW arrived at the same conclusion that Valley Run is impaired.

In terms of benthic macroinvertebrates, the type and numbers of organisms found resulted in very low IBI values (Index of Biotic Integrity). Given the time of year sampling occurred, an IBI score of less than 50 is considered "impaired". IBI scores for RT-3 and RT-4 were 14.84 and 31.76 respectively. RETTEW could only perform a modified macroinvertebrate investigation at RT-3 and RT-4 because only 31 and 39 organisms were collected respectively due to limited presence. The protocol is typically based upon the random collection of 200 organisms. The protocol has a fixed area of substrate to be sampled given the time of year. Once that area has been sampled, the various macroinvertebrate indices are performed regardless if 200 organisms have been collected. In this situation, low numbers of organisms are in fact an indication of impairment. It was not possible to generate any sort of numerical IBI score for RT-1 and RT-2 due to lack of macroinvertebrates (likely due to the stream being intermittent at RT-1 and RT-2). Only water striders (*family Gerridae*) and predaceous diving beetles (*family Dytiscidae*) were found at RT-1 and RT-2. Both insect families are aquatic but do not require perennial flow in that they can relocate when waterbodies go dry. Additionally, striders and diving beetles have a fairly high tolerance to pollution. ***See Section V for completed macroinvertebrate metrics.***

In terms of qualitative habitat, sampling locations RT-1, RT-2 and RT-3 can be considered sub-optimal mainly due to the developed, urbanized character of the drainage areas tributary at those locations within the watershed. RT-4 could be considered optimal mainly because of the intact forest buffer within the Macrone Park. Given this stream type, a total habitat score less than 120 would indicate habitat impairment. RT-1 had an overall score of 103, RT-2 a score of 138, RT-3 a score of 119, and RT-4 a score of 168. Qualitative habitat scores consider physical characteristics of the stream channel and riparian zone. ***See Sections VI and VII for field data sheets.***

In terms of water chemistry, collected samples tested high for chlorides and sulfates. RETTEW suggests this is likely due to road salts and deicers being spread on parking lots and roadways within the headwater drainage basin and atmospheric deposition respectively. Sulfates could also be entering the stream

system as a result of pesticide/herbicide applications within the watershed. Studies have demonstrated 55% of chloride in deicers applied during road salting is transported in surface runoff, while the balance infiltrates through soils into groundwater⁽¹⁾.

Chloride can be toxic to many forms of aquatic life. It can increase in toxicity when combined with other cations such as potassium and magnesium. Similarly, sulfate can be determinantal. At higher concentrations, sulfate can assist in releasing metals from sediments and thus changing a stream's alkalinity, which in turn can adversely affect organisms that have a low tolerance for high pH. On a positive note, oil and grease were not detected in any collected samples. ***See Sections VI and VIII for field and lab results***

When considering assessment of a stream for biological impairment, examination of the macroinvertebrate community is a far better indicator of chronic conditions as compared to the occasional, collected water sample tested for its chemical compositions. Given the field investigation that was conducted by RETTEW on May 9, 2017, RETTEW would recommend the reader of this report consider the macroinvertebrate metrics to be the most reliable indicator of stream health at this time.

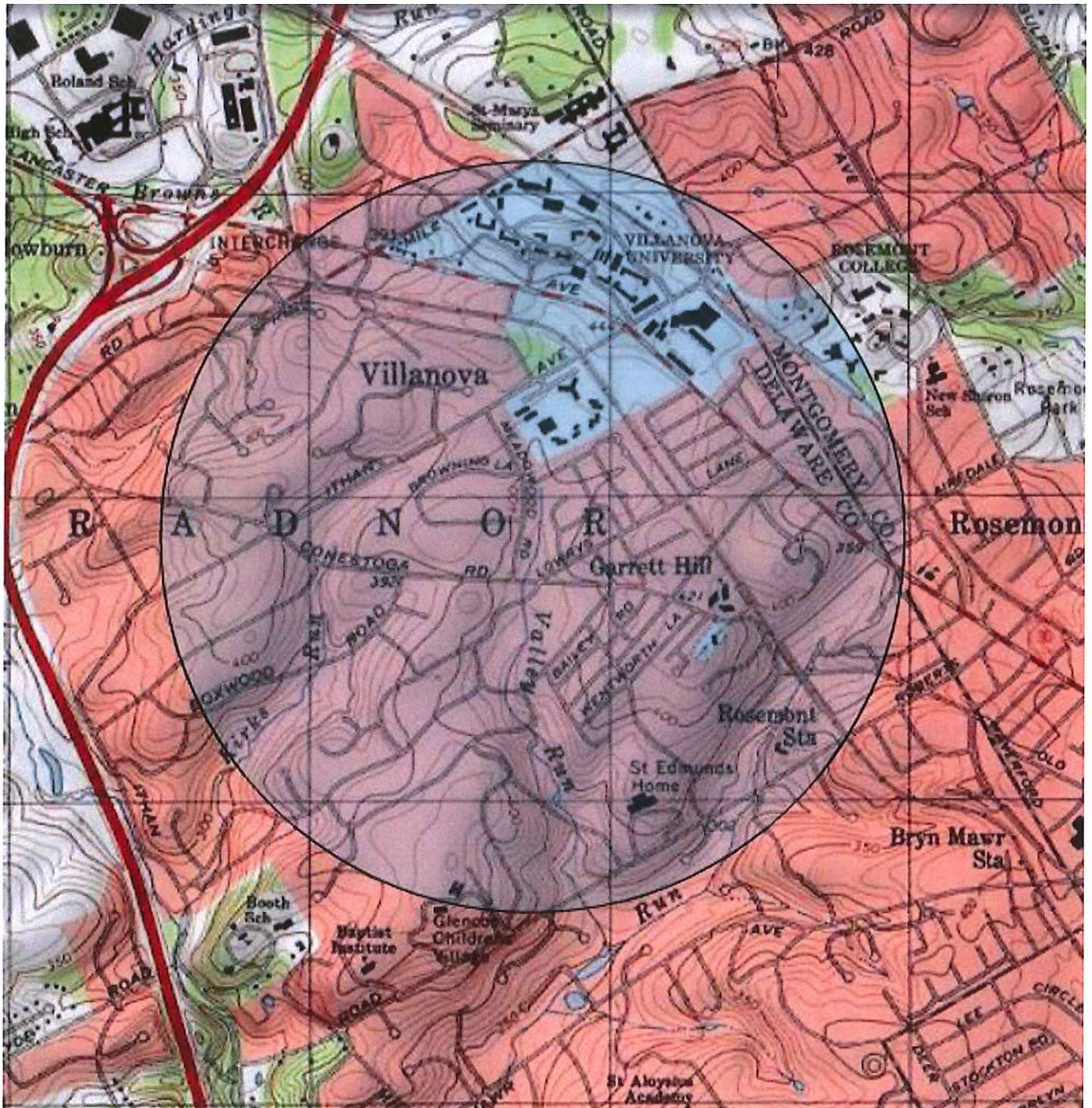
It is important to note Villanova University has gone through a regulated, acceptable land development planning and permitting process; part of which involves securing an NPDES (National Pollutant Discharge Elimination System) permit and approval of a post construction stormwater management plan. Said NPDES permit and post construction stormwater plan was reviewed and issued by the Delaware County Conservation District and the Pennsylvania Department of Environmental Protection. The post construction stormwater plan manages both rate of discharge and quality of the stormwater being discharged. On that basis, long-term, once all stormwater BMPs (Best Management Practices) are installed as per the approved post construction stormwater management plan, the stormwater being discharged from the converted parking lot should be of better quality than it had been when being discharged from the prior existing parking lot (where/when no water quality BMPs existed).

The Township has requested RETTEW perform a second stream assessment in May 2018. The Township wants to be assured re-development of the subject parking lot at Villanova University does not have a contributable, detrimental effect on Valley Run water quality and general stream health.

(1): Church, P.E., and Friesz, P.J., 1993, Effectiveness of highway drainage systems in preventing road-salt contamination of groundwater--Preliminary findings: Transportation Research Board Transportation Research Record 1420, p. 56-64.

III. LOCATION MAP

LOCATION MAP



NORRISTOWN, PENNSYLVANIA – USGS QUAD

IV. PHOTOGRAPHS

SAMPLING LOCATIONS



SAMPLING LOCATION RT-1

Sampling location at 40° 02' 00.52" North x 75° 20' 31.49" West
Elevation approximately 428 feet



Photograph #1 – View of sampling location RT-1 looking north and upstream towards the SEPTA rails. The stream emerges from a culvert underneath the SEPTA railroad bed. Given site conditions as of May 9, 2017, it is RETTEW's opinion the stream is intermittent at this point in the Valley Run Watershed.



Photograph #2 – View of sampling location RT-1 looking southeast and downstream.

SAMPLING LOCATION RT-2

Sampling location at 40° 01' 56.88" North x 75° 20' 31.74" West
Elevation approximately 415 feet



Photograph #3 - View of sampling location RT-2 looking northwest and upstream into the Aldwyn Triangle Area. Given site conditions as of May 9, 2017, it is RETTEW's opinion the stream is intermittent at this point in the Valley Run Watershed.



Photograph #4 – View of sampling location RT-2 looking southeast and downstream. The stream enters a culvert under South Ithan Avenue and is enclosed for several hundred feet in the area of Stanford Hall, Villanova University.

SAMPLING LOCATION RT-3

Sampling location at 40° 01' 44.85" North x 75° 20' 33.41" West
Elevation approximately 399 feet



Photograph #5 – View of sampling location RT-3 looking north and upstream towards Brooklea Road. Given the presence of freshwater shrimp (*Amphipoda*) and sow bugs (*Isopoda*) and surface water assessment work completed by the Pennsylvania Department of Environmental Protection, it is RETTEW's opinion the stream in this location is typically perennial.



Photograph #6 – View of sampling location RT-3 looking south and downstream. The Pennsylvania Department of Environmental Protection identifies this reach of Valley Run as being impaired as per criteria of the Federal Clean Water Act – Section 303(d) relating to Impaired Waters and Total Maximum Daily Loads (TMDLs).

SAMPLING LOCATION RT-4

Sampling location at 40° 01' 27.04" North x 75° 20' 36.46" West
Elevation approximately 388 feet

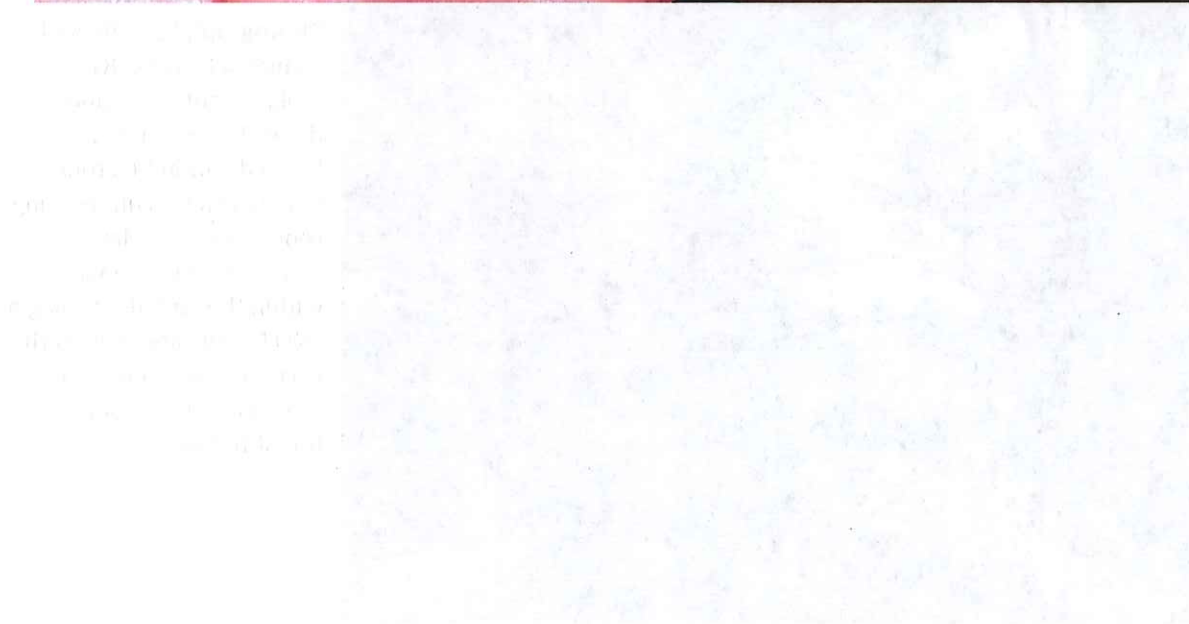


Photograph #7 – View of sampling location RT-4 looking northeast and upstream. Notice the smaller 1st order unnamed tributary entering from the east (right side of photograph). Given site conditions, RETTEW believes the main stem of Valley Run is perennial and the smaller 1st order tributary entering from the east is intermittent and mainly comprised of stormwater.



Photograph #8 – View of sampling location RT-4 looking southwest and downstream. RT-4 is located within Macrone Park which was undergoing renovations on May 9, 2017. There is signage within the park describing a “NO MOW” area within the riparian zone which serves to protect the present forest buffer.

Photograph #9 – Close-up photograph of a Blacknose dace (*Rhinichthys atratulus*) captured at RT-4. These dace were common on May 9, 2017 within this reach of Valley Run though RETTEW did not find them just upstream at RT-3 (Brooklea Road).



