QUALITY ASSURANCE PROJECT PLAN

Enhanced Nutrient Monitoring of Chesapeake Bay Non-tidal Sites and Comprehensive Analysis of Non-tidal Tributary Water Quality Nutrient and Suspended Sediment Trends

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James Hargett, Chesapeake Bay Program Office, USEPA, Annapolis, MD

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James Shallenberger, Susquehanna River Basin Commission, Harrisburg, PA

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Durga Ghosh, Chesapeake Bay Program Office, USEPA, Annapolis, MD

Project QA Officer Signature _____ Date _____
Josh Lookenbill, PA Department of Environmental Protection, Harrisburg, PA

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ATTACHMENTS

I. PROJECT NAME

Assessment of Nutrient Sources from Mainstem and Selected Watersheds in the Susquehanna River Basin

II. PROJECT OFFICER

James Shallenberger (Susquehanna River Basin Commission)

III. QUALITY ASSURANCE OFFICER

James Shallenberger (Susquehanna River Basin Commission)

IV. DATE OF PROJECT INITIATION

January 2020 to December 2020

V. DISTRIBUTION LIST

Susquehanna River Basin Commission: Andrew Gavin, James Shallenberger, Kyle Kessler, Joshua Brengel

PA Department of Environmental Protection: Dustin Shull, Mark Brickner, Josh Lookenbill

U.S. Environmental Protection Agency, Chesapeake Bay Program Office: James Hargett, Durga Ghosh

SRBC website: www.srbc.net

VI. PROJECT DESCRIPTION

A. Objectives and Scope

Prior to 2004, the Susquehanna River Basin Commission's (SRBC's) Sediment and Nutrient Assessment Program (SNAP) collected base flow, monthly, random, and storm samples at six stations throughout the Susquehanna basin. Additional stations were added in 2004, 2005, and 2012 in support of the Chesapeake Bay Program's (CBP's) collective effort to enhance non-tidal monitoring of the Chesapeake Bay Watershed. Subsequent reductions in funding in 2013 resulted in the discontinuation of the Tioughnioga at Itaska.

The current network has 26 stations, with 20 in Pennsylvania, one in Maryland, and five in New York. Collectively, these 26 sites represent the highest priority monitoring sites in the Susquehanna River Basin, as outlined by the non-tidal workgroup and the individual states. Output from this project will be used to improve nutrient and suspended-sediment load and trend estimations, as well as improve calibration and verification of the watershed models.

This project includes two major objectives:

1. Nutrient and Suspended Sediment Monitoring

This objective includes conducting monthly and stormwater quality monitoring at 26 sites and posting data on the SRBC website. Water quality data collected during the time period, as well as summary statistics (maximum, minimum, median, mean, and standard deviation values), are submitted to the Chesapeake Bay Program Office (CBPO).

2. Trend Analysis

This objective will use compiled datasets to conduct flow-normalized trend analyses and flow trend analyses using the USGS WRTDS model. Trend results will be compared with results of previous years and to other agency results to identify consistencies and/or discrepancies. Statistical and graphical results will be provided to the CBPO as well as being posted on SRBC's website.

B. Data Usage

The environmental measurements and analysis will provide baseline nutrient loading data for the mainstem and the selected major tributaries in sufficient detail to:

- Allow model refinement and verification,
- Track and better define nutrient loading dynamics,
- Relate measured load fluctuations to changes in water discharge due to precipitation events of varying intensities, durations, and seasons, and
- Evaluate nutrient loading trends.

C. Monitoring Network Design and Rationale

This section provides the rationale for establishing the sampling network that includes a series of mainstem (long-term monitoring) and major tributary (enhanced monitoring) sites. All sites have been co-located with USGS stream gaging stations to obtain discharge data. The latitude and longitude of these sites and location map can be found in Attachment A.

1. Long-term Sites

Six long-term sites are incorporated into this project and are listed below:

- Susquehanna River at Towanda, PA. The Susquehanna River at Towanda was selected because it represents the contribution from New York State, although the drainage area does include a part of the Tioga River Basin in northern Pennsylvania and an area along the northern tier counties of northeastern Pennsylvania. The drainage area at Towanda is 7,797 square miles.
- Susquehanna River at Danville, PA. The Susquehanna River at Danville has a drainage area of 11,220 square miles and includes part of northcentral Pennsylvania and much of southcentral New York. Data collected at Danville represent the loadings from the mainstem Susquehanna River.
- West Branch Susquehanna River at Lewisburg, PA. Data collected from the West Branch Susquehanna River at Lewisburg represent the loadings from a major tributary to the mainstem. The West Branch Susquehanna River includes much of northcentral Pennsylvania and has a

drainage area of 6,847 square miles. This watershed is predominantly forested (81 percent). The combined drainage area at Lewisburg and Danville represents 65.7 percent of the total Susquehanna River Basin.

- Juniata River at Newport, PA. The Juniata River at Newport, another major tributary to the mainstem Susquehanna River, drains much of the southcentral area of Pennsylvania and has a drainage area of 3,354 square miles. The combined drainage area at Newport, Lewisburg, and Danville represents 77 percent of the total Susquehanna River Basin and 88.9 percent of the watershed above Harrisburg, PA.

- Susquehanna River at Marietta, PA. The Susquehanna River at Marietta is the southern-most sampling site upstream from the reservoirs on the Lower Susquehanna River and represents the inflow to the reservoirs from its 25,900-square-mile drainage area. This drainage area represents 94.5 percent of the total Susquehanna River Basin.

- Conestoga River at Conestoga, PA. Data collected from the Conestoga River at Conestoga provide loadings from a major tributary watershed that is actively farmed and is experiencing an increase in agricultural nutrient management programs. Additionally, this watershed is experiencing an increase in urban and suburban development. The drainage area of this basin at the sampling site is 470 square miles.

2. Enhanced Monitoring Sites

A total of 26 sites are included as enhanced monitoring sites and meet the conditions below:

- Sites that are located at outlets of major streams draining the tributary strategy basins,

- Sites that are located in areas within the tributary strategy basins that have the highest nutrient delivery to the Bay, and

- Sites that represent the overall range of conditions in the Bay watershed. This would include ranges of loads from different land cover types (urban, agriculture, and forestland covers), diverse physiographic/geologic settings, and different watershed sizes.

Samples collected at these sites will be used for load and trend determination. To effectively capture the loads being transported, 20 samples will be collected per year, consisting of 12 monthly samples and eight storm samples. Two storm samples will be collected on different days during each of four storms per year (one per season), targeting the rising and peak flow of the storm. In the future, the network may be modified to ensure that these objectives are met. The enhanced monitoring sites include:

- Susquehanna River at Smithboro, NY
- Chemung River at Chemung, NY
- Cohocton River near Campbell, NY
- Susquehanna River at Conklin, NY
- Unadilla River at Rockdale, NY
- Susquehanna River near Wilkes-Barre, PA
- West Branch Susquehanna River near Karthaus, PA
- West Branch Susquehanna River near Jersey Shore, PA
- Penns Creek at Penns Creek, PA
- Raystown Branch Juniata River at Saxton, PA
- Shermans Creek near Dromgold, PA
- Conodoguinet Creek near Hogestown, PA

- Swatara Creek near Hershey, PA
- Yellow Breeches Creek near Camp Hill, PA
- Pequea Creek near Martic Forge, PA
- Bald Eagle Creek near Castanea, PA
- East Mahantango Creek near Dalmatia, PA
- Paxton Creek near Penbrook, PA
- Kishacoquillas Creek near Reedsville, PA
- Octoraro Creek at Richardsmere, MD

D. Monitoring Parameters and Frequency of Collection

Filtered and unfiltered samples will be analyzed for physical characteristics and constituents listed in Table 1.

All samples are collected using Equal Weight Intervals (EWI), and are depth-integrated using either a DH-81, DH-95, or D-95 sampler. Individual verticals are composited into a single churn splitter and processed into appropriate sampling bottles. Samples collected at long-term monitoring sites during the end of the month are referenced with the CBP sample type code "Other-Non-storm samples (ONS)." An additional date-based random flow sample will be collected during the middle of each month at all sites, regardless of the stream discharge. These samples will be referenced with the CBP sample type code "Routine (R)."

Routine samples that are storm-impacted will be handled as per the CBP Non-tidal sampling procedures which state, "If high discharge occurs during routine monthly sampling, collect the samples on the scheduled date using procedures for storm event sampling, and including a Suspended Sediment Concentration (SSC) sample." These samples are to be counted as routine, monthly samples and designated as sample type "Routine, Storm-impacted (RSI)." A routine, storm-impacted event has a rising discharge (cfs) of at least twice that of the pre-storm, average daily discharge.

Storm runoff samples for all sites will be collected during four high flow events per year, targeting one storm per season. Two discrete samples will be collected per storm, targeting one sample during the rise and one during the peak of flow on different days. These samples will be referenced with the CBP sample type code "Storm samples (S)."

Table 1. Monitoring Parameters

Parameter	Number of Samples	Sample Matrix	Analytical Method Reference	Sample Preservation	Holding Time
Dissolved Oxygen	1,448	Water/sediment	Instream field measurement at each vertical	N/A	None
pH	1,448	Water/sediment	Instream field measurement at each vertical	N/A	None
Temperature	1,448	Water/sediment	Instream field measurement at each vertical	N/A	None
Specific Conductance	1,448	Water/sediment	Instream field measurement at each vertical	N/A	None
Turbidity	1,448	Water/sediment	Instream field measurement at each vertical	N/A	None
Suspended Sediment	552	Water/sediment	SRBC* - Filtration Method	N/A	N/A
Suspended Sediment	416	Water/sediment	ASTM Method D 3977-97	N/A	N/A
Sand-Fine Splits	208	Water/Sediment	ASTM Method D 3977-97	N/A	N/A
Total Nitrogen	1,248	Water/sediment	SM. 4500-Norg-D**	Chill at < 6^{O}C w/out freezing	None
Dissolved Nitrogen	1,248	Water	SM. 4500-Norg-D**		None
Total Nitrate + Nitrite	1,448	Water/sediment	USEPA 353.2		48 Hours
Dissolved Nitrate + Nitrite	1,448	Water	USEPA 353.2		48 Hours
Dissolved Orthophosphate	1,448	Water	USEPA 365.1		48 Hours
Total Kjeldahl Nitrogen $^{+}$	200	Water/sediment	USEPA 351.2	Chill at < 6^{O}C w/out freezing H_2SO_4 to pH<2	28 Days
Dissolved Kjeldahl Nitrogen $^{+}$	200	Water	USEPA 351.2		28 Days
Total Ammonia	1,448	Water/sediment	USEPA 350.1		28 Days
Dissolved Ammonia	1,448	Water	USEPA 350.1		28 Days
Total Phosphorus-TP	1,448	Water/sediment	USEPA 365.1		28 Days
Dissolved Phosphorus-DP	1,448	Water	USEPA 365.1		28 Days
Total Organic Carbon	1,248	Water/sediment	SM 5310C		28 Days
Total Organic Carbon	200	Water/sediment	SM20 5310C $^{+}$		28 Days
Total Suspended Solids	1,248	Water/sediment	USGS-I-3765/3767 and SM 2540E	N/A	7 Days
Total Suspended Solids	200	Water/Sediment	SM 2540 D $^{+}$	N/A	7 Days

* SRBC suspended sediment methodology listed in Attachment B
**Standard Methods, 19th Edition
$^{+}$ New York analysis – ALS Environmental, Inc.

Additional storm runoff samples will be collected for long-term monitoring sites, including a fifth storm event targeted for the spring. In addition to the two discrete samples mentioned above, up to four additional discreet samples over the hydrograph (two on the rising and two on the falling stage) will be sent to the laboratory for analysis for long-term monitoring sites. These samples will be referenced with the CBP sample type code "Other-storm samples (OS)."

VII. PROJECT FISCAL INFORMATION

See USEPA CBPO grant application.

VIII. SCHEDULE

Activity	2020 J	F	M	A	M	J	J	A	S	O	N	D	2021 J
Coordination	X	X	X	X	X	X	X	X	X	X	X	X	X
Water Sampling	X	X	X	X	X	X	X	X	X	X	X	X	
DATA													
Duet Submission			X										
Summary Statistics								X					
REPORTS													
Quarterly Reports			X			X			X			X	
Mid-year Report							X						
Annual Report													X

IX. PROJECT ORGANIZATION AND RESPONSIBILITY

A. Project Organization

Agency	Contact	Role	Email
SRBC	James Shallenberger	Project Officer, QA Officer	jshallenberger@srbc.net
	Kyle Kessler	Field Operations Lead	kkessler@srbc.net
	Joshua Brengel	Technical Lead	jbrengel@srbc.net
PADEP, BCW, WQD	Mark Brickner	Project Officer	mbrickner@pa.gov
	Dustin Shull	Environmental Group Manager	dushull@pa.gov
	Josh Lookenbill	QA Officer	mlookenbill@pa.gov
PADEP Lab	Martina McGarvey	Director	mmcgarvey@pa.gov
	Taru Upadhyay	Technical Director	tupadhyay@pa.gov
	Janelle Barry	Section Chief, Radiation Measurements	jbarry@pa.gov
	Chris Wilkinson	Section Chief, Air Chemistry & Gravimetric Services	lwilkinson@pa.gov
	Carmen Gaston	Section Chief, Trace Metals & Receiving	cgaston@pa.gov
	Jennifer Fesler	QA Officer	jenfesler@pa.gov
NYSDEC	Jacqueline Lendrum	NY Sampling coordinator	Jacqueline.lendrum@dec.ny.gov
ALS Environmental	Janice Jaeger	Project Manager	janice.jaeger@alsglobal.com
USGS, OH-KY-IN WSC	Rebecca Bushon	Ohio Water Microbiology Lab	rnbushon@usgs.gov
	Thomas Jeffords	Physical Science Technology	tjeffords@usgs.gov
USEPA CBPO	James Hargett	Project Officer	Hargett.james@epa.gov
	Durga Ghosh	QA Officer	dghosh@chesapeakebay.net

B. Project Responsibility

1. Data Collection

Data collection and data analysis will be performed by SRBC with cooperation from the PADEP Bureau of Laboratories (PADEP Lab) and the Bureau of Clean Water (BCW), Water Quality Division (WQD). Compliance with the Quality Assurance Project Plan (QAPP) will be the responsibility of each agency's Quality Assurance Officer. Quarterly reports documenting data collection activities will be sent to the PADEP BCW Project Officer.