V. MACROINVERTEBRATE METRICS

RETTEW Associates, Inc.
 Radnor Township - Valley Run Headwaters

DATE: 5/9/2017

LOCATION: RT-4 Macrone Park

PROJECT NO. & NAME: 101442012, Soils and Stream Assessment

INVESTIGATORS: MAM

ID: MAM

Class/Order/ Suborder	Family	Genus	Quantity	Tolerance Value (HBI)	Trophic Classification	Modified Becks Index	EPT Taxa Richness (TV 0-4)	Total Taxa Richness	Shannon Diversity Index	HBI Index	% Sensitive Individuals (TV 3 or less)
Amphipoda	Gammaridae	<i>Gammarus</i>	3	4	GC			1	0.197	17	
Diptera	Chironomidae		23	6	GC			1	0.311	138	
Diptera	Simuliidae		1	6	FC			1	0.094	6	
Coleoptera	Elmidae		1	5	GC			1	0.094	5	
Ephemeroptera	Ephemeralidae	<i>Ephemeralia</i>	6	1	GC	2	1	1	0.288	6	6
Trichoptera	Hydropsychidae		2	5	FC			1	0.152	10	2
Trichoptera	Leptocentridae		1	4			1	1	0.094	4	1
Trichoptera	Hydroptilidae		2	4	GC		1	1	0.152	8	2
		Metric Values	39			2	3	8	1.383	189	0.28205128
										4.85	28.21

RETTEW Associates, Inc.
 Radnor Township - Valley Run Headwaters

DATE: 5/9/2017

LOCATION: RT-3 Brooklea Road

PROJECT NO. & NAME: 101442012, Soils and Stream Assessment

INVESTIGATORS: MAM ID: MAM

Class/Order/ Suborder	Family	Genus	Quantity	Tolerance Value (HBI)	Trophic Classification	Modified Becks Index	EPT Taxa Richness (TV 0-4)	Total Taxa Richness	Shannon Diversity Index	HBI Index	% Sensitive Individuals (TV 3 or less)
Amphipoda	Gammaridae	<i>Gammarus</i>	2	4	GC			1	0.177	8	
Diptera	Chironomidae		26	6	GC			1	0.148	156	
Isopoda	Asellidae		1	8	GC			1	0.111	8	
Coleoptera	Dytiscidae	<i>Hydroporus</i>	1	5	PR			1	0.111	5	
Odonata	Calopterygidae		1	5	PR			1	0.111	5	
Metric Values			31			0	0	5	0.657	5.87	0.00

RETTEW Associates, Inc.
 Radnor Township - Valley Run Headwaters
 DATE: 5/9/2017
 PROJECT NO. & NAME: 101442012, Soils and Stream Assessment
 INVESTIGATORS: MAM ID: MAM

	Modified Becks Index	EPT Taxa Richness (TV 0-4)	Total Taxa Richness	Shannon Diversity Index	HBI Index	% Sensitive Individuals (TV 3 or less)
RT-4	2	3	8	1.383	4.86	28.21
RT-3	0	0	5	0.657	5.87	0.00

RT-4				
Metric	Standardization Equation	Observed Metric Value	Standardized Metric Score	Adjusted Standardized Metric Score (Maximum = 1.000)
Modified Becks Index	observed value / 38	2	0.053	0.053
EPT Taxa Richness	observed value / 19	3	0.158	0.158
Total Taxa Richness	observed value / 33	8	0.242	0.242
Shannon Diversity Index	observed value/2.86	1.383	0.484	0.484
Hilsenhoff Biotic Index	(10-observed value) / (10-1.89)	4.846	0.635	0.635
Percent Intolerant Individuals	observed value / 84.5	28.21	0.334	0.334
			IBI Score=	31.76

RT-3				
Metric	Standardization Equation	Observed Metric Value	Standardized Metric Score	Adjusted Standardized Metric Score (Maximum = 1.000)
Modified Becks Index	observed value / 38	0	0.000	0.000
EPT Taxa Richness	observed value / 19	0	0.000	0.000
Total Taxa Richness	observed value / 33	5	0.152	0.152
Shannon Diversity Index	observed value/2.86	0.657	0.230	0.230
Hilsenhoff Biotic Index	(10-observed value) / (10-1.89)	5.871	0.509	0.509
Percent Intolerant Individuals	observed value / 84.5	0.00	0.000	0.000
			IBI Score=	14.84

RETTEW Associates, Inc.
 Radnor Township - Valley Run Headwaters
 DATE: 5/9/2017

PROJECT NO. & NAME: 101442012, Soils and Stream Assessment
 INVESTIGATORS: MAM ID: MAM

	Modified Becks Index	EPT Taxa Richness (TV 0-4)	Total Taxa Richness	Shannon Diversity Index	HBI Index	% Sensitive Individuals (TV 3 or less)	IBI Value
RT-4	2	3	8	1.383	4.85	28.21	31.76
RT-3	0	0	5	0.657	5.87	0.00	14.84

IBI Supporting Use Threshold 60-63
 IBI EQ Threshold 80

VI. FLOWING WATERBODY FIELD DATA FORMS

RT-1



COMMONWEALTH OF PENNSYLVANIA
 DEPARTMENT OF ENVIRONMENTAL PROTECTION
 BUREAU OF POINT AND NON-POINT SOURCE MANAGEMENT
FLOWING WATERBODY FIELD DATA FORM

(Information and comments for fields boxed in double lines are required database entries. Other fields are optional for personal use.)

Date-Time-Initials* Example 20040212-0312-XYZ	5-9-17	1222	MAM	Watershed Code (HUC) 020402020505	Stream Code 00781	Ch. 93 Use CWF, MF
	Date	Time	Initials			
Secondary Station ID	PENNA CODE 02040202005189			Surveyed by: MARK A. HETZLER		

*Date as YYYYMMDD, time as military time, and your initials uniquely identify the stream reach.

SWP Watershed 036

Survey Type

(1) Basin Survey, (2) Cause / Effect, (3) Fish Tissue, (4) Instream Comprehensive Evaluation [ICE], (5) Point-of-First-Use, (6) SERA, (7) Antidegradation [Special Protection], (8) Toxics, (10) Use Attainability, (11) WQN, (12) Limestone, (13) Low-gradient [Multihabitat]

Location

County: DELAWARE Municipality: RADNOR TWP Topo Quad: NORRISTOWN

Location Description: RT-1 - PARKING LOT/SEPTA

Land Use (WITHIN 200 METERS)

Residential:	15 %	Commercial:	30 %	Industrial:	5 %	Cropland:	%	Pasture:	%
Abd. Mining:	%	Old Fields:	3 %	Forest:	25 %	Other:	22 %		

Land Use Comments: ADJACENT TO SEPTA TRACK - AT CULVERT DISCHARGE OVERHEAD POWER LINES - MOWED ROW

Canopy cover: open partly shaded mostly shaded fully shaded

Water Quality

Collector-sequence #	Field Meter Readings:					Bottle Notes (N-normal, MNF-metals non-filtered, MF-metals filtered, B-bac't, Others: Indicate)
	Temp (°C)	DO (mg/l)	pH	Cond. (µS/cm)	Alkalinity mg/l	
1.	15.32	10.96	8.83	202	196	136 ORP (V) (OXIDATION/REDUCTION POTENTIAL)
2.			7.7			
3.						

Water Appearance/Odor Comments: (* see bottom of back for common descriptors) LAB READING IN RED
 SIGNIFICANT ALGAE GROWTH

Findings

Not Impaired:	<input type="checkbox"/>	Impaired biology?	<input checked="" type="checkbox"/>	Impaired habitat?	<input checked="" type="checkbox"/>	Is impact localized?	<input type="checkbox"/>	Reevaluate designated use?	<input type="checkbox"/>
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Decision comments. Describe the rationale for your "Not Impaired" or "Impaired" decision; reach locations for use designation reevaluations; special condition comments; etc.:

IBI Score: N/A Total Habitat Score: 103

NO FISH

Macroinvertebrate sampling	
Sampling method: Std. kick screen: <input type="checkbox"/> D-frame: <input checked="" type="checkbox"/> Surber: <input type="checkbox"/> Other: <input type="checkbox"/> method?: _____	
Comments/Abundance Notes: GERRIDAE (WATER STRIDER) COMMON POND SNAILS ALSO PRESENT - COMMON DYTISIDAE (PREDACEOUS DIVING BEETLE) PRESENT	
Habitat Impairment Thresholds	Metric Score
#3 Riff/Run: embeddedness <i>or</i> #3 Glide/Pool: substrate character + #6 Sediment Deposition = 24 or less (20 or less for warm water, low gradient streams) $3 + 4 = 7$	(7)
#9 Condition of Banks + #10 Bank Vegetation = 24 or less (20 or less for warm water, low gradient streams) $18 + 18$	36
Total habitat score 140 or less for forested, cold water, high gradient streams (120 or less for warm water, low gradient streams)	(103)
Habitat Comments: STREAM FLOWS UNDER SEPTA TRUNK VIA CULVERT - PIPE SPRING SEEP-LIKE THAN STREAM-LIKE - VERY VEGETATED CHANNEL - FLOWS THROUGH WETLAND (PEM) DOMINATED BY SENSITIVE FERN	
Special Condition	
Use this block to describe conditions that justify attainment/impairment of stations with IBI score <63 and >53.	
*Common descriptors: Water Odors - none normal sewage petroleum chemical other; Water Surface Oils - none slick sheen globs flecks; Turbidity - clear slight turbid opaque; NPS Pollution - no evidence some potential obvious; Sediment Odors - none normal sewage petroleum chemical anaerobic; Sediment Oils - absent slight moderate profuse; Deposits - none sludge sawdust paper fiber sand relict shells other. Are the undersides of stones deeply embedded black?	



COMMONWEALTH OF PENNSYLVANIA
 DEPARTMENT OF ENVIRONMENTAL PROTECTION
 BUREAU OF POINT AND NON-POINT SOURCE MANAGEMENT
FLOWING WATERBODY FIELD DATA FORM

RT-2

(Information and comments for fields boxed in double lines are required database entries. Other fields are optional for personal use.)

Date-Time-Initials* Example 20040212-0312-XYZ	5-9-17	1145	MAM	Watershed Code (HUC) 020402020505	Stream Code 00781	Ch. 93 Use OWF, MF
	Date	Time	Initials			
Secondary Station ID	PENNA CODE 02040202005189			Surveyed by: MARK A. METZGER		

*Date as YYYYMMDD, time as military time, and your initials uniquely identify the stream reach.

SWP Watershed	036
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Survey Type

(1) Basin Survey, (2) Cause / Effect, (3) Fish Tissue, (4) Instream Comprehensive Evaluation [ICE], (5) Point-of-First-Use, (6) SERA, (7) Antidegradation [Special Protection], (8) Toxics, (10) Use Attainability, (11) WQN, (12) Limestone, (13) Low-gradient [Multihabitat]

Location

County:	DELAWARE	Municipality:	RADNOR TWP	Topo Quad:	MORRISTOWN
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Location Description: RT-2 - ALDWIN TRIANGLE AREA

Land Use (WITHIN 200 METERS)

Residential:	5 %	Commercial:	10 %	Industrial:	15 %	Cropland:	%	Pasture:	%
Abd. Mining:	%	Old Fields:	%	Forest:	30 %	Other:	40 %	LAWN	

Land Use Comments: DEVELOPED AREA - ROADS, PARKING LOT, LAWNS, BUILDINGS AND FORESTED AREA - WETLANDS AREA (PEN) UPSTREAM

Canopy cover: open partly shaded mostly shaded fully shaded FROM SAMPLING LOCATION

Water Quality

Collector-sequence #	Field Meter Readings:					Bottle Notes (N-normal, MNF-metals non-filtered, MF-metals filtered, B-bac't, Others: Indicate)
	Temp (°C)	DO (mg/l)	pH	Cond. (µS/cm)	Alkalinity mg/l	
1.	13.22	13.13	8.90	197	192	101 ORP MV
2.			7.82			
3.						

Water Appearance/Odor Comments: (* see bottom of back for common descriptors)

SEDIMENT (SAND) LADEN, TRASH (BOTTLES, PLASTICS) IN RED

Findings

Not Impaired:	<input type="checkbox"/>	Impaired biology?	<input checked="" type="checkbox"/>	Impaired habitat?	<input checked="" type="checkbox"/>	Is impact localized?	<input type="checkbox"/>	Reevaluate designated use?	<input type="checkbox"/>
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Decision comments. Describe the rationale for your "Not Impaired" or "Impaired" decision; reach locations for use designation reevaluations; special condition comments; etc.:

IBI Score:	N/A	Total Habitat Score:	138
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HEAVILY IMPACTED BY UPSTREAM LANDUSE
 NO FISH

Macroinvertebrate sampling	
Sampling method: Std, kick screen: <input type="checkbox"/> D-frame: <input checked="" type="checkbox"/> Surber: <input type="checkbox"/> Other: <input type="checkbox"/> method?: _____	
Comments/Abundance Notes: <div style="text-align: center; font-size: 1.2em; color: blue;">SEE ICE RESULTS</div>	
Habitat Impairment Thresholds	Metric Score
#3 Riff/Run: embeddedness or #3 Glide/Pool: substrate character + #6 Sediment Deposition = 24 or less (20 or less for warm water, low gradient streams) 5 + 8 = 13	13
#9 Condition of Banks + #10 Bank Vegetation = 24 or less (20 or less for warm water, low gradient streams) 18 + 19 = 37	37
Total habitat score 140 or less for forested, cold water, high gradient streams (120 or less for warm water, low gradient streams)	138
Habitat Comments: → IN A PRISTINE, NATURAL SETTING, THIS STREAM WOULD BE A 1 ST ORDER, COLD WATER STREAM LIKELY INFLUENCED BY SPRING FLOW AND UPSTREAM WETLANDS	
Special Condition	
Use this block to describe conditions that justify attainment/impairment of stations with IBI score <63 and >53.	
<small>*Common descriptors: Water Odors - none normal sewage petroleum chemical other; Water Surface Oils - none slick sheen globs flecks; Turbidity - clear slight turbid opaque; NPS Pollution - no evidence some potential obvious; Sediment Odors - none normal sewage petroleum chemical anaerobic; Sediment Oils - absent slight moderate profuse; Deposits - none sludge sawdust paper fiber sand relict shells other. Are the undersides of stones deeply embedded black?</small>	



COMMONWEALTH OF PENNSYLVANIA
 DEPARTMENT OF ENVIRONMENTAL PROTECTION
 BUREAU OF POINT AND NON-POINT SOURCE MANAGEMENT
FLOWING WATERBODY FIELD DATA FORM

RT-3

(Information and comments for fields boxed in double lines are required database entries. Other fields are optional for personal use.)

Date-Time-Initials* Example 20040212-0312-XYZ	5-9-17	1054	MAM	Watershed Code (HUC) 020402020505	Stream Code 00781	Ch. 93 Use LWF, MF
	Date	Time	Initials			
Secondary Station ID	REACH CODE 02040202005189			Surveyed by: MARIL A. METZLER		

*Date as YYYYMMDD, time as military time, and your initials uniquely identify the stream reach.

SWP Watershed 036

Survey Type

(1) Basin Survey, (2) Cause / Effect, (3) Fish Tissue, (4) Instream Comprehensive Evaluation [ICE], (5) Point-of-First-Use, (6) SERA, (7) Antidegradation [Special Protection], (8) Toxics, (10) Use Attainability, (11) WQN, (12) Limestone, (13) Low-gradient [Multihabitat]

Location

County: DELAWARE Municipality: RADNOR TWP Topo Quad: NORRISTOWN

Location Description: RT-3 - BROOKLEA ROAD

Land Use

Residential:	100 %	Commercial:	%	Industrial:	%	Cropland:	%	Pasture:	%
Abd. Mining:	%	Old Fields:	%	Forest:	%	Other:	%		

Land Use Comments: WITHIN RESIDENTIAL COMMUNITY - HOWEVER SIGNIFICANT LAWN AREAS W/ TREES / SHRUBS

Canopy cover: open partly shaded mostly shaded fully shaded

Water Quality

Collector-sequence #	Field Meter Readings:					Bottle Notes (N-normal, MNF-metals non-filtered, MF-metals filtered, B-bac't, Others: indicate)
	Temp (°C)	DO (mg/l)	pH	Cond. (µS/cm)	Alkalinity mg/l	
1.	12.49	11.42	8.73	168	184	107 ORP mV
2.			7.71			
3.						

Water Appearance/Odor Comments: (* see bottom of back for common descriptors)

ENTRENCHED CHANNEL, SEDIMENT PATCH (SANDS, SILTS) LAB PENDING IN RED

Findings

Not Impaired:	<input type="checkbox"/>	Impaired biology?	<input checked="" type="checkbox"/>	Impaired habitat?	<input checked="" type="checkbox"/>	Is impact localized?	<input type="checkbox"/>	Reevaluate designated use?	<input type="checkbox"/>
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Decision comments. Describe the rationale for your "Not Impaired" or "Impaired" decision; reach locations for use designation reevaluations; special condition comments; etc.:

IBI Score: 14.84 Total Habitat Score: 119

No Fish

Macroinvertebrate sampling

Sampling method: Std. kick screen: D-frame: Surber: Other: method?: _____

Comments/Abundance Notes:

SEE ICE RESULTS

Habitat Impairment Thresholds	Metric Score
#3 Riff/Run: embeddedness <u>or</u> #3 Glide/Pool: substrate character + #6 Sediment Deposition = 24 or less (20 or less for warm water, low gradient streams) $9 + 8 = 17$	(17)
#9 Condition of Banks + #10 Bank Vegetation = 24 or less (20 or less for warm water, low gradient streams) $14 + 17 =$	31
Total habitat score 140 or less for forested, cold water, high gradient streams (120 or less for warm water, low gradient streams)	(119)

Habitat Comments:

SIGNIFICANT STORMWATER DISCHARGES TO STREAM
CHANNEL HEAVILY INFLUENCED BY STORMWATER

Special Condition

Use this block to describe conditions that justify attainment/impairment of stations with IBI score <63 and >53.

*Common descriptors: Water Odors - none normal sewage petroleum chemical other; Water Surface Oils - none slick sheen globs flecks; Turbidity - clear slight turbid opaque; NPS Pollution - no evidence some potential obvious; Sediment Odors - none normal sewage petroleum chemical anaerobic; Sediment Oils - absent slight moderate profuse; Deposits - none sludge sawdust paper fiber sand relict shells other. Are the undersides of stones deeply embedded black?



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FLOWING WATERBODY FIELD DATA FORM

RT-4

(Information and comments for fields boxed in double lines are required database entries. Other fields are optional for personal use.)

Date-Time-Initials* Example 20040212-0312-XYZ	5-9-17	0945	MAM	Watershed Code (HUC) 020402020505	Stream Code 00781	Ch. 93 Use LWF, MF
	Date	Time	Initials			
Secondary Station ID	PENNS CODE 02040202005189			Surveyed by: Mark A. Metzler		

*Date as YYYYMMDD, time as military time, and your initials uniquely identify the stream reach. SWP Watershed 036

Survey Type

(1) Basin Survey, (2) Cause / Effect, (3) Fish Tissue, (4) Instream Comprehensive Evaluation [ICE], (5) Point-of-First-Use, (6) SERA, (7) Antidegradation [Special Protection], (8) Toxics, (10) Use Attainability, (11) WQN, (12) Limestone, (13) Low-gradient [Multihabitat]

Location

County: DELAWARE Municipality: RADNOR TWP Topo Quad: NORRISTOWN

Location Description: RT-4 - MACRONE PARK
 NEAR CONFLUENCE W/ SMALLER DRAINAGE WITHIN PARK

Land Use

Residential:	50 %	Commercial:	%	Industrial:	%	Cropland:	%	Pasture:	%
Abd. Mining:	%	Old Fields:	%	Forest:	%	Other:	50 %	PARK	

Land Use Comments: MACRONE PARK

Canopy cover: open partly shaded mostly shaded fully shaded

Water Quality

Collector-sequence #	Field Meter Readings:					Bottle Notes (N-normal, MNF-metals non-filtered, MF-metals filtered, B-bac't, Others: indicate)
	Temp (°C)	DO (mg/l)	pH	Cond. (µS/cm)	Alkalinity mg/l	
1.	10.63	10.00	9.15	0.911	-	145 ORP mV
2.	< 12.2°C	FOR TIME OF YEAR	7.3	91	114	
3.	WOULD INDICATE COLD WATER FISHERY					

Water Appearance/Odor Comments: (* see bottom of back for common descriptors) LAB REMAINS IN RED
 CLEAR
 FAIRLY SEDIMENT FREE SUBSTRATE

Findings

Not Impaired:	<input type="checkbox"/>	Impaired biology?	<input checked="" type="checkbox"/>	Impaired habitat?	<input checked="" type="checkbox"/>	Is impact localized?	<input type="checkbox"/>	Reevaluate designated use?	<input type="checkbox"/>
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Decision comments. Describe the rationale for your "Not Impaired" or "Impaired" decision; reach locations for use designation reevaluations; special condition comments; etc.:

IBI Score: 31.76 Total Habitat Score: 168

BLACKNOSE DACE (RHINICATHYS ATRATULUS) PRESENT

Macroinvertebrate sampling

Sampling method: Std. kick screen: D-frame: Surber: Other: method?: _____

Comments/Abundance Notes:

SEE ICE RESULTS

Habitat Impairment Thresholds	Metric Score
#3 Riff/Run: embeddedness <u>or</u> #3 Glide/Pool: substrate character + #6 Sediment Deposition = 24 or less (20 or less for warm water, low gradient streams) 15 + 14	29
#9 Condition of Banks + #10 Bank Vegetation = 24 or less (20 or less for warm water, low gradient streams) 11 + 13	24
Total habitat score 140 or less for forested, cold water, high gradient streams (120 or less for warm water, low gradient streams)	168

Habitat Comments:

WITH PARK SETTING - THERE IS A NO-MOW ZONE THAT PRESERVES THE FOREST BUFFER IN THE RIPARIAN ZONE. CHANNEL IS ENTRENCHED AND SHOWS SIGNS OF FLASHY, STORMWATER FLOWS.

Special Condition

Use this block to describe conditions that justify attainment/impairment of stations with IBI score <63 and >53.

*Common descriptors: Water Odors - none normal sewage petroleum chemical other; Water Surface Oils - none slick sheen globs flecks; Turbidity - clear slight turbid opaque; NPS Pollution - no evidence some potential obvious; Sediment Odors - none normal sewage petroleum chemical anaerobic; Sediment Oils - absent slight moderate profuse; Deposits - none sludge sawdust paper fiber sand relict shells other. Are the undersides of stones deeply embedded black?

VII. WATER QUALITY NETWORK – HABITAT ASSESSMENT FORMS



SCORE 103

**WATER QUALITY NETWORK
HABITAT ASSESSMENT**

REALM CODE 02040202005189
STR CODE/RMI 00781

WATERBODY NAME HEADWATERS OF VALLEY CREEK

STATION NUMBER RT-1 LOCATION PARKING LOT / SEPTA

DATE 5-9-17 TIME 1222

AQUATIC ECOREGION _____ COUNTY DELAWARE

INVESTIGATORS MARK A. METZLER

FORM COMPLETED BY SAME RIFLE/RUN PREVALENCE

Habitat Parameter	Category			
	Optimal	Suboptimal	Marginal	Poor
1. Instream Cover (Fish) SCORE <u>6</u>	Greater than 50% mix of boulder, cobble, submerged logs, undercut banks, or other stable habitat. 20 19 18 17 16	30-50% mix of boulder, cobble, or other stable habitat; adequate habitat. 15 14 13 12 11	10-30% mix of boulder, cobble, or other stable habitat; habitat availability less than desirable. 10 9 8 7 6	Less than 10% mix of boulder, cobble, or other stable habitat; lack of habitat is obvious. 5 4 3 2 1
2. Epifaunal Substrate SCORE <u>4</u>	Well-developed riffle and run, riffle is as wide as stream and length extends two times the width of stream; abundance of cobble. 20 19 18 17 16	Riffle is as wide as stream but length is less than two times width; abundance of cobble; boulders and gravel common. 15 14 13 12 11	Run area may be lacking; riffle not as wide as stream and its length is less than two times the stream width; gravel or large boulders and bedrock prevalent; some cobble present. 10 9 8 7 6	Riffles or run virtually nonexistent; large boulders and bedrock prevalent; cobble lacking. 5 4 3 2 1
3. Embeddedness SCORE <u>3</u>	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. 20 19 18 17 16	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment. 15 14 13 12 11	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment. 10 9 8 7 6	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment. 5 4 3 2 1
4. Velocity/Depth Regimes SCORE <u>5</u>	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). 20 19 18 17 16	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes). 15 14 13 12 11	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score lower than if missing other regimes). 10 9 8 7 6	Dominated by 1 velocity/depth regime (usually slow-deep). 5 4 3 2 1
5. Channel Alteration SCORE <u>6</u>	No channelization or dredging present. 20 19 18 17 16	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present. 15 14 13 12 11	New embankments present on both banks; and 40-80% of stream reach channelized and disrupted. 10 9 8 7 6	Banks shored gabion or cement; over 80% of the stream reach channelized and disrupted. 5 4 3 2 1

Total Side 1 24

SPRING SEEP-LIKE

RIFFLE/RUN PREVALENCE

Habitat Parameter	Category			
	Optimal	Suboptimal	Marginal	Poor
6. Sediment Deposition SCORE <u>4</u>	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition. 20 19 18 17 16	Some new increase in bar formation, mostly from coarse gravel; 5-30% of the bottom affected; slight deposition in pools. 15 14 13 12 11	Moderate deposition of new gravel, coarse sand on old and new bars; 30-50% of the bottom affected; sediment deposits at obstruction, constriction, and bends; moderate deposition of pools prevalent. 10 9 8 7 6	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition. 5 <u>4</u> 3 2 1
7. Frequency of Riffles SCORE <u>5</u>	Occurrence of riffles relatively frequent; distance between riffles divided by the width of the stream equals 5 to 7; variety of habitat. 20 19 18 17 16	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream equals 7 to 15. 15 14 13 12 11	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25. 10 9 8 7 6	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is between ratio >25. <u>5</u> 4 3 2 1
8. Channel Flow Status SCORE <u>17</u>	Water reaches base of both lower banks and minimal amount of channel substrate is exposed. 20 19 18 <u>17</u> 16	Water fills > 75% of the available channel; or <25% of channel substrate is exposed. 15 14 13 12 11	Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed. 10 9 8 7 6	Very little water in channel and mostly present as standing pools. 5 4 3 2 1
9. Condition of Banks SCORE <u>18</u>	Banks stable; no evidence of erosion or bank failure. 20 19 <u>18</u> 17 16	Moderately stable; infrequent, small areas of erosion mostly healed over. 15 14 13 12 11	Moderately unstable; up to 60% of banks in reach have areas of erosion. 10 9 8 7 6	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; on side slopes, 60-100% of bank has erosional scars. 5 4 3 2 1
10. Bank Vegetative Protection SCORE <u>18</u>	More than 90% of the streambank surface covered by vegetation. 20 19 <u>18</u> 17 16	70-90% of the streambank surface covered by vegetation. 15 14 13 12 11	50-70% of the streambank surfaces covered by vegetation. 10 9 8 7 6	Less than 50% of the streambank surface covered by vegetation. 5 4 3 2 1
11. Grazing or Other Disruptive Pressure SCORE <u>11</u>	Vegetative disruption, through grazing or mowing, minimal or not evident; almost all plants allowed to grow naturally. 20 19 18 17 16	Disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining. 15 14 13 12 <u>11</u>	Disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining. 10 9 8 7 6	Disruption of vegetation is very high; vegetation has been removed to 2 inches or less in average stubble height. 5 4 3 2 1
12. Riparian Vegetative Zone Width SCORE <u>6</u>	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone. 20 19 18 17 16	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally. 15 14 13 12 11	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal. 10 9 8 7 <u>6</u>	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities. 5 4 3 2 1
Total Side 2 <u>79</u>				
Total Score <u>103</u>				