New York samples will be collected by SRBC. Additional samples at Chemung and Smithboro will be collected by NYSDEC from April to September. Quality assurance of sample collection will be insured by both agencies following the sample procedure listed in Section XI.

- SRBC
  - Kyle Kessler, Field Operations Lead
  - Joshua Brengel, Technical Lead
  - James Shallenberger, Project Officer and Quality Assurance Officer

- PADEP BCW
  - Mark Brickner, Project Officer

2. Data Analysis

All Pennsylvania water samples, including QA samples, will be taken to the PADEP Lab. Appropriate quality assurance measures for sample analyses and lab procedures, as established by the PADEP Lab, will be the responsibility of the Quality Assurance Officer for the lab. Resolution of problems will be the responsibility of a Section Chief and the respective Quality Assurance officers.

Water samples and duplicates collected at New York sites will be sent to ALS Environmental for analysis. Samples will be analyzed according to the lab's approved QAPP.

Sand/fine particle analysis and sediment analysis for storm samples will be conducted at the USGS Sediment Lab. Suspended-sediment analysis for routine sampling at long-term monitoring sites will be conducted at SRBC. The SRBC SS standard operating procedure (SOP) is listed in Attachment B.

- PADEP Lab
  - Martina McGarvey, Director
  - Taru Upadhyay, Technical Director
  - Janelle Barry, Chris Wilkinson, and Carmen Gaston, Inorganics Section Chiefs
  - Jennifer Fesler, Quality Assurance Officer

- NYSDEC
  - Jacqueline Lendrum, Contact

- ALS Environmental
  - Janice Jaeger, Project Manager, New York Sampling

- USGS, Ohio-Kentucky-Indiana Water Science Center
  - Rebecca Bushon, Ohio Water Microbiology Laboratory
  - Thomas Jeffords, Physical Science Technology

3. Project Coordination and Overview

Project coordination and review will be the responsibility of the PADEP BCW Project Officer. Appropriate quarterly progress reports will be sent to the USEPA Project Officer by the PADEP BCW. Any problems that occur that cannot be solved by the project officers of each agency will be resolved by the identified PADEP BCW responsible individual.

- PADEP BCW, WQD
  - Dustin Shull, Environmental Group Manager, Assessment Section
  - Mark Brickner, Water Program Specialist, Monitoring Section
  - Josh Lookenbill, Environmental Group Manager, Monitoring Section

- USEPA Chesapeake Bay Program Office
  - James Hargett, Project Officer
  - Durga Ghosh, Quality Assurance Officer

X. DATA QUALITY REQUIREMENTS AND ASSESSMENTS

Data collected during this study will be used to help define magnitude, timing, and severity of nutrient and SS inputs to the Bay and to provide a comparison with data collected from the Susquehanna River at Conowingo, MD. For this reason, several quality assurance objectives must be met.

A. Detection Limits

Analytical methods and detection limits must be compatible with those used by other data collection agencies. The analytical methods and detection limits selected for the constituents of concern were determined by consultation with the USGS and the PADEP Lab to assure compatibility of the results. Detection limits, accuracy, and precision data contained in the Quality Assurance Plan for the PADEP Lab have been found acceptable for this project. A list of the constituents and their detection limits are presented in Table 2.

Table 2. Detection Limits

Parameter	Detection Limits for ALS Environmental (mg/l)	Detection Limits for PADEP Labs (mg/l)
Total Nitrogen	N/A	0.040
Dissolved Nitrogen	N/A	0.040
Total Kjeldahl Nitrogen	0.050	N/A
Dissolved Kjeldahl Nitrogen	0.050	N/A
Total Ammonia	0.05	0.020
Dissolved Ammonia	0.05	0.020
Total Nitrite + Nitrate	0.002	0.040
Dissolved Nitrite + Nitrate	0.002	0.040
Total Phosphorus-TP	0.002	0.020
Dissolved Phosphorus-DP	0.002	0.020
Orthophosphate-P	0.001	0.002
Total Suspended Solids	1.0	2.000*
Total Organic Carbon	1.0	0.500

* Reporting limit

B. Data Representativeness

The collection of water quality samples representative of river conditions is essential for the program to be successful. Spatial variability inherent to a sampling site is addressed by taking depth-integrated, isokinetic water samples across the cross section at the sampling site; the sample thus reflects the composite effect of occurrences upstream from the site. Data will be collected within the same time frame at all locations. Therefore, data collected at all sites should be representative of conditions in the Susquehanna River Basin within a specified timeframe. Collection of greater than 90 percent of the programmed samples will be considered as fulfilling the program objective.

C. Data Comparability

Use of USEPA-approved laboratory methods and USGS field techniques provide a uniform methodology for both field and laboratory analysis. Data from this project are intended to be comparable with data collected for the Chesapeake Bay River Input Monitoring Program. To ensure data are comparable with the River Input Program, similar data collection methods and analysis are used. The PADEP Lab routinely analyzes CBP split samples and USGS reference samples to check the comparability of the field and laboratory data.

D. Precision and Accuracy

Variability within the PADEP Lab will be quantified with field-split samples. Field blanks will be used to determine total measurement error due to contamination. If contamination of the blank is found, additional field blanks will be submitted, along with samples from the same volume of deionized water poured directly into the precleaned sample bottle. This procedure will help to determine the source of contamination. Samples sent to the laboratory for analyses will include >5 percent field-split samples including 24 duplicates in PA, 10 duplicates in NY, 21 field blanks in PA, five field blanks in NY, four source water blanks in PA, and one source water blank in NY. Random number generation will be used to determine where and when QA samples will be collected, as well as whether they will be collected during the routine sampling round of a given month or during a storm/storm-impacted round. Duplicate sample difference should be less than 20 percent. Field blank results should be less than 10 percent of the lowest value in the sample batch. Variability among laboratories will be quantified through the use of Chesapeake Bay Program field-split duplicate samples that will be sent to the USGS and the PADEP laboratories. This activity is being conducted in cooperation with the USGS Water Science Center in Catonsville, MD, which has the responsibility for interlaboratory quality assurance.

Detection limits, accuracy, and precision of data are included in each lab's individual Quality Assurance Plan and are acceptable for this project. For all analytes, 10 percent of samples analyzed have duplicates completed. For all analytes, a spike analysis is completed for every 10 samples. Recovery amounts are listed in Table 3. Data analysis methods will be based on approved USEPA and USGS techniques.