Score 138

**WATER QUALITY NETWORK
HABITAT ASSESSMENT**

REACH CODE
02040202005189
STR CODE/RMI 00781

WATERBODY NAME HEADWATERS OF VALLEY CREEK

STATION NUMBER RT-2 LOCATION ALDWIN TRIANGLE AREA

DATE 5-9-17 TIME 11:45

AQUATIC ECOREGION _____ COUNTY DELAWARE

INVESTIGATORS MARK A. METZLER

FORM COMPLETED BY SAME RIFFLE/RUN PREVALENCE

Habitat Parameter	Category																			
	Optimal					Suboptimal					Marginal					Poor				
1. Instream Cover (Fish)	Greater than 50% mix of boulder, cobble, submerged logs, undercut banks, or other stable habitat.					30-50% mix of boulder, cobble, or other stable habitat; adequate habitat.					10-30% mix of boulder, cobble, or other stable habitat; habitat availability less than desirable.					Less than 10% mix of boulder, cobble, or other stable habitat; lack of habitat is obvious.				
SCORE <u>5</u>	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
2. Epifaunal Substrate	Well-developed riffle and run, riffle is as wide as stream and length extends two times the width of stream; abundance of cobble.					Riffle is as wide as stream but length is less than two times width; abundance of cobble; boulders and gravel common.					Run area may be lacking; riffle not as wide as stream and its length is less than two times the stream width; gravel or large boulders and bedrock prevalent; some cobble present.					Riffles or run virtually nonexistent; large boulders and bedrock prevalent; cobble lacking.				
SCORE <u>11</u>	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
3. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment.					Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.					Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.					Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.				
SCORE <u>5</u>	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
4. Velocity/Depth Regimes	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 than if missing other regimes).					Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score lower than if missing other regimes).					Dominated by 1 velocity/depth regime (usually slow-deep).				
SCORE <u>8</u>	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
5. Channel Alteration	No channelization or dredging present.					Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.					New embankments present on both banks; and 40-80% of stream reach channelized and disrupted.					Banks shored gabion or cement; over 80% of the stream reach channelized and disrupted.				
SCORE <u>12</u>	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Total Side 1 41

Seems intermittent

RIFFLE/RUN PREVALENCE

Habitat Parameter	Category			
	Optimal	Suboptimal	Marginal	Poor
6. Sediment Deposition SCORE <u>8</u>	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition. 20 19 18 17 16	Some new increase in bar formation, mostly from coarse gravel; 5-30% of the bottom affected; slight deposition in pools. 15 14 13 12 11	Moderate deposition of new gravel, coarse sand on old and new bars; 30-50% of the bottom affected; sediment deposits at obstruction, constriction, and bends; moderate deposition of pools prevalent. 10 9 8 7 6	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition. 5 4 3 2 1
7. Frequency of Riffles SCORE <u>10</u>	Occurrence of riffles relatively frequent; distance between riffles divided by the width of the stream equals 5 to 7; variety of habitat. 20 19 18 17 16	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream equals 7 to 15. 15 14 13 12 11	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25. 10 9 8 7 6	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is between ratio >25. 5 4 3 2 1
8. Channel Flow Status SCORE <u>14</u>	Water reaches base of both lower banks and minimal amount of channel substrate is exposed. 20 19 18 17 16	Water fills > 75% of the available channel; or <25% of channel substrate is exposed. 15 14 13 12 11	Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed. 10 9 8 7 6	Very little water in channel and mostly present as standing pools. 5 4 3 2 1
9. Condition of Banks SCORE <u>18</u>	Banks stable; no evidence of erosion or bank failure. 20 19 18 17 16	Moderately stable; infrequent, small areas of erosion mostly healed over. 15 14 13 12 11	Moderately unstable; up to 60% of banks in reach have areas of erosion. 10 9 8 7 6	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; on side slopes, 60-100% of bank has erosional scars. 5 4 3 2 1
10. Bank Vegetative Protection SCORE <u>19</u>	More than 90% of the streambank surface covered by vegetation. 20 19 18 17 16	70-90% of the streambank surface covered by vegetation. 15 14 13 12 11	50-70% of the streambank surfaces covered by vegetation. 10 9 8 7 6	Less than 50% of the streambank surface covered by vegetation. 5 4 3 2 1
11. Grazing or Other Disruptive Pressure SCORE <u>12</u>	Vegetative disruption, through grazing or mowing, minimal or not evident; almost all plants allowed to grow naturally. 20 19 18 17 16	Disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining. 15 14 13 12 11	Disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining. 10 9 8 7 6	Disruption of vegetation is very high; vegetation has been removed to 2 inches or less in average stubble height. 5 4 3 2 1
12. Riparian Vegetative Zone Width SCORE <u>16</u>	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone. 20 19 18 17 16	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally. 15 14 13 12 11	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal. 10 9 8 7 6	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities. 5 4 3 2 1
Total Side 2 <u>92</u>				
Total Score <u>138</u>				



Score 119

**WATER QUALITY NETWORK
HABITAT ASSESSMENT**

RENK CODE
02040202005789
STR CODE/RMI 00781

WATERBODY NAME HEADWATERS OF VALLEY CREEK STR CODE/RMI 00781

STATION NUMBER RT-3 LOCATION BROOKLET ROAD

DATE 5-9-17 TIME 1054

AQUATIC ECOREGION _____ COUNTY DELAWARE

INVESTIGATORS MARK A. METZLER

FORM COMPLETED BY SAME RIFFLE/RUN PREVALENCE

Habitat Parameter	Category			
	Optimal	Suboptimal	Marginal	Poor
1. Instream Cover (Fish) SCORE <u>9</u>	Greater than 50% mix of boulder, cobble, submerged logs, undercut banks, or other stable habitat. 20 19 18 17 16	30-50% mix of boulder, cobble, or other stable habitat; adequate habitat. 15 14 13 12 11	10-30% mix of boulder, cobble, or other stable habitat; habitat availability less than desirable. 10 <u>9</u> 8 7 6	Less than 10% mix of boulder, cobble, or other stable habitat; lack of habitat is obvious. 5 4 3 2 1
2. Epifaunal Substrate SCORE <u>10</u>	Well-developed riffle and run, riffle is as wide as stream and length extends two times the width of stream; abundance of cobble. 20 19 18 17 16	Riffle is as wide as stream but length is less than two times width; abundance of cobble; boulders and gravel common. 15 14 13 12 11	Run area may be lacking; riffle not as wide as stream and its length is less than two times the stream width; gravel or large boulders and bedrock prevalent; some cobble present. <u>10</u> 9 8 7 6	Riffles or run virtually nonexistent; large boulders and bedrock prevalent; cobble lacking. 5 4 3 2 1
3. Embeddedness SCORE <u>9</u>	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. 20 19 18 17 16	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment. 15 14 13 12 11	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment. 10 <u>9</u> 8 7 6	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment. 5 4 3 2 1
4. Velocity/Depth Regimes SCORE <u>10</u>	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). 20 19 18 17 16	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes). 15 14 13 12 11	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score lower than if missing other regimes). <u>10</u> 9 8 7 6	Dominated by 1 velocity/depth regime (usually slow-deep). 5 4 3 2 1
5. Channel Alteration SCORE <u>7</u>	No channelization or dredging present. 20 19 18 17 16	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present. 15 14 13 12 11	New embankments present on both banks; and 40-80% of stream reach channelized and disrupted. 10 9 8 <u>7</u> 6	Banks shored gabion or cement; over 80% of the stream reach channelized and disrupted. 5 4 3 2 1
Total Side 1 <u>45</u>				

RIFFLE/RUN PREVALENCE

Habitat Parameter	Category			
	Optimal	Suboptimal	Marginal	Poor
6. Sediment Deposition SCORE <u>8</u>	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition. 20 19 18 17 16	Some new increase in bar formation, mostly from coarse gravel; 5-30% of the bottom affected; slight deposition in pools. 15 14 13 12 11	Moderate deposition of new gravel, coarse sand on old and new bars; 30-50% of the bottom affected; sediment deposits at obstruction, constriction, and bends; moderate deposition of pools prevalent. 10 9 <u>8</u> 7 6	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition. 5 4 3 2 1
7. Frequency of Riffles SCORE <u>8</u>	Occurrence of riffles relatively frequent; distance between riffles divided by the width of the stream equals 5 to 7; variety of habitat. 20 19 18 17 16	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream equals 7 to 15. 15 14 13 12 11	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25. 10 9 <u>8</u> 7 6	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is between ratio >25. 5 4 3 2 1
8. Channel Flow Status SCORE <u>13</u>	Water reaches base of both lower banks and minimal amount of channel substrate is exposed. 20 19 18 17 16	Water fills > 75% of the available channel; or <25% of channel substrate is exposed. 15 14 <u>13</u> 12 11	Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed. 10 9 8 7 6	Very little water in channel and mostly present as standing pools. 5 4 3 2 1
9. Condition of Banks SCORE <u>14</u>	Banks stable; no evidence of erosion or bank failure, 20 19 18 17 16	Moderately stable; infrequent, small areas of erosion mostly healed over. 15 <u>14</u> 13 12 11	Moderately unstable; up to 60% of banks in reach have areas of erosion. 10 9 8 7 6	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; on side slopes, 60-100% of bank has erosional scars. 5 4 3 2 1
10. Bank Vegetative Protection SCORE <u>17</u>	More than 90% of the streambank surface covered by vegetation. 20 19 18 <u>17</u> 16	70-90% of the stream-bank surface covered by vegetation. 15 14 13 12 11	50-70% of the stream-bank surfaces covered by vegetation. 10 9 8 7 6	Less than 50% of the streambank surface covered by vegetation. 5 4 3 2 1
11. Grazing or Other Disruptive Pressure SCORE <u>8</u>	Vegetative disruption, through grazing or mowing, minimal or not evident; almost all plants allowed to grow naturally. 20 19 18 17 16	Disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining. 15 14 13 12 11	Disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining. 10 9 <u>8</u> 7 6	Disruption of vegetation is very high; vegetation has been removed to 2 inches or less in average stubble height. 5 4 3 2 1
12. Riparian Vegetative Zone Width SCORE <u>6</u>	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone. 20 19 18 17 16	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally. 15 14 13 12 11	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal. 10 9 8 7 <u>6</u>	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities. 5 4 3 2 1
Total Side 2 <u>74</u>				
Total Score <u>119</u>				



Score 168

**WATER QUALITY NETWORK
HABITAT ASSESSMENT**

REACH CODE
02040202005789
STR CODE/RMI 00781

WATERBODY NAME HEADWATERS OF VALLEY CREEK

STATION NUMBER RT-4 LOCATION MACRONE PARK

DATE 5-9-17 TIME 0945

AQUATIC ECOREGION _____ COUNTY DELAWARE

INVESTIGATORS MARK A. METZLER

FORM COMPLETED BY SAME **RIFFLE/RUN PREVALENCE**

Habitat Parameter	Category																			
	Optimal					Suboptimal					Marginal					Poor				
1. Instream Cover (Fish) SCORE <u>13</u>	Greater than 50% mix of boulder, cobble, submerged logs, undercut banks, or other stable habitat.					30-50% mix of boulder, cobble, or other stable habitat; adequate habitat.					10-30% mix of boulder, cobble, or other stable habitat; habitat availability less than desirable.					Less than 10% mix of boulder, cobble, or other stable habitat; lack of habitat is obvious.				
	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
2. Epifaunal Substrate SCORE <u>15</u>	Well-developed riffle and run, riffle is as wide as stream and length extends two times the width of stream; abundance of cobble.					Riffle is as wide as stream but length is less than two times width; abundance of cobble; boulders and gravel common.					Run area may be lacking; riffle not as wide as stream and its length is less than two times the stream width; gravel or large boulders and bedrock prevalent; some cobble present.					Riffles or run virtually nonexistent; large boulders and bedrock prevalent; cobble lacking.				
	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
3. Embeddedness SCORE <u>15</u>	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment.					Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.					Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.					Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.				
	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
4. Velocity/Depth Regimes SCORE <u>15</u>	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 than if missing other regimes).					Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score lower than if missing other regimes).					Dominated by 1 velocity/depth regime (usually slow-deep).				
	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
5. Channel Alteration SCORE <u>14</u>	No channelization or dredging present.					Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.					New embankments present on both banks; and 40-80% of stream reach channelized and disrupted.					Banks shored gabion or cement; over 80% of the stream reach channelized and disrupted.				
	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Total Side 1 <u>72</u>																				