Table 3. Recovery Amounts

Parameter	Spike Recovery Limits %		Duplicate Max Variation %	
	PADEP	ALS	PADEP	ALS
Total Nitrogen	± 10%	N/A	± 10%	20%
Dissolved Nitrogen	± 10%	N/A	± 10%	20%
Total Kjeldahl Nitrogen	± 10%	71-120	± 10%	20%
Dissolved Kjeldahl Nitrogen	± 10%	71-120	± 10%	20%
Total Ammonia	± 10%	90-110	± 10%	20%
Dissolved Ammonia	± 10%	90-110	± 10%	20%
Total Nitrite + Nitrate	± 10%	90-110	± 10%	20%
Dissolved Nitrite + Nitrate	± 10%	90-110	± 10%	20%
Total Phosphorus-TP	± 10%	81-112	± 10%	20%
Dissolved Phosphorus-DP	± 10%	81-112	± 10%	20%
Orthophosphate-P	± 10%	90-110	± 10%	20%
Total Suspended Solids < 100 mg/L	± 10%	80-120	± 10%	20%
Total Suspended Solids >100 mg/L	± 20%	80-120	± 10%	20%
Total Organic Carbon	± 20%	86-117	± 10%	20%

XI. SAMPLING PROCEDURES

A. Sample Collection

All samples will be depth-integrated, isokinetic samples, using USGS standard equipment and techniques. A complete description of the sampling procedures used for this study can be found in Brown and others (1970), in Guy and Norman (1970), and in USGS (2006). Descriptions of sampling devices are found in the National Handbook of Recommended Methods for Water-Data Acquisition, Chapter 3, pp. 3-18 to 3-24. Equipment used includes weighted bottle, DH-2, DH-81, DH-95, D-95, and D-96.

A copy of the sample identification and lab request form is found in Attachment C. Information on the form includes the collector's name and telephone number, date, time, sample number, and stream name. The first four digits of the sample number identify the collecting agency (SRBC) and the last three digits identify the sample in sequential order.

All water quality parameters including temperature, dissolved oxygen, turbidity, conductivity, and pH will be taken instream at each vertical, and the median value will be recorded. During times when this is not possible due to high flow, all water quality will be taken from the composite sample after the water quality sample has been processed from the churn.

Whole-water (unfiltered) samples will be collected to ensure that the samples are representative of stream conditions. Samples will be collected by compositing depth-integrated samples from equal increments of discharge along the cross section in a precleaned churn splitter. Sample bottles will be filled while gently churning the water. Field-split samples will be collected by filling sample bottles from the same volume of water in the churn splitter. Samples will be filtered in the field using Fondriest medium capacity dispos-a-filter, 0.45-micron, 350-cm^2 filter area.

A random number generator is used at the beginning of the calendar year to determine the collection schedule for blank samples and duplicate samples. This schedule is then constructed so that every site has at least one duplicate sample taken during the year and one blank.

Field-blank samples will be processed in the field. Deionized water for blank samples will be transported to the sampling site and processed through the pre-cleaned sampling equipment and churn splitter before filling the sample bottles.

Appropriate labels with the sample number, location, date, time, and fixative (where appropriate) will be affixed to each sample container. Samples will be stored on ice and transported to the lab within 24 hours of collection.

The standard USGS depth-integrating samplers, DH-2, DH-81, DH-95, D-95 and D-96, will be used for sampling. A 1/8, 3/16, 1/4, or 5/16 inch nozzle will be used for isokinetic sampling. A newly cleaned plastic bottle will be used at each site. All equipment will be cleaned in the laboratory with 0.1 percent v/v ratio of Liquinox: tap water and rinsed with tap water followed by deionized water. The equipment will be rinsed with river water at each site prior to sample collection. The churn will be rinsed with deionized water after completion of sample collection at each site and repackaged in plastic for the following site.

XII. SAMPLE CUSTODY PROCEDURES

Immediately upon collection, samples will be chilled on ice and transported to the lab within 24 hours. The lab will perform the necessary analyses within the holding time limits specified in its Quality Assurance Plan.

All samples will be submitted with the appropriate analysis request form (Attachment C), as provided by the PADEP Lab and ALS Environmental. This form includes the site location, name of person collecting the sample, and the standard analysis code, as well as any other pertinent information the lab or the sampler needs for future reference.

Field-tracking forms are not needed, since only one person will be handling and transmitting samples to the lab. A field notebook will be kept by personnel collecting the samples. A copy of the note sheet is included in Attachment C. Data to be recorded in the field notebook include the sample ID and type, date, time, field data collected, collector initials, sonde ID, sample location, field WQ location, sampler type, nozzle, lot numbers for filter and preservatives, and any comments the collector has concerning the conditions at the site or problems encountered while collecting the sample.

Custody of samples at the lab will follow procedures as established by each lab's individual Quality Assurance Plan, with appropriate documentation. A complete flow chart for data collection through data submission is listed in Attachment D.

XIII. CALIBRATION PROCEDURES AND PREVENTATIVE MAINTENANCE

SRBC uses the Eureka Manta+ 30 for instream measurement of pH, specific conductivity, dissolved oxygen, turbidity, and temperature during routine samples. During times when this is not possible due to high flow, all water quality will be taken from the composite sample after the water quality sample has been processed from the churn. Every instrument used to collect water quality data will be returned for factory maintenance/calibration as needed.

Meters will be calibrated at the beginning of each sampling day. For multi-day sampling efforts, the morning calibration will serve as both the current days calibration and the previous days post calibration. At the end of a multi-day sampling round a final post calibration will be completed after the last day of sampling.

A. Meters

1. Specific Conductance Meter

Primary Meter: Eureka Manta+ 30 will be used. SRBC personnel will keep meters in working order and calibrated daily against one specific conductance standard (usually 1000 umhos/cm), obtained within six months.

Acceptance Criteria: Standards (<1,000 umhos/cm) ± 4 percent
(>1,000 umhos/cm) ± 3 percent

Backup Meter: YSI 650 MDS with 6820 V2 logger will be used. SRBC personnel will keep meters in working order and calibrated monthly against one specific conductance standard (usually 1000 umhos/cm), obtained within six months.

2. pH Meter

Primary Meter: Eureka Manta+ 30 will be used. SRBC personnel will calibrate meters daily prior to use using two pH buffer standards (7 and 10), purchased within six months to insure the meters are working properly.

Backup Meter: YSI 650 MDS with 6820 V2 logger will be used. SRBC personnel will calibrate meters daily prior to use using two pH buffer standards (7 and 10), purchased within six months to insure the meters are working properly.

3. Thermometer

Eureka Manta+ 30 will be used. The sondes utilize a thermistor of sintered metallic oxide that changes predictably in resistance with temperature variation. The algorithm for conversion of resistance to temperature is built into the sonde, software, and accurate temperature readings in degrees Celsius, Kelvin, or Fahrenheit are provided automatically. No calibration or maintenance of the temperature sensor is required.

In accordance with the 2008 CBPO Nontidal WQ Procedures, thermistor will be checked annually.

4. Dissolved Oxygen Meter

Primary Meter: Eureka Manta+ 30 will be used. Meters will be calibrated daily prior to sample collection using the air calibration chamber in water method.

Backup Meter: YSI 650 MDS with 6820 V2 logger will be used. Meters will be calibrated daily prior to sample collections using the air calibration chamber in water method.

5. Turbidity Meter

Meter: Eureka Manta+ 30 will be used. Meters will be calibrated daily prior to sample collection using 0 NTU and 1000 NTU.

Backup Meter: YSI 650 MDS with 6820 V2 logger will be used. Meters will be calibrated daily prior to sample collections.

B. Maintenance of Calibration Records

Staff will maintain records of instrument calibrations, repairs, and maintenance in the "Water Quality Field Instrument Calibration Log," and will report any abuse or neglect of equipment or calibration schedules to the Project Officer.

C. Preventative Maintenance

1. Conductivity-dip cell

Staff will wash the conductivity cell with deionized water and river water. The cell will be shaken dry and stored.

2. pH-combination electrode

The electrode will be stored according to operating manual instructions.

3. Dissolved oxygen meter

Meters will be stored according to operating manual instructions.

4. Water sample churn

SRBC staff will churn with deionized water and river water before collecting a sample at each site. SRBC staff also will rinse and scrub the churn splitter with Liquinox detergent and rinse with tap water then deionized water prior to each sampling day.

D. Backup Instruments and Equipment

Backup instruments and equipment also will be maintained, as described in Section A above.

XIV. DOCUMENTATION, DATA REDUCTION, AND REPORTING

A complete flow chart for data collection through data submission is listed in Attachment D. Samples collected in the field will be labeled at the time of collection. PADEP sample bottles are labeled with a seven-digit identification number, sampling date, and time. The seven-digit identification number consists of a four-digit collector identification number and a three-digit sample number. This identification information also is recorded on a laboratory submission sheet. One form is submitted with each set of samples and also includes an analysis code that designates the laboratory analyses to be conducted. Laboratory results from PADEP will be received by electronic transfer. ALS Environmental will submit electronic copies of data from New York.

All project data will be entered into the SRBC database. On completion of data entry, they will be retrieved, and visually checked by project personnel to insure that data were entered correctly. The data will be served on SRBC's web site (www.srbc.net). New York data will be submitted by SRBC through the CBPO's Data Upload and Evaluation Tool (DUET). All parameters will be reported in mg/L.

Prior to sample collection each year, SRBC and PADEP will provide the CBPO with an updated set of the metadata spreadsheets addressing the upcoming field collection period including any anticipated changes

in personnel, parameters, and/or methods. The spreadsheets include 1) Expected Parameters & Stations, 2) Points of Contact, and 3) Methods/MDLs.

The new model Weighted Regression on Time Discharge and Season (WRTDS) will be used to calculate loads, concentrations, flow normalized loads, and flow normalized concentrations (FNC) and for trend analysis (Hirsch and De Cicco, 2015). Trends in flow will be evaluated in R using the Mann- Kendall test and Thiel-Sen slope estimator.

XV. DATA VERIFICATION AND VALIDATION

Primary responsibility for data validation lies with the project officer. Field collections are conducted according to the above methodology to ensure accurate data. The use of a blank sample and duplicates, the results of which are reviewed by the project officer, also validates the water quality analyses. The SRBC project officer verifies all sample labeling, chain-of-custody forms, and lab reports to ensure they are in agreement and complete. The project officer also checks the data reports to ensure that no data were flagged by ALS or PADEP Lab and that the data were generated under proper methodology and holding time. The collector and other SRBC scientists may assist the project officer in determining the acceptability of the data at the time of receipt based on his/her knowledge of the current and historic stream conditions. In this way, peer review of the data upon receipt helps verify and validate the data.

ALS and PADEP Lab verifies and validates data using protocols outlined in respective Quality Assurance Manuals (available on request). The SRBC project officer will review QA/QC reports supplied by the labs for the periods of time in which samples for the project are processed. The project officer will immediately contact the labs for further investigation if data are missing or appear to be in error or improper techniques were used.

The data go through a series of validations as they are entered into the database, including checking values for duplicate samples against one another, comparing computer entries to field and laboratory data sheets, looking for data gaps and missing information, checking flow calculations, and examining raw data for outliers or inappropriate measurements. Peer review by one or two other staff members of the information after input is done to ensure correct data entry.

XVI. PERFORMANCE AND SYSTEMS AUDITS

A. Laboratory Analyses

Analytical and quality assurance procedures for each laboratory are detailed in the labs' Quality Assurance Plan. Duplicate samples will be submitted to the PADEP, ALS, and USGS laboratories by the field personnel, as directed above. The total number of quality assurance samples submitted will be at least 10 percent of the samples analyzed. The appropriate Quality Assurance Officer and Project Officer will review results for necessary action. Any problems which cannot be resolved by SRBC personnel will be deferred to the PADEP BCW Project Officer for solution.

Chesapeake Bay Tributary Split Samples (Blue Plains) are delivered to PADEP Lab, and the results are compared to other Bay laboratories. USGS nutrient reference samples are analyzed once or twice a year.

B. Field Procedures

Field personnel will be subjected to performance audits for pH and specific conductance. The USGS Water Science Center in New Cumberland will schedule audits annually using standard samples provided by the USGS Central Lab. Results will be verified by the USGS Central Lab. The SRBC Project Officer is responsible for verifying that all field personnel are competent in the collection techniques before participation in any fieldwork. Any unsatisfactory results will be cause for a repeat audit, at the discretion of the Project Officer.

XVII. CORRECTIVE ACTION

Corrective action is taken immediately upon discovery of a problem. Project personnel will interact constantly to coordinate project activities. Additionally, meetings with personnel from all agencies will be held at the discretion of the PADEP BCW Project Officer. Data and data-collection activities are discussed constantly and evaluated. Corrective action is taken immediately by the appropriate agency Project Officer, if evaluation indicates action is necessary. Laboratory corrective action is the responsibility of the Lab Quality Assurance Officer. Any issues that cannot be resolved by the Lab Officer and the SRBC Officer will be referred to the PADEP BCW Project Officer or his/her supervisor for action.

XVIII. REPORTS

Quarterly reports will be submitted by SRBC to the PADEP BCW Project Officer. These quarterly reports will include a description of activities completed during the quarter, as well as any problems encountered. Data analysis results will be summarized.

A quarterly report will be submitted to USEPA, CBPO Project Officer by the PADEP BCW Project Officer as part of the quarterly grant report.

A final report also will be submitted by SRBC annually that summarizes the results to the PADEP BCW Project Officer.

For the enhanced monitoring sites and trends work, a semi-annual progress report and final report will be completed and submitted to the CBPO.

XIX. DATA QUALITY OBJECTIVES

SRBC personnel will receive results of analyses, and will submit copies of the analyses and "primary printouts" to project personnel. The data will be verified by comparing values with ranges of values from prior sampling and by review of data plots.

If an error in an analysis is detected or suspected, the questionable value will be noted and a rerun will be requested. Rerun data will be reviewed by the project personnel, and appropriate changes will be made in the computer files. If results of field-split duplicate samples are different but are within quality assurance specifications, the average of the two values will be reported.

REFERENCES

Brown, E., M.W. Skougstad, and M. Fishman. 1970. Methods for Collection and Analysis of Water Samples for Dissolved Minerals and Gases. U.S. Geological Survey Techniques of Water Resources Investigation, Book 5, Chapter A1.