RIFFLE/RUN PREVALENCE

Habitat Parameter	Category																			
	Optimal					Suboptimal					Marginal					Poor				
6. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.					Some new increase in bar formation, mostly from coarse gravel; 5-30% of the bottom affected; slight deposition in pools.					Moderate deposition of new gravel, coarse sand on old and new bars; 30-50% of the bottom affected; sediment deposits at obstruction, constriction, and bends; moderate deposition of pools prevalent.					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 <u>14</u>	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
7. Frequency of Riffles	Occurrence of riffles relatively frequent; distance between riffles divided by the width of the stream equals 5 to 7; variety of habitat.					Occurrence of riffles infrequent; distance between riffles divided by the width of the stream equals 7 to 15.					Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.					Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is between ratio >25.				
SCORE <u>15</u>	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
8. Channel Flow Status	Water reaches base of both lower banks and minimal amount of channel substrate is exposed.					Water fills > 75% of the available channel; or <25% of channel substrate is exposed.					Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed.					Very little water in channel and mostly present as standing pools.				
SCORE <u>16</u>	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
9. Condition of Banks	Banks stable; no evidence of erosion or bank failure,					Moderately stable; infrequent, small areas of erosion mostly healed over.					Moderately unstable; up to 60% of banks in reach have areas of erosion.					Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; on side slopes, 60-100% of bank has erosional scars.				
SCORE <u>11</u>	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
10. Bank Vegetative Protection	More than 90% of the streambank surface covered by vegetation.					70-90% of the stream-bank surface covered by vegetation.					50-70% of the stream-bank surfaces covered by vegetation.					Less than 50% of the streambank surface covered by vegetation.				
SCORE <u>13</u>	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
11. Grazing or Other Disruptive Pressure	Vegetative disruption, through grazing or mowing, minimal or not evident; almost all plants allowed to grow naturally.					Disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.					Disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.					Disruption of vegetation is very high; vegetation has been removed to 2 inches or less in average stubble height.				
SCORE <u>15</u>	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
12. Riparian Vegetative Zone Width	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.					Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.					Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.					Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.				
SCORE <u>12</u>	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Total Side 2 <u>96</u>																				
Total Score <u>168</u>																				

VIII. ESC ANALYTICAL REPORT – WATER CHEMISTRY RESULTS

May 18, 2017

RETTEW

Sample Delivery Group: L908178
Samples Received: 05/10/2017
Project Number: 101442012
Description: Monitoring at Valley Creek

Report To: Mr. Mark Metzler
3020 Columbia Avenue
Lancaster, PA 17603

Entire Report Reviewed By:



T. Alan Harvill
Technical Service Representative

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 ESC is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.

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SAMPLE SUMMARY

ONE LAB. NATIONWIDE.

RT-1 L908178-01 WW

Collected by
Mark A Metzler
Collected date/time
05/09/17 12:22
Received date/time
05/10/17 08:45

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

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG979162	1	05/16/17 09:10	05/16/17 10:07	AS
Wet Chemistry by Method 1664A	WG979621	1	05/15/17 08:46	05/15/17 15:10	SHG
Wet Chemistry by Method 2130 B-2011	WG978037	1	05/10/17 14:18	05/10/17 14:18	MA
Wet Chemistry by Method 2310 B-2011	WG978326	1	05/10/17 20:42	05/10/17 20:42	MZ
Wet Chemistry by Method 2320 B-2011	WG978300	1	05/11/17 11:08	05/11/17 11:08	AMC
Wet Chemistry by Method 300.0	WG978164	1	05/10/17 16:18	05/10/17 16:18	KCF
Wet Chemistry by Method 300.0	WG978164	10	05/10/17 16:34	05/10/17 16:34	KCF
Wet Chemistry by Method 365.4	WG978261	1	05/10/17 13:27	05/10/17 22:54	ASK
Wet Chemistry by Method 4500H+ B-2011	WG978166	1	05/10/17 15:50	05/10/17 15:50	MHM
Wet Chemistry by Method 45000 G-2011	WG978954	1	05/11/17 15:26	05/11/17 15:26	ARM
Wet Chemistry by Method 5310 B-2011	WG978762	1	05/12/17 21:26	05/12/17 21:26	SJM
Metals (ICP) by Method 200.7	WG978515	1	05/11/17 08:28	05/11/17 19:16	ST
Metals (ICP) by Method 200.7	WG978515	1	05/11/17 08:28	05/11/17 23:48	ST
Volatile Organic Compounds (GC) by Method RSK175	WG978676	1	05/16/17 13:29	05/16/17 13:29	MJ

RT-2 L908178-02 WW

Collected by
Mark A Metzler
Collected date/time
05/09/17 11:45
Received date/time
05/10/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG979162	1	05/16/17 09:10	05/16/17 10:07	AS
Wet Chemistry by Method 1664A	WG979621	1	05/15/17 08:46	05/15/17 15:10	SHG
Wet Chemistry by Method 2130 B-2011	WG978037	1	05/10/17 14:18	05/10/17 14:18	MA
Wet Chemistry by Method 2310 B-2011	WG978326	1	05/10/17 20:42	05/10/17 20:42	MZ
Wet Chemistry by Method 2320 B-2011	WG978300	1	05/11/17 11:14	05/11/17 11:14	AMC
Wet Chemistry by Method 300.0	WG978164	1	05/10/17 17:20	05/10/17 17:20	KCF
Wet Chemistry by Method 300.0	WG978164	10	05/10/17 17:35	05/10/17 17:35	KCF
Wet Chemistry by Method 365.4	WG978261	1	05/10/17 13:27	05/10/17 22:55	ASK
Wet Chemistry by Method 4500H+ B-2011	WG978166	1	05/10/17 15:50	05/10/17 15:50	MHM
Wet Chemistry by Method 45000 G-2011	WG978954	1	05/11/17 15:26	05/11/17 15:26	ARM
Wet Chemistry by Method 5310 B-2011	WG978762	1	05/12/17 21:37	05/12/17 21:37	SJM
Metals (ICP) by Method 200.7	WG978515	1	05/11/17 08:28	05/11/17 19:29	ST
Metals (ICP) by Method 200.7	WG978515	1	05/11/17 08:28	05/12/17 00:06	ST
Volatile Organic Compounds (GC) by Method RSK175	WG978676	1	05/16/17 13:47	05/16/17 13:47	MJ

RT-3 L908178-03 WW

Collected by
Mark A Metzler
Collected date/time
05/09/17 10:54
Received date/time
05/10/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG979162	1	05/16/17 09:10	05/16/17 10:07	AS
Wet Chemistry by Method 1664A	WG979621	1	05/15/17 08:46	05/15/17 15:10	SHG
Wet Chemistry by Method 2130 B-2011	WG978037	1	05/10/17 14:18	05/10/17 14:18	MA
Wet Chemistry by Method 2310 B-2011	WG978326	1	05/10/17 20:42	05/10/17 20:42	MZ
Wet Chemistry by Method 2320 B-2011	WG978551	1	05/11/17 12:50	05/11/17 12:50	AMC
Wet Chemistry by Method 300.0	WG978164	1	05/10/17 17:51	05/10/17 17:51	KCF
Wet Chemistry by Method 300.0	WG978164	10	05/10/17 18:06	05/10/17 18:06	KCF
Wet Chemistry by Method 365.4	WG978261	1	05/10/17 13:27	05/10/17 22:57	ASK
Wet Chemistry by Method 4500H+ B-2011	WG978166	1	05/10/17 15:50	05/10/17 15:50	MHM
Wet Chemistry by Method 45000 G-2011	WG978954	1	05/11/17 15:26	05/11/17 15:26	ARM
Wet Chemistry by Method 5310 B-2011	WG978762	1	05/12/17 21:48	05/12/17 21:48	SJM
Metals (ICP) by Method 200.7	WG978515	1	05/11/17 08:28	05/11/17 19:32	ST
Metals (ICP) by Method 200.7	WG978515	1	05/11/17 08:28	05/12/17 00:09	ST
Volatile Organic Compounds (GC) by Method RSK175	WG978676	1	05/16/17 14:04	05/16/17 14:04	MJ

SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



RT-4 L908178-04 WW

Collected by
Mark A Metzler

Collected date/time
05/09/17 09:45

Received date/time
05/10/17 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Gravimetric Analysis by Method 2540 C-2011	WG979162	1	05/16/17 09:10	05/16/17 10:07	AS
Wet Chemistry by Method 1664A	WG979621	1	05/15/17 08:46	05/15/17 15:11	SHG
Wet Chemistry by Method 2130 B-2011	WG978037	1	05/10/17 14:18	05/10/17 14:18	MA
Wet Chemistry by Method 2310 B-2011	WG978326	1	05/10/17 20:42	05/10/17 20:42	MZ
Wet Chemistry by Method 2320 B-2011	WG978551	1	05/11/17 15:15	05/11/17 15:15	AMC
Wet Chemistry by Method 300.0	WG978249	1	05/10/17 15:46	05/10/17 15:46	KCF
Wet Chemistry by Method 300.0	WG978249	10	05/10/17 16:02	05/10/17 16:02	KCF
Wet Chemistry by Method 365.4	WG978261	1	05/10/17 13:27	05/10/17 22:58	ASK
Wet Chemistry by Method 4500H+ B-2011	WG978166	1	05/10/17 15:50	05/10/17 15:50	MHM
Wet Chemistry by Method 45000 G-2011	WG978954	1	05/11/17 15:26	05/11/17 15:26	ARM
Wet Chemistry by Method 5310 B-2011	WG978762	1	05/12/17 21:59	05/12/17 21:59	SJM
Metals (ICP) by Method 200.7	WG978515	1	05/11/17 08:28	05/11/17 19:35	ST
Metals (ICP) by Method 200.7	WG978515	1	05/11/17 08:28	05/12/17 00:12	ST
Volatile Organic Compounds (GC) by Method RSK175	WG978676	1	05/16/17 14:22	05/16/17 14:22	MJ

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

3 Al

9 Sc



All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times. 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.

T. Alan Harvill
Technical Service Representative

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



Collected date/time: 05/09/17 12:22

L908178

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	1380000		10000	1	05/16/2017 10:07	WG979162

1 Cp

2 Tc

Wet Chemistry by Method 1664A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Oil & Grease (Hexane Extr)	ND		5050	1	05/15/2017 15:10	WG979621

3 Ss

4 Cn

Wet Chemistry by Method 2130 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Turbidity	0.643		0.100	1	05/10/2017 14:18	WG978037

5 Sr

6 Qc

Wet Chemistry by Method 2310 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Acidity	ND		10000	1	05/10/2017 20:42	WG978326

7 Gl

8 Al

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Alkalinity	196000		20000	1	05/11/2017 11:08	WG978300

9 Sc

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chloride	468000		10000	10	05/10/2017 16:34	WG978164
Nitrate as (N)	1460		100	1	05/10/2017 16:18	WG978164
Nitrite as (N)	ND		100	1	05/10/2017 16:18	WG978164
Sulfate	33500		5000	1	05/10/2017 16:18	WG978164

Wet Chemistry by Method 365.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Phosphorus, Total	ND		100	1	05/10/2017 22:54	WG978261

Wet Chemistry by Method 4500H+ B-2011

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	7.70	T8	1	05/10/2017 15:50	WG978166

Sample Narrative:

4500H+ B-2011 L908178-01 WG978166: 7.70 at 15.5c

Wet Chemistry by Method 45000 G-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Oxygen	9.00 at 20.1c	T8	3000	1	05/11/2017 15:26	WG978954

Wet Chemistry by Method 5310 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch



Collected date/time: 05/09/17 12:22

L908178

Wet Chemistry by Method 5310 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
TOC (Total Organic Carbon)	1670		1000	1	05/12/2017 21:26	WG978762

¹ Cp

² Tc

Metals (ICP) by Method 200.7

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Barium	261		5.00	1	05/11/2017 19:16	WG978515
Calcium	153000		1000	1	05/11/2017 19:16	WG978515
Iron	108		100	1	05/11/2017 19:16	WG978515
Magnesium	62900		1000	1	05/11/2017 19:16	WG978515
Potassium	6510		1000	1	05/11/2017 23:48	WG978515
Sodium	116000		1000	1	05/11/2017 19:16	WG978515

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

Volatile Organic Compounds (GC) by Method RSK175

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Methane	ND		10.0	1	05/16/2017 13:29	WG978676
Ethane	ND		13.0	1	05/16/2017 13:29	WG978676
Ethene	ND		13.0	1	05/16/2017 13:29	WG978676

⁷ Gl

⁸ Al

⁹ Sc



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	1320000		10000	1	05/16/2017 10:07	WG979162

1 Cp

2 Tc

Wet Chemistry by Method 1664A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Oil & Grease (Hexane Extr)	ND		5050	1	05/15/2017 15:10	WG979621

3 Ss

4 Cn

Wet Chemistry by Method 2130 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Turbidity	1.08		0.100	1	05/10/2017 14:18	WG978037

5 Sr

6 Qc

Wet Chemistry by Method 2310 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Acidity	ND		10000	1	05/10/2017 20:42	WG978326

7 GI

8 AI

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Alkalinity	192000		20000	1	05/11/2017 11:14	WG978300

9 Sc

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chloride	453000		10000	10	05/10/2017 17:35	WG978164
Nitrate as (N)	1320		100	1	05/10/2017 17:20	WG978164
Nitrite as (N)	ND		100	1	05/10/2017 17:20	WG978164
Sulfate	32400		5000	1	05/10/2017 17:20	WG978164

Wet Chemistry by Method 365.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Phosphorus, Total	ND		100	1	05/10/2017 22:55	WG978261