Chesapeake Bay Program. 2013. "Interim Guidance for Nontidal Network WY 2013 Field Blank and Duplicate Sample Collection." March 12, 2013. URL: http://www.chesapeakebay.net/channel_files/19326/ntn_wy2013_qc_sample_guide-3-12-13_app-d.pdf.

Chesapeake Bay Program. 2008. "Chapter V, Nontidal Water Quality Monitoring," Final Draft, Rev. 0, November 18, 2008. URL: http://archive.chesapeakebay. net/pubs/subcommittee/msc/ amqawg/Chapter%205%20Nov%2008%20Final.pdf.

Cohn, T.A., L.L DeLong, E.J. Gilroy, R.M. Hirsch, and D.E Wells. 1989. Estimating Constituent Loads. Water Resources Research, 25(5), pp. 937-942.

Guy, H.P. and V.W. Norman. 1969. Field Methods for Measurement of Fluvial Sediment. U.S. Geological Survey Techniques of Water Resources Investigation, Book 3, Chapter C2 and Book 5, Chapter C1.

Hirsch, R.M. and L.A. De Cicco. 2015. User guide to Exploration and Graphics for RivEr Trends (EGRET) and dataRetrieval: R packages for hydrologic data (version 2.0, February 2015): U.S. Geological Survey Techniques and Methods book 4, chap. A10, 93 pp., http://dx.doi.org/10.3133/tm4A10.

Langland, M.J., J.D. Bloomquist, L.A. Sprague, and R.E. Edwards. 1999. Summary of Trends and Status for Flow, Nutrients, Sediments at selected Nontidal Sites, Chesapeake Bay Basin, 1985-99. U.S. Geological Survey (Open-File Report 01-73), 20 pp.

Schertz, T.L., R.B. Alexander, and D.J. Ohe. 1991. The computer program EStimate TREND (ESTREND), a system for the detection of trends in water quality data: U.S. Geological Survey Water-Resources Investigations Report 91-4040, 63 pp.

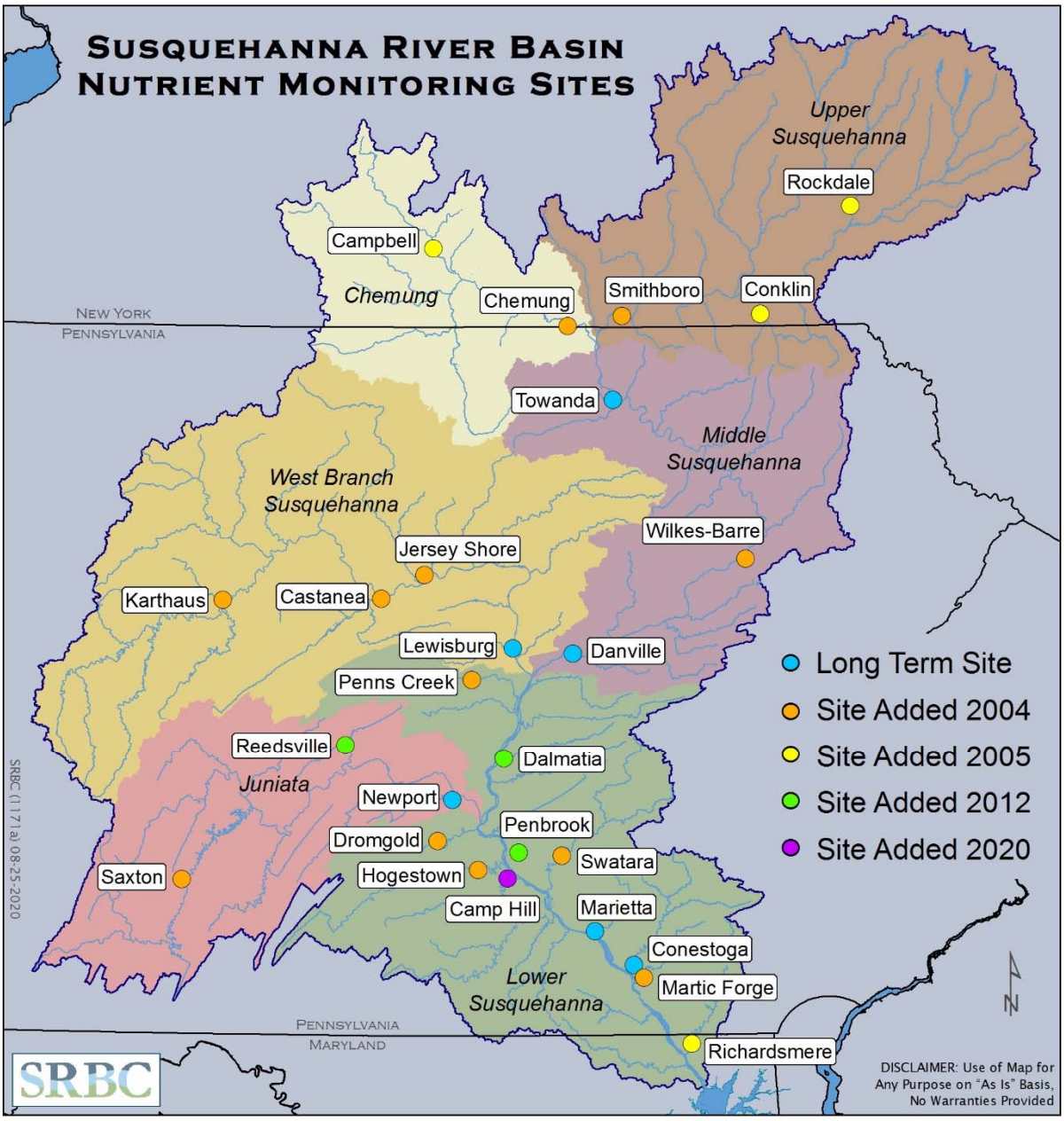
U.S. Geological Survey. 2006. Collection of water samples (ver. 2.0): U.S. Geological Survey Techniques of Water-Resources Investigations, book 9, chap. A4. Accessed 2/6/12. http://pubs.water.usgs.gov/twri9A4/.

ATTACHMENT A
Site Locations

Table A1. USGS Gage Numbers and Latitude and Longitude of Sampling Sites

Long-term Monitoring Sites	Gage #	Latitude	Longitude
Susquehanna River at Towanda, PA (James Street Bridge)	01531500	41°47'27"	-76°26'40"
Susquehanna River at Danville, PA	01540500	40°57'29"	-76°37'10"
Susquehanna River at Lewisburg, PA	01553500	40°58'05"	-76°52'25"
Juniata River at Newport, PA	01567000	40°28'42"	-77°07'46"
Susquehanna River at Marietta, PA (Rt. 30 Bridge)	01576000	40°02'08"	-75°31'23"
Conestoga River at Conestoga, PA	01576754	39°56'20"	-76°23'15"
Enhanced Monitoring Sites	**Gage #**	**Latitude**	**Longitude**
Susquehanna River at Smithboro, NY	01515000	42°02'02"	-76°24'02"
Cohocton River near Campbell, NY	01529500	42°15'09"	-77°13'01"
Chemung River at Chemung, NY	01531000	42°00'10"	-76°38'06"
Susquehanna River at Conklin, NY	01503000	42°02'07"	-75°48'12"
Unadilla River at Rockdale, NY	01502500	42°22'40"	-75°24'23"
Susquehanna River near Wilkes-Barre, PA	01536500	41°15'03"	-75°52'52"
West Branch Susquehanna River near Jersey Shore, PA	01549760	41°12'08"	-77°15'05"
Penns Creek at Penns Creek, PA	01555000	40°52'00"	-77°02'55"
Bald Eagle Creek near Castanea, PA	01548085	41°07'36"	-77°25'60"
Shermans Creek near Dromgold, PA	01568000	40°20'46"	-77°11'31"
Conodoguinet Creek near Hogestown, PA	01570000	40°15'08"	-77°01'17"
Swatara Creek near Hershey, PA	01573560	40°17'54"	-76°40'05"
Yellow Breeches Creek near Camp Hill, PA	01574000	40°13'29"	-76°53'54"
Pequea Creek near Martic Forge, PA	01576787	39°53'53"	-76°20'32"
West Branch Susquehanna River near Karthaus, PA	01542500	41°07'03"	-78°06'33"
Raystown Branch Juniata River at Saxton, PA	01562000	40°12'57"	-78°15'56"
Octoraro Creek at Richardsmere, MD	01578475	39°41'25"	-76°07'41"
East Mahantango Creek near Dalmatia, PA	01555500	40°36'40"	-76°54'44"
Paxton Creek near Penbrook, PA	01571000	40°18'30"	-76°51'00"
Kishacoquillas Creek near Reedsville, PA	01565000	40°39'17"	-77°35'00"

Figure A1. Sampling Site Locations



ATTACHMENT B
SRBC Suspended Sediment Standard Operating Procedure

STANDARD OPERATING PROCEDURE (SOP) FOR SUSPENDED SEDIMENT CONCENTRATION (SSC)

Susquehanna River Basin Commission
4423 North Front Street
Harrisburg, PA 17110-1788
Phone (717) 238-0423
Fax (717) 238-2436

Manager, Monitoring & Protection
Name James P. Shallenberger Signature _____ Date_____

QA Officer
Name James P. Shallenberger Signature _____ Date_____

Author
Name Kevin H. McGonigal Signature _____ Date_____

Review	Date	Description of Revision /Comment	Signature
1	2/5/2015	Initial Release	

TABLE OF CONTENTS

I. OVERVIEW & PURPOSE

The following standard operating procedure has been developed in order to provide Susquehanna River Basin Commission (SRBC) staff with information necessary to perform suspended sediment concentration analysis at the SRBC laboratory located at 4423 North Front Street.

The SOP has been adopted from Guy, 1969*. Adherence to the SOPs will ensure that conformance to technical and quality system requirements are met regardless of personnel changes and that consistent, high-quality data is collected.

II. PROCEDURAL SECTION

A. Scope & Applicability
   1. This SOP is intended to provide specific procedures involved in suspended sediment concentration analysis to be conducted in the laboratory at Susquehanna River Basin Commission.

B. Summary of Method
   1. Filtration method outlined in Guy (1969)*

C. Definitions
   1. SSC – Suspended Sediment Concentration

D. Health & Safety Warnings
   1. Caution when working with crucibles and sediment bottles to avoid broken glass.

E. Interferences
   1. Potential interferences include contaminated containers and materials, large pieces of debris or gravel on the filter paper, which need to be removed prior to measurement.

F. Personnel Qualifications/Responsibilities
   1. Individuals new to this procedure will work with experienced staff to gain familiarity with equipment and procedures.

G. Equipment and Supplies

1. Pyrex Gooch coarse fritted disc crucibles
2. Whatman glass microfiber 32 mm Filters
3. Desiccator
4. Forceps
5. Gravity Convection Oven
6. Dishwasher for sediment bottles
7. Vacuum/filtration system (Air Admiral Vacuum pump)
8. Water Bottle
9. Scales
   - OHAUS E4000 – weighing sediment bottles
   - Mettler AE240 – weighing crucibles
10. Tongs

H. Procedure

Use tongs during all procedures involving crucibles after cooked in the oven.

Sediment sample processing procedure

1. Clean Crucibles in water
2. Air dry and add filter paper
3. Into oven for 24 hours at 105* degrees
4. Out of oven into desiccator for 24 hours (using tongs)
5. Weigh each crucible (handle with tongs)
6. Weigh sediment sample (record Tare and Gross)
7. Record information (site, date, time etc.)
8. Record crucible number to be used
9. Pour sediment sample into crucible (rinse bottle with DI to insure all sediment collected)
10. Use forceps to remove any large pieces of organic matter and/or gravel.
11. Crucibles into oven for 24 hours at 105* degrees
12. Out of oven into desiccator for 24 hours (tongs)
13. Weigh sample (tongs)
14. Crucibles to sink

Scale Calibration procedure

1. Turn scale on and allow 30 minutes before step 2
2. Hold bar down until calibration mode is reached
3. Wait until 100 g is requested then slide lever on right side backward
4. Wait until 0 g is requested then slide lever on right side forward
5. After calibration place crucible in center and close door. Allow several seconds for reading dot goes off on LED display before recording value.

I. Data and Records Management

1. Suspended sediment concentration is calculated using the following equation:

$$\frac{(A - B) \times 1{,}000{,}000}{C}$$

A = Weight of crucible plus filtered sediment in grams
B = Weight of crucible plus filter paper (tare) in grams
C = Weight of entire sample minus container tare weight in grams
Results in ppm equivalent to mg/L

2. Data entry form used in laboratory to be transferred to excel
3. Records stored electronically
4. Excel Spreadsheet used for calculations
5. Data entry forms listed in section four.

* As per ASTM Method D 3977-97, the oven temperature recommendation is 105 degrees. The SRBC method for oven temperature was changed from 110 degrees to 105 degrees based on USEPA recommendation on 2/27/2015. (ASTM, 1999)

III. REFERENCES

ASTM. 1999, D 3977-97, *Standard Test Method for Determining Sediment Concentration in Water Samples*, Annual Book of Standards, Water and Environmental Technology, 1999, Volume 11.02, p. 389-394.

Guy, H.P. and V.W. Norman. 1969. *Field methods for measurement of fluvial sediment.* U.S. Geological Survey Techniques of Water Resources Investigation, Book 3, Chapter C2 and Book 5, Chapter C1.

U.S. Environmental Protection Agency. 2007. *Guidance for Preparing Standard Operating Procedures (SOPs) (QA/G-6)*, EPA/600/B-07/001, Office of Environmental Information, Washington, DC.