Wet Chemistry by Method 4500H+ B-2011

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	7.82	T8	1	05/10/2017 15:50	WG978166

Sample Narrative:

4500H+ B-2011 L908178-02 WG978166: 7.82 at 16.1c

Wet Chemistry by Method 4500O G-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Oxygen	9.00 at 20.1c	T8	3000	1	05/11/2017 15:26	WG978954

Wet Chemistry by Method 5310 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
	ug/l		ug/l		date / time	



Collected date/time: 05/09/17 11:45

L908178

Wet Chemistry by Method 5310 B-2011

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
TOC (Total Organic Carbon)	1920		1000	1	05/12/2017 21:37	WG978762

1 Cp

2 Tc

Metals (ICP) by Method 200.7

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Barium	272		5.00	1	05/11/2017 19:29	WG978515
Calcium	157000		1000	1	05/11/2017 19:29	WG978515
Iron	698		100	1	05/11/2017 19:29	WG978515
Magnesium	64900		1000	1	05/11/2017 19:29	WG978515
Potassium	6810		1000	1	05/12/2017 00:06	WG978515
Sodium	118000		1000	1	05/11/2017 19:29	WG978515

3 Ss

4 Cn

5 Sr

6 Qc

Volatile Organic Compounds (GC) by Method RSK175

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Methane	ND		10.0	1	05/16/2017 13:47	WG978676
Ethane	ND		13.0	1	05/16/2017 13:47	WG978676
Ethene	ND		13.0	1	05/16/2017 13:47	WG978676

7 Gl

8 Al

9 Sc



Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	1180000		10000	1	05/16/2017 10:07	WG979162

1 Cp

2 Tc

Wet Chemistry by Method 1664A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Oil & Grease (Hexane Extr)	ND		5050	1	05/15/2017 15:10	WG979621

3 Ss

4 Cn

Wet Chemistry by Method 2130 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Turbidity	2.11		0.100	1	05/10/2017 14:18	WG978037

5 Sr

6 Qc

Wet Chemistry by Method 2310 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Acidity	ND		10000	1	05/10/2017 20:42	WG978326

7 Gl

8 Al

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Alkalinity	184000		20000	1	05/11/2017 12:50	WG978551

9 Sc

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chloride	407000		10000	10	05/10/2017 18:06	WG978164
Nitrate as (N)	1330		100	1	05/10/2017 17:51	WG978164
Nitrite as (N)	ND		100	1	05/10/2017 17:51	WG978164
Sulfate	23200		5000	1	05/10/2017 17:51	WG978164

Wet Chemistry by Method 365.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Phosphorus, Total	ND		100	1	05/10/2017 22:57	WG978261

Wet Chemistry by Method 4500H+ B-2011

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	7.71	T8	1	05/10/2017 15:50	WG978166

Sample Narrative:

4500H+ B-2011 L908178-03 WG978166: 7.71 at 15.9c

Wet Chemistry by Method 4500O G-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Oxygen	9.00 at 20.0c	T8	3000	1	05/11/2017 15:26	WG978954

Wet Chemistry by Method 5310 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
	ug/l		ug/l		date / time	



Collected date/time: 05/09/17 10:54

L908178

Wet Chemistry by Method 5310 B-2011

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
TOC (Total Organic Carbon)	2690		1000	1	05/12/2017 21:48	WG978762

1 Cp

2 Tc

Metals (ICP) by Method 200.7

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Barium	383		5.00	1	05/11/2017 19:32	WG978515
Calcium	130000		1000	1	05/11/2017 19:32	WG978515
Iron	468		100	1	05/11/2017 19:32	WG978515
Magnesium	55400		1000	1	05/11/2017 19:32	WG978515
Potassium	5690		1000	1	05/12/2017 00:09	WG978515
Sodium	108000		1000	1	05/11/2017 19:32	WG978515

3 Ss

4 Cn

5 Sr

6 Qc

Volatile Organic Compounds (GC) by Method RSK175

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Methane	ND		10.0	1	05/16/2017 14:04	WG978676
Ethane	ND		13.0	1	05/16/2017 14:04	WG978676
Ethene	ND		13.0	1	05/16/2017 14:04	WG978676

7 Gl

8 Al

9 Sc



Collected date/time: 05/09/17 09:45

L908178

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Solids	721000		10000	1	05/16/2017 10:07	WG979162

1 Cp

2 Tc

Wet Chemistry by Method 1664A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Oil & Grease (Hexane Extr)	ND		5050	1	05/15/2017 15:11	WG979621

3 Ss

4 Cn

Wet Chemistry by Method 2130 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Turbidity	0.612		0.100	1	05/10/2017 14:18	WG978037

5 Sr

6 Qc

Wet Chemistry by Method 2310 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Acidity	ND		10000	1	05/10/2017 20:42	WG978326

7 Gl

8 Al

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Alkalinity	114000		20000	1	05/11/2017 15:15	WG978551

9 Sc

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Chloride	237000		10000	10	05/10/2017 16:02	WG978249
Nitrate as (N)	1920		100	1	05/10/2017 15:46	WG978249
Nitrite as (N)	ND		100	1	05/10/2017 15:46	WG978249
Sulfate	26800		5000	1	05/10/2017 15:46	WG978249

Wet Chemistry by Method 365.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Phosphorus, Total	ND		100	1	05/10/2017 22:58	WG978261

Wet Chemistry by Method 4500H+ B-2011

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
pH	7.30	T8	1	05/10/2017 15:50	WG978166

Sample Narrative:

4500H+ B-2011 L908178-04 WG978166: 7.30 at 16.3c

Wet Chemistry by Method 45000 G-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Dissolved Oxygen	9.4 at 19.9c	T8	3000	1	05/11/2017 15:26	WG978954

Wet Chemistry by Method 5310 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch



Collected date/time: 05/09/17 09:45

L908178

Wet Chemistry by Method 5310 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
TOC (Total Organic Carbon)	1780		1000	1	05/12/2017 21:59	WG978762

1 Cp

2 Tc

Metals (ICP) by Method 200.7

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Barium	257		5.00	1	05/11/2017 19:35	WG978515
Calcium	87400		1000	1	05/11/2017 19:35	WG978515
Iron	109		100	1	05/11/2017 19:35	WG978515
Magnesium	35100		1000	1	05/11/2017 19:35	WG978515
Potassium	4420		1000	1	05/12/2017 00:12	WG978515
Sodium	65200		1000	1	05/11/2017 19:35	WG978515

3 Ss

4 Cn

5 Sr

6 Qc

Volatile Organic Compounds (GC) by Method RSK175

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Methane	ND		10.0	1	05/16/2017 14:22	WG978676
Ethane	ND		13.0	1	05/16/2017 14:22	WG978676
Ethene	ND		13.0	1	05/16/2017 14:22	WG978676

7 Gl

8 Al

9 Sc

WG979162

Gravimetric Analysis by Method 2540 C-2011

QUALITY CONTROL SUMMARY

L908178-01,02,03,04

ONE LAB. NATIONWIDE.



Method Blank (MB)

(MB) R3218795-1 05/16/17 10:07

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Dissolved Solids	U		2820	10000

1 Cp

2 Tc

3 Ss

L908359-01 Original Sample (OS) • Duplicate (DUP)

(OS) L908359-01 05/16/17 10:07 • (DUP) R3218795-4 05/16/17 10:07

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Dissolved Solids	520000	521000	1	0.192		5

4 Cn

5 Sr

6 Qc

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

(LCS) R3218795-2 05/16/17 10:07 • (LCSD) R3218795-3 05/16/17 10:07

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Dissolved Solids	8800000	8660000	8500000	98.4	96.6	85.0-115			1.86	5

7 Gl

8 Al

9 Sc

ACCOUNT:
RETTEW

PROJECT:
101442012

SDG:
L908178

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WG979621

Wet Chemistry by Method 1664A

QUALITY CONTROL SUMMARY

L908178-01,02,03,04

ONE LAB. NATIONWIDE.



Method Blank (MB)

(MB) R3218102-1 05/15/17 15:05

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Oil & Grease (Hexane Extr)	U		1160	5000

1 Cp

2 Tc

3 Ss

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

(LCS) R3218102-2 05/15/17 15:05 • (LCSD) R3218102-3 05/15/17 15:06

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Oil & Grease (Hexane Extr)	40000	40500	38200	101	95.5	78.0-114			5.84	20

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

ACCOUNT:
RETTEW

PROJECT:
101442012

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L908178

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WG978037

Wet Chemistry by Method 2130 B-2011

QUALITY CONTROL SUMMARY

L908178-01,02,03,04

ONE LAB. NATIONWIDE.



Method Blank (MB)

(MB) WG978037-1 05/10/17 14:18

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
Turbidity	0.0860		0.0310	0.100

1 Cp

2 Tc

3 Ss

L908001-01 Original Sample (OS) • Duplicate (DUP)

(OS) L908001-01 05/10/17 14:18 • (DUP) WG978037-4 05/10/17 14:18

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Turbidity	2.35	2.36	1	0.425		20

4 Cn

5 Sr

6 Qc

L908178-04 Original Sample (OS) • Duplicate (DUP)

(OS) L908178-04 05/10/17 14:18 • (DUP) WG978037-5 05/10/17 14:18

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Turbidity	0.612	0.611	1	0.164		20

7 GI

8 AI

9 Sc

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

(LCS) WG978037-2 05/10/17 14:18 • (LCSD) WG978037-3 05/10/17 14:18

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Turbidity	40.0	39.8	39.7	99.5	99.3	90.0-110			0.252	20

ACCOUNT:
RETTEW

PROJECT:
101442012

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L908178

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WG978326

Wet Chemistry by Method 2310 B-2011

QUALITY CONTROL SUMMARY

L908178-01,02,03,04

ONE LAB. NATIONWIDE



Method Blank (MB)

(MB) WG978326-1 05/10/17 20:42

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Acidity	4000		3630	10000

1 Cp

2 Tc

3 Ss

L908178-04 Original Sample (OS) • Duplicate (DUP)

(OS) L908178-04 05/10/17 20:42 • (DUP) WG978326-4 05/10/17 20:42

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Acidity	ND	ND	1	0.000		20

4 Cn

5 Sr

6 Qc

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

(LCS) WG978326-2 05/10/17 20:42 • (LCSD) WG978326-3 05/10/17 20:42

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Acidity	20000	20000	20000	100	100	85.0-115			0.000	20

7 Gl

8 Al

9 Sc

ACCOUNT:
RETTEW

PROJECT:
101442012

SDG:
L908178

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WG978300

Wet Chemistry by Method 2320 B-2011

QUALITY CONTROL SUMMARY

L908178-01.02

ONE LAB. NATIONWIDE.



Method Blank (MB)

(MB) R3217506-1 05/11/17 08:32

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Alkalinity	U		2710	20000

1 Cp

2 Tc

3 Ss

L908057-01 Original Sample (OS) • Duplicate (DUP)

(OS) L908057-01 05/11/17 08:41 • (DUP) R3217506-3 05/11/17 08:49

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Alkalinity	95700	97400	1	2.00		20

4 Cn

5 Sr

6 Qc

L908178-02 Original Sample (OS) • Duplicate (DUP)

(OS) L908178-02 05/11/17 11:14 • (DUP) R3217506-6 05/11/17 11:21

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Alkalinity	192000	193000	1	0.000		20

7 GI

8 AI

9 Sc

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

(LCS) R3217506-4 05/11/17 09:34 • (LCSD) R3217506-5 05/11/17 10:51

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Alkalinity	100000	103000	99100	103	99.0	85.0-115			4.00	20

ACCOUNT:
RETTEW

PROJECT:
101442012

SDG:
L908178

DATE/TIME:
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WG978551

Wet Chemistry by Method 2320 B-2011

QUALITY CONTROL SUMMARY

L908178-03,04

ONE LAB. NATIONWIDE.



Method Blank (MB)

(MB) R3217507-1 05/11/17 12:43

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Alkalinity	U		2710	20000

1 Cp

2 Tc

3 Ss

L908178-03 Original Sample (OS) • Duplicate (DUP)

(OS) L908178-03 05/11/17 12:50 • (DUP) R3217507-2 05/11/17 12:59

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Alkalinity	184000	189000	1	2.00		20

4 Cn

5 Sr

6 Qc

L908178-04 Original Sample (OS) • Duplicate (DUP)

(OS) L908178-04 05/11/17 15:15 • (DUP) R3217507-4 05/11/17 15:22

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Alkalinity	114000	115000	1	1.00		20

7 Gl

8 Al

9 Sc

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

(LCS) R3217507-3 05/11/17 13:54 • (LCSD) R3217507-5 05/11/17 15:29

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Alkalinity	100000	102000	104000	102	104	85.0-115			2.00	20

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WG978164

Wet Chemistry by Method 300.0

QUALITY CONTROL SUMMARY

L908178-01,02,03

ONE LAB. NATIONWIDE.



Method Blank (MB)

(MB) R3216810-1 05/10/17 05:48

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Chloride	U		51.9	1000
Nitrate	U		22.7	100
Nitrite	U		27.7	100
Sulfate	U		77.4	5000

1 Cp

2 Tc

3 Ss

4 Cn

L908001-01 Original Sample (OS) • Duplicate (DUP)

(OS) L908001-01 05/10/17 11:56 • (DUP) R3216810-4 05/10/17 12:10

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	7710	7670	1	1		20
Nitrate	984	979	1	0		20
Nitrite	ND	0.000	1	0		20
Sulfate	25400	25500	1	0		20

5 Sr

6 Qc

7 Gl

8 Al

L908176-06 Original Sample (OS) • Duplicate (DUP)

(OS) L908176-06 05/10/17 15:48 • (DUP) R3216810-8 05/10/17 16:03

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	95800	95800	1	0		20
Nitrate	U	0.000	1	0		20
Nitrite	U	0.000	1	0		20

9 Sc

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

(LCS) R3216810-2 05/10/17 06:03 • (LCSD) R3216810-3 05/10/17 06:19

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Chloride	40000	40200	40100	100	100	90-110			0	20
Nitrate	8000	8180	8170	102	102	90-110			0	20
Nitrite	8000	8030	8050	100	101	90-110			0	20
Sulfate	40000	40100	40000	100	100	90-110			0	20

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Wet Chemistry by Method 300.0

QUALITY CONTROL SUMMARY

L908178-01,02,03

ONE LAB. NATIONWIDE.



L908001-02 Original Sample (OS) • Matrix Spike (MS)

(OS) L908001-02 05/10/17 12:26 • (MS) R3216810-5 05/10/17 12:41

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Chloride	50000	17400	67400	100	1	80-120	
Nitrate	5000	1270	6250	100	1	80-120	
Nitrite	5000	ND	5170	103	1	80-120	
Sulfate	50000	36100	85000	98	1	80-120	

1 Cp

2 Tc

3 Ss

4 Cn

L908176-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L908176-03 05/10/17 15:01 • (MS) R3216810-6 05/10/17 15:17 • (MSD) R3216810-7 05/10/17 15:32

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Nitrate	5000	4620	9550	9450	99	97	1	80-120			1	20
Nitrite	5000	43.8	5210	5200	103	103	1	80-120			0	20

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

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Wet Chemistry by Method 300.0

QUALITY CONTROL SUMMARY

L908178-04

ONE LAB. NATIONWIDE.



Method Blank (MB)

(MB) R3217205-1 05/10/17 05:42

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	ug/l		ug/l	ug/l
Chloride	U		51.9	1000
Nitrate	U		22.7	100
Nitrite	U		27.7	100
Sulfate	U		77.4	5000

1 Cp

2 Tc

3 Ss

4 Cn

L907994-01 Original Sample (OS) • Duplicate (DUP)

(OS) L907994-01 05/10/17 14:45 • (DUP) R3217205-4 05/10/17 15:00

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	ug/l	ug/l		%		%
Chloride	12700	12700	1	0		20
Nitrate	470	465	1	1		20
Nitrite	ND	0.000	1	0		20
Sulfate	15900	15800	1	0		20

5 Sr

6 Qc

7 GI

8 AI

L908094-01 Original Sample (OS) • Duplicate (DUP)

(OS) L908094-01 05/10/17 19:22 • (DUP) R3217205-6 05/10/17 20:08

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	ug/l	ug/l		%		%
Chloride	11600	11200	1	4		20
Nitrate	135	135	1	0		20
Nitrite	ND	0.000	1	0		20
Sulfate	49500	49500	1	0		20

9 Sc

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

(LCS) R3217205-2 05/10/17 05:57 • (LCSD) R3217205-3 05/10/17 06:13

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	ug/l	ug/l	ug/l	%	%	%			%	%
Chloride	40000	40200	40100	100	100	90-110			0	20
Nitrate	8000	8160	8160	102	102	90-110			0	20
Nitrite	8000	8030	8040	100	101	90-110			0	20
Sulfate	40000	40700	40500	102	101	90-110			0	20

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Wet Chemistry by Method 300.0

QUALITY CONTROL SUMMARY

L908178-04

ONE LAB. NATIONWIDE.



L907994-02 Original Sample (OS) • Matrix Spike (MS)

(OS) L907994-02 05/10/17 15:16 • (MS) R3217205-5 05/10/17 15:31

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Chloride	50000	12400	63100	101	1	80-120	
Nitrate	5000	459	5410	99	1	80-120	
Nitrite	5000	ND	5140	103	1	80-120	
Sulfate	50000	15900	65800	100	1	80-120	

1 Cp

2 Tc

3 Ss

4 Cn

L908094-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L908094-02 05/10/17 20:24 • (MS) R3217205-7 05/10/17 20:39 • (MSD) R3217205-8 05/10/17 20:55

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Chloride	50000	9100	59200	59900	100	102	1	80-120			1	20
Nitrate	5000	ND	4920	4850	98	97	1	80-120			1	20
Nitrite	5000	ND	5110	5100	102	102	1	80-120			0	20
Sulfate	50000	52300	99900	100000	95	96	1	80-120	E		0	20

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

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Wet Chemistry by Method 365.4

QUALITY CONTROL SUMMARY

L908178-01,02,03,04

ONE LAB. NATIONWIDE.



Method Blank (MB)

(MB) R3217173-1 05/10/17 22:35

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Phosphorus, Total	U		35.0	100

1 Cp

2 Tc

3 Ss

L908158-02 Original Sample (OS) • Duplicate (DUP)

(OS) L908158-02 05/10/17 22:50 • (DUP) R3217173-4 05/10/17 22:51

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Phosphorus, Total	2110	2180	1	3		20

4 Cn

5 Sr

6 Qc

L908195-01 Original Sample (OS) • Duplicate (DUP)

(OS) L908195-01 05/10/17 23:00 • (DUP) R3217173-5 05/10/17 23:02

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Phosphorus, Total	333	365	1	9		20

7 Gl

8 Al

9 Sc

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

(LCS) R3217173-2 05/10/17 22:36 • (LCSD) R3217173-3 05/10/17 22:37

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Phosphorus, Total	2000	1810	1830	91	92	90-110			1	20

L908195-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L908195-02 05/10/17 23:06 • (MS) R3217173-6 05/10/17 23:07 • (MSD) R3217173-7 05/10/17 23:08

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Phosphorus, Total	2500	414	2570	2570	86	86	1	90-110	J6	J6	0	20

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Wet Chemistry by Method 4500H+ B-2011

QUALITY CONTROL SUMMARY

L908178-01,02,03,04

ONE LAB. NATIONWIDE.



L908000-01 Original Sample (OS) • Duplicate (DUP)

(OS) L908000-01 05/10/17 15:50 • (DUP) WG978166-3 05/10/17 15:50

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
pH	7.59	7.59	1	0.000	T8	1

1 Cp

2 Tc

3 Ss

L908178-04 Original Sample (OS) • Duplicate (DUP)

(OS) L908178-04 05/10/17 15:50 • (DUP) WG978166-4 05/10/17 15:50

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
pH	7.30	7.29	1	0.137	T8	1

4 Cn

5 Sr

6 Qc

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

(LCS) WG978166-1 05/10/17 15:50 • (LCSD) WG978166-2 05/10/17 15:50

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
pH	7.50	7.49	7.49	99.9	99.9	98.7-101			0.000	1

7 Gl

8 Al

9 Sc

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WG978762

Wet Chemistry by Method 5310 B-2011

QUALITY CONTROL SUMMARY

L908178-01,02,03,04

ONE LAB. NATIONWIDE.



Method Blank (MB)

(MB) R3217918-1 05/12/17 11:13

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
TOC (Total Organic Carbon)	U		102	1000

1 Cp

2 Tc

3 Ss

L908178-04 Original Sample (OS) • Duplicate (DUP)

(OS) L908178-04 05/12/17 21:59 • (DUP) R3217918-7 05/12/17 22:10

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
TOC (Total Organic Carbon)	1780	1740	1	2		20

4 Cn

5 Sr

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

(LCS) R3217918-2 05/12/17 13:47 • (LCSD) R3217918-4 05/12/17 17:09

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
TOC (Total Organic Carbon)	75000	71100	73300	95	98	85-115			3	20

6 Qc

7 Gl

8 Al

L908117-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L908117-01 05/12/17 19:53 • (MS) R3217918-5 05/12/17 20:08 • (MSD) R3217918-6 05/12/17 20:23

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
TOC (Total Organic Carbon)	50000	2290	47100	46500	90	88	1	80-120			1	20

9 Sc

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Metals (ICP) by Method 200.7

QUALITY CONTROL SUMMARY

L908178-01,02,03,04

ONE LAB. NATIONWIDE.



Method Blank (MB)

(MB) R3217474-1 05/11/17 18:19

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Barium	U		1.00	5.00
Calcium	U		100	1000
Iron	U		28.2	100
Magnesium	U		16.8	1000
Sodium	U		93.9	1000

1 Cp

2 Tc

3 Ss

4 Cn

Method Blank (MB)

(MB) R3217490-1 05/11/17 23:31

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Potassium	U		107	1000

5 Sr

6 Qc

7 Gl

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

(LCS) R3217474-2 05/11/17 18:22 • (LCSD) R3217474-3 05/11/17 18:25

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Barium	1000	1070	1060	107	106	85-115			1	20
Calcium	10000	10500	10500	105	105	85-115			1	20
Iron	10000	10800	10800	108	108	85-115			0	20
Magnesium	10000	10800	10700	108	107	85-115			1	20
Sodium	10000	10500	10400	105	104	85-115			1	20

8 Al

9 Sc

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

(LCS) R3217490-2 05/11/17 23:33 • (LCSD) R3217490-3 05/11/17 23:35

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Potassium	10000	10100	10000	101	100	85-115			1	20

L908110-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L908110-01 05/11/17 18:27 • (MS) R3217474-5 05/11/17 18:33 • (MSD) R3217474-6 05/11/17 18:35

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Barium	1000	251	1340	1390	109	114	1	70-130			4	20
Calcium	10000	47800	59600	60600	118	128	1	70-130			2	20

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Metals (ICP) by Method 200.7

QUALITY CONTROL SUMMARY

L908178-01,02,03,04

ONE LAB. NATIONWIDE.



L908110-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L908110-01 05/11/17 18:27 • (MS) R3217474-5 05/11/17 18:33 • (MSD) R3217474-6 05/11/17 18:35

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Iron	10000	723	11600	11800	108	111	1	70-130			2	20
Magnesium	10000	11000	21800	22300	109	113	1	70-130			2	20
Sodium	10000	30500	40500	41300	100	108	1	70-130			2	20

1 Cp

2 Tc

3 Ss

4 Cn

L908178-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L908178-01 05/11/17 19:16 • (MS) R3217474-7 05/11/17 19:18 • (MSD) R3217474-8 05/11/17 19:27

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Barium	1000	261	1320	1320	106	106	1	70-130			0	20
Calcium	10000	153000	170000	169000	171	160	1	70-130	V	V	1	20
Iron	10000	108	10800	10900	107	108	1	70-130			1	20
Magnesium	10000	62900	75600	74900	127	120	1	70-130			1	20
Sodium	10000	116000	129000	127000	135	112	1	70-130	V		2	20

5 Sr

6 Qc

7 Gl

8 Al

L908178-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L908178-01 05/11/17 23:48 • (MS) R3217490-7 05/11/17 23:51 • (MSD) R3217490-8 05/11/17 23:53

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Potassium	10000	6510	17000	16900	105	104	1	70-130			1	20

9 Sc

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Volatile Organic Compounds (GC) by Method RSK175

QUALITY CONTROL SUMMARY

L908178-01,02,03,04

ONE LAB. NATIONWIDE.



Method Blank (MB)

(MB) R3218471-1 05/16/17 08:55

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Methane	U		2.91	10.0
Ethane	U		4.07	13.0
Ethene	U		4.26	13.0

1 Cp

2 Tc

3 Ss

4 Cn

L907939-01 Original Sample (OS) • Duplicate (DUP)

(OS) L907939-01 05/16/17 09:14 • (DUP) R3218471-2 05/16/17 12:21

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Methane	913	1050	20	13.6		20
Ethane	U	0.000	20	0.000		20
Ethene	U	0.000	20	0.000		20

5 Sr

6 Qc

7 Gl

L908179-04 Original Sample (OS) • Duplicate (DUP)

(OS) L908179-04 05/16/17 14:38 • (DUP) R3218471-3 05/16/17 15:45

Analyte	Original Result ug/l	DUP Result ug/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Methane	15.2	18.1	1	17.4		20
Ethane	ND	0.000	1	0.000		20
Ethene	ND	0.000	1	0.000		20

8 Al

9 Sc

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

(LCS) R3218471-4 05/16/17 16:01 • (LCSD) R3218471-5 05/16/17 16:18

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Methane	67.8	62.0	64.2	91.4	94.7	85.0-115			3.48	20
Ethane	129	118	119	91.2	92.4	85.0-115			1.39	20
Ethene	127	116	117	91.2	91.8	85.0-115			0.700	20

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Abbreviations and Definitions

SDG	Sample Delivery Group.
MDL	Method Detection Limit.
RDL	Reported Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
U	Not detected at the Reporting Limit (or MDL where applicable).
RPD	Relative Percent Difference.
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.
Rec.	Recovery.

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

Qualifier	Description
E	The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL).
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.
T8	Sample(s) received past/too close to holding time expiration.
V	The sample concentration is too high to evaluate accurate spike recoveries.



ESC Lab Sciences is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our "one location" design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be **YOUR LAB OF CHOICE**.
 * Not all certifications held by the laboratory are applicable to the results reported in the attached report.

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

State Accreditations

Alabama	40660	Nevada	TN-03-2002-34
Alaska	UST-080	New Hampshire	2975
Arizona	AZ0612	New Jersey-NELAP	TN002
Arkansas	88-0469	New Mexico	TN00003
California	01157CA	New York	11742
Colorado	TN00003	North Carolina	Env375
Connecticut	PH-0197	North Carolina ¹	DW21704
Florida	E87487	North Carolina ²	41
Georgia	NELAP	North Dakota	R-140
Georgia ¹	923	Ohio-VAP	CL0069
Idaho	TN00003	Oklahoma	9915
Illinois	200008	Oregon	TN200002
Indiana	C-TN-01	Pennsylvania	68-02979
Iowa	364	Rhode Island	221
Kansas	E-10277	South Carolina	84004
Kentucky ¹	90010	South Dakota	n/a
Kentucky ²	16	Tennessee ¹⁴	2006
Louisiana	AI30792	Texas	T 104704245-07-TX
Maine	TN0002	Texas ⁵	LAB0152
Maryland	324	Utah	6157585858
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	109
Minnesota	047-999-395	Washington	C1915
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA
Nebraska	NE-OS-15-05		

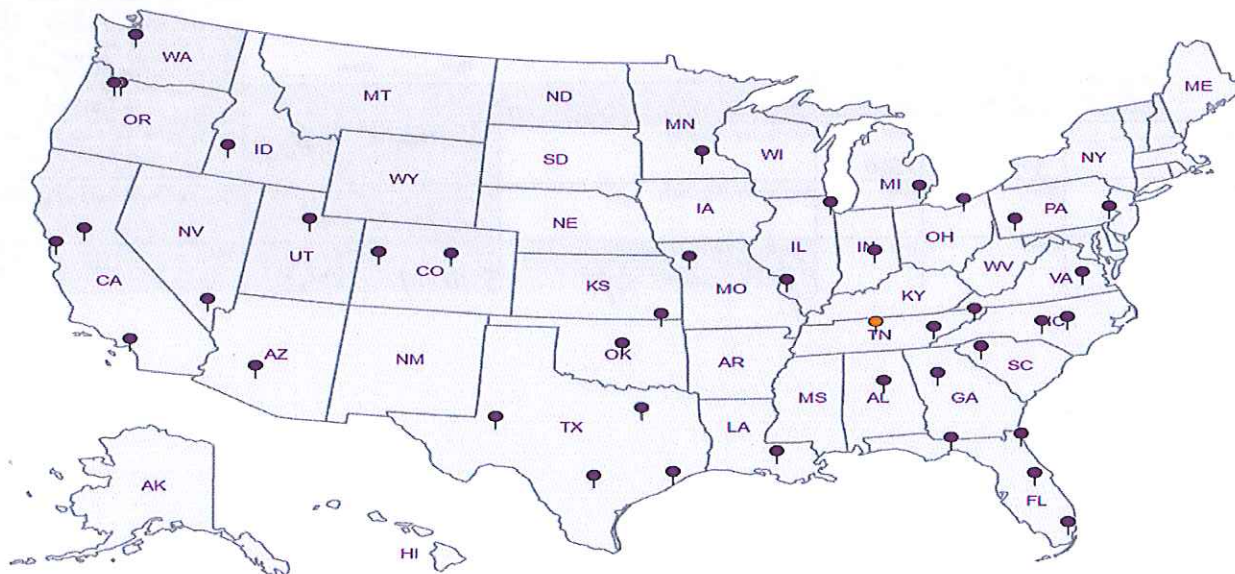
Third Party & Federal Accreditations

AZLA – ISO 17025	1461.01	AIHA-LAP,LLC	100789
AZLA – ISO 17025 ⁵	1461.02	DOD	1461.01
Canada	1461.01	USDA	S-67674
EPA-Crypto	TN00003		

¹ Drinking Water ² Underground Storage Tanks ³ Aquatic Toxicity ⁴ Chemical/Microbiological ⁵ Mold ¹⁴ Accreditation not applicable

Our Locations

ESC Lab Sciences has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. **ESC Lab Sciences performs all testing at our central laboratory.**



RETTEW

3020 Columbia Avenue
Lancaster, PA 17603

Billing Information:
Mr. Mark Metzler
3020 Columbia Ave.
Lancaster, PA 17603

Report to:
Mr. Mark Metzler

Email to: mmetzler@rettew.com

Project Description: *MONITORING C VALLEY CREEK*

City/State Collected: *PA*

Phone: 717-394-3721
Fax: 717-394-1063

Client Project #
101442012

Lab Project #
RETTEW-030812S

Collected by (print):
MARK A METZLER

Site/Facility ID #

P.O. #

Collected by (signature):
Mark A Metzler

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

Quote #

Date Results Needed

Immediately Packed on ice N Y X

Pres Chk	Analysis / Container / Preservative
	ALK 500mlHDPE-NoPres
	Acc.Turb.TDS 250mlHDPE-NoPres
	Cl:SO4:NO2:NO3 125mlHDPE-NoPres
	Metals 250mlHDPE-HNO3
	Cl:HEX 1L-ClF-Add:HCl
	PT 250mlHDPE-H2SO4
	RSK375 40mlAmb-HCl
	TOC 250mlAmb-HCl
	pH, DO 125mlHDPE-NoPres

Chain of Custody Page 1 of 1



12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-736-5858
Phone: 630-767-5859
Fax: 615-736-5859



Lab # *1008178*
A010

Accnum: RETTEW
Template: T122685
Prelogin: P597345
TSR: 264 - T. Alan Harvill
PB:

Shipped Via:

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Entries	ALK 500mlHDPE-NoPres	Acc.Turb.TDS 250mlHDPE-NoPres	Cl:SO4:NO2:NO3 125mlHDPE-NoPres	Metals 250mlHDPE-HNO3	Cl:HEX 1L-ClF-Add:HCl	PT 250mlHDPE-H2SO4	RSK375 40mlAmb-HCl	TOC 250mlAmb-HCl	pH, DO 125mlHDPE-NoPres
<i>RT-1</i>	<i>GRAB</i>	<i>WW</i>		<i>5-9-17</i>	<i>0945</i>	<i>10</i>	X	X	X	X	X	X	X	X	X
<i>RT-2</i>	<i>GRAB</i>	<i>WW</i>		<i>5-9-17</i>	<i>1145</i>	<i>10</i>	X	X	X	X	X	X	X	X	X
<i>RT-3</i>	<i>GRAB</i>	<i>WW</i>		<i>5-9-17</i>	<i>1054</i>	<i>10</i>	X	X	X	X	X	X	X	X	X
<i>RT-4</i>	<i>GRAB</i>	<i>WW</i>		<i>5-9-17</i>	<i>0945</i>	<i>10</i>	X	X	X	X	X	X	X	X	X
		<i>WW</i>				<i>10</i>	X	X	X	X	X	X	X	X	X
		<i>WW</i>				<i>10</i>	X	X	X	X	X	X	X	X	X
		<i>WW</i>				<i>10</i>	X	X	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 _____

Example Receipt Checklist

COC Seal Present/Intact: Y N
 COC Signed/Accurate: Y N
 Bottles arrive intact: Y N
 Correct bottles used: Y N
 Sufficient volume sent: Y N
 If Applicable
 VOA zero Headspace: Y N
 Preservation Correct/Checked: Y N

Relinquished by: (Signature) *Mark A Metzler* Date: *5-9-17* Time: *1300*

Relinquished by: (Signature) _____ Date: _____ Time: _____

Relinquished by: (Signature) _____ Date: _____ Time: _____

Tracking # *7136 2465 4149*

Received by: (Signature) _____ Trip Blank Received: Yes No
 HCL/MeOH TBH


Temp: *1.6 °C* Bottles Received: *40*

Received for lab by: (Signature) *Chad* Date: *5-10-17* Time: *8:45*

Hold: _____ Condition: *NCF 100*

IX. PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION
(eMapPA – Valley Run 303(d) listing)

Assessment_Unit_ID	GNIS_Name	GNIS_ID	Assessed_LU	Attain_Use	Source_Cau	HUC	Reachcode	COMID	Length_Miles	Symbol	Date_Create
18881	Null	Null	Fish Consumption	Impaired	Source Unknown - PCB	02040202	02040202004616	25601569	0.042467	-1	10/27/2015 7:34:23 AM
18881	Null	Null	Fish Consumption	Impaired	Source Unknown - PCB	02040202	02040202003055	25615396	0.294529	-1	10/27/2015 7:34:23 AM
18881	Abrahams Run	01168031	Fish Consumption	Impaired	Source Unknown - PCB	02040202	02040202008555	25620422	0.348589	-1	10/27/2015 7:34:23 AM
18881	Null	Null	Fish Consumption	Impaired	Source Unknown - PCB	02040202	02040202004623	25615394	0.028583	-1	10/27/2015 7:34:23 AM
18881	Null	Null	Fish Consumption	Impaired	Source Unknown - PCB	02040202	02040202008442	25617948	0.004971	-1	10/27/2015 7:34:23 AM
18881	Cobbie Creek	01172089	Fish Consumption	Impaired	Source Unknown - PCB	02040202	02040202001954	25601213	0.758071	-1	10/27/2015 7:34:23 AM
18881	Valley Run	01190308	Fish Consumption	Impaired	Source Unknown - PCB	02040202	02040202005189	25612970	0.700284	-1	10/27/2015 7:34:23 AM

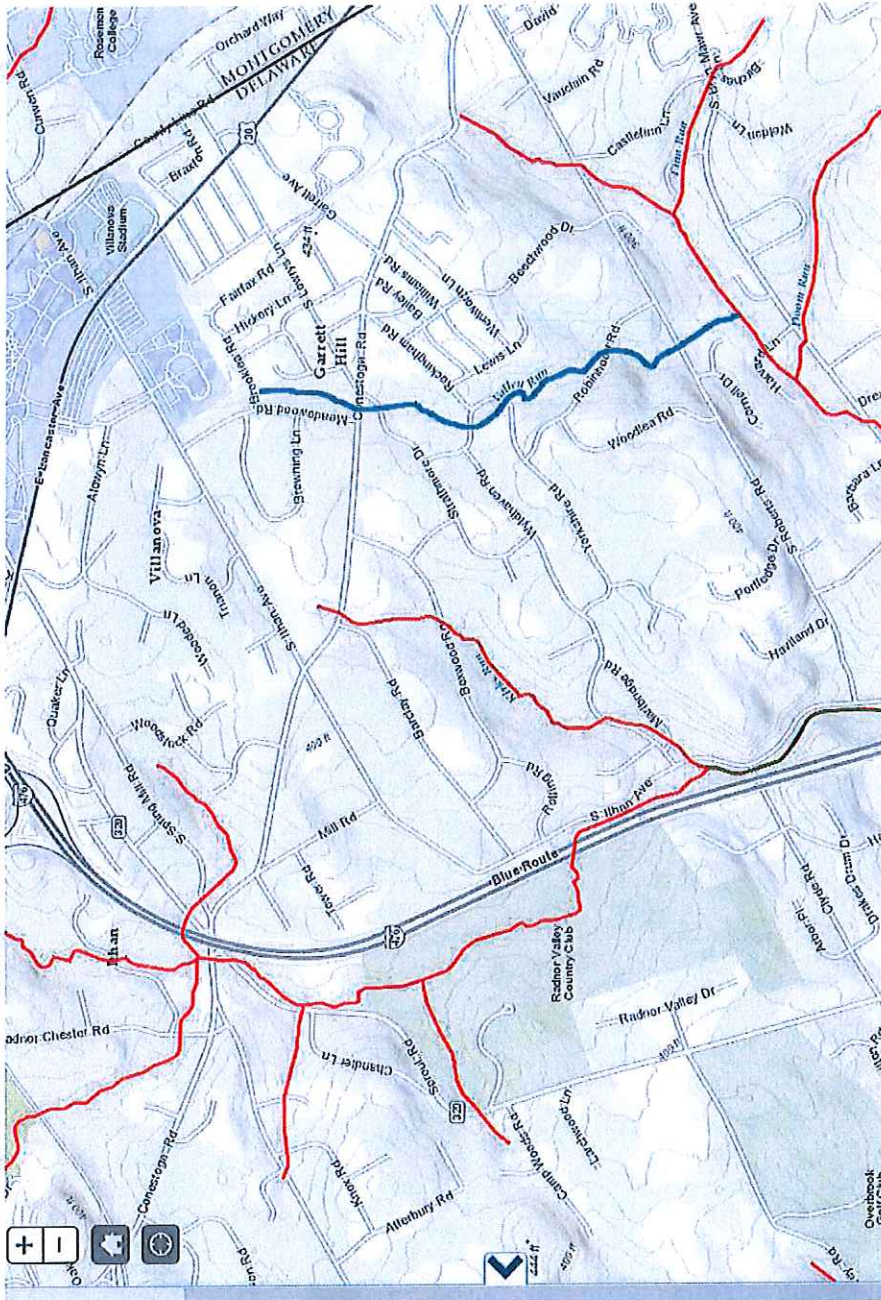


eMapPA

Layers Legend Tasks Links

- eMapPA Layers
- Complaints
- Federal EPA Sites
- Regulated Facilities and Related Information
- Areas POI - Geological
- Areas POI - Environmental
- Areas POI - General
- Boundaries
- Zip Code Points
- DEP Regions

Map eFacts Query **Advanced Query**



applied. The 303(d) list includes the reason for impairment, which may be one or more point sources, like industrial or sewage discharges, or non-point sources, like abandoned mine lands or agricultural runoff and the pollutant causing the impairment such as metals, pH, mercury or siltation. 305(b) is the narrative report. See 2016 Integrated Report for details. For questions or general assistance with the Integrated Report please contact the Division of Water Quality Standards at 717-787-9637 or send email to RA-WQAssessments@pa.gov.

Find

Select query:
 Select a Stream or Lake By Name

Search for:
 valley run

Find exact matches only

Clear Search

350 Results found

Name	Assessmt	Status	County
valley Run	7202	Supporting	berks
Valley Run	18759	Supporting	Berks
Valley Run	13831	Impaired	Delaware