IV. DATA ENTRY AND CALCULATION FORM EXCERPTS AND EXAMPLE

Sediment Concentration Data Entry Sheet					
Station	Example				
Date	1/1/2015				
Time	1500				
Gross Sample	738				
Tare Sample	234				
Cruc. #	35				

Crucible Weights Data Entry		
Cruc #	Used	Clean
1	23.235	23.20
2		
3		
4		
5		

SEDIMENT CONCENTRATION CALCULATION SHEET											
SITE		Example									
DATE	|	1/1/2015									
TIME	|	1500									
GAGE HT.	|										
GROSS SAMP	|	738									
TARE SAMP	|	234									
NET SAMPLE	|	504	0	0	0	0	0	0	0	0	0
----------	|										
CRUC. #	|	1									
GROSS WT	|	23.235									
TARE WT	|	23.2									
NET WEIGHT	|	0.0350	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
----------	|										
*1000000	|	35000	0	0	0	0	0	0	0	0	0
CONC. PPM	|	69									

ATTACHMENT C
Forms

Field Notes Data Entry Page

SAMPLE # _____
DATE _____
TIME _____
pH _____
COND. _____
TEMP. _____
D.O. _____
TURB _____
GAGE HT _____
Vertical # _____
Filter Lot # _____
HCl lot # _____
HNO3 Lot # _____
Collector _____
Sonde ID _____

____ WQ in churn ____ Alt location
____ Storm ____ Routine
____ Routine Storm Impacted
____ Non-Iso ___ ISO
____ DH-95 ___ D-95 ____ DH-81
____ D-2 ___ Weight Bottle
Nozzle: ____ 3/16 ____ 1/2 ____5/16
Field Notes:

Calibration Log Book Entry Page

Date:		Employee Name:			
Time:		Sonde Type and Serial Number:			
Calibration					
Function	Temp. of Standard	Value of Standard	Initial Reading	Calibrated to	Comments
Specific conductance ≥1,000 µS/cm					Zero Check □Pass □Fail; Value =
pH calibrated (7)					
pH mv for pH 7 solution					Range 0 ± 50 mv
pH calibrated (10/4)					
pH mv for pH10 pH mv for pH 4					Range: -130 to -230 mv Range: 130 to 230 mv
Dissolved Oxygen (% Sat)					
Optional Sensors (include parameter: turbidity, etc.)					
DATA NEEDED FOR DISSOLVED OXYGEN CALIBRATION					
Altitude (A) = _____feet above msl			Barometric pressure_____mm hg		

3800-FM-WSFR0121 8/2009

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Sample Submission Sheet

PA DEP Bureau of Laboratories

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER STANDARDS AND FACILITY REGULATION

# of Unpreserved Bottles:		
Tests	**# of bottles**	**Fixative**
Metals		HNO3
Phenols		H2SO4
CN		NaOH
NA/K		HNO3
Spl. Inorg/Nutrients		H2SO4

Organic Bottles Submitted			
Bottle	**Test**	**# of bottles**	**Fixative**
40mL VOA amber	TOC		H2SO4
40mL VOA amber	DOC		H2SO4
1 L amber			
500 mL amber			
Other:	Bacteria		Pre-cl'd
Other:			

LAB USE ONLY

Lab Number:

Date Received:

Received By:

Temp. ≤ 6°C

Collector ID: 8 6 | **Sequence No.** | **Date Collected (MM, DD, YY)** | **Time Collected (HH MM)**

Reason Code | **Cost Center Code** | **Program Code**: 0 0 | **STD Analysis Code**: 0

Matrix Code | **Residual Chlorine**: Yes No | **pH less than 2.0**: Yes No | **Legal Seal Number:** | Legal Seal Intact: Y N

Additional Analysis

How Shipped:

- ☐ US Cargo
- ☒ Hand Delivered
- ☐ Other _____

Collectors Name: (printed) _____

Phone 717-433-0808

Relinquished By: (signature) _____

Date: _____

Station Number (WQN0###): W Q N 0

Station Name _____

Sampling Location _____

Stream Code | River Mile Index

Stream Name _____

Latitude (DMS) | Longitude (DMS)

FIELD RESULTS:

Temp.(°c)	(00010)	
pH (units)	(00405)	
D.O. (mg/l)	(00300)	
Sp. Cond. (µmhos)	(00094)	
Gage (ft)	(00065)	
Flow (cfs)	(00061)	
Secchi Disk	(00078)	
Turbidity (NTU)	(82079)	

Comments:

FIELD WQ TAKEN: ☐ IN STREAM ☐ IN CHURN

SAMPLE COLLECTION: ☐ ISOKINETIC ☐ NON-ISOKINETIC

One Copy of This Sheet Goes To: a) 625 Broadway, 4th Floor, Albany, New York 12233-3502
b) With sample to contract lab c) Retain for your records

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

CONTRACT LAB SAMPLE INFORMATION SHEET

Print Legibly

Clear Form

CAUTION (check if applicable)

☐ Lab personnel are expected to use caution when handling DEC samples, however, please use special caution when handling this sample since it is believed to contain significant concentrations of hazardous and/or toxic material(s).

CHECK THE BOX PRECEDING THE REQUESTED ANALYSIS

PRIORITY POLLUTANTS (Water and Wastewater Title 40 Part 136)—SPDES

☐ 1. 13PP Metals	☐ 10. Sulfate	☐ 19. Halogenated Volatiles (USEPA 601 GC)
☐ 2. Cyanide	☐ 11. Reactive Phosphorus	☐ 20. Aromatic Volatiles (USEPA 602 GC)
☐ 3. BOD	☑ 12. Total Phosphorus	☐ 21. Volatiles (USEPA 624 GC/MS)
☐ 4. CBOD	☑ 13. Nitrate/Nitrite	☐ 22. Low-Level Volatiles (USEPA 524.2 GC/MS)
☐ 5. COD	☑ 14. Ammonia	☐ 23. Acids/Base/Neutrals (USEPA 625 GC/MS)
☐ 6. pH	☐ 15. TKN	☐ 24. Pesticides/PCBs (USEPA 608 GC)
☐ 7. Settleable Solids	☐ 16. Total Phenols	☐ 25. PCBs at 0.065 µg/L (USEPA 608 GC)
☐ 8. Total Solids	☑ 17. TOC	☐ 26. PCBs congener method (1668A HRGC/HRMS)
☑ 9. TSS	☐ 18. Oil/Grease	☑ 27. Other TPO4, DPO4, TN, DN

CONTRACT LABORATORY PROTOCOLS

☐ 28. (ALL) - Water - Includes 29-33	☐ 35. (ALL) - Soil/Sediments - Includes 36-40
☐ 29. Base/Neutral/Acid (B/N/A) Water (GC/MS)	☐ 36. Base/Neutral/Acid (B/N/A) Soil/Sediments (GC/MS)
☐ 30. Volatile Organic Analysis (VOA) Water (GC/MS)	☐ 37. Volatile Organic Analysis (VOA) Soil/Sediments (GC/MS)
☐ 31. Pesticides/PCBs Water (GC/MS)	☐ 38. Pesticides/PCBs Soil/Sediments (GC)
☐ 32. 23 Metals in Water	☐ 39. 23 Metals in Soil/Sediments
☐ 33. Cyanide in Water	☐ 40. Cyanide in Soil/Sediments
☐ 34. Dioxin - Water (1613B GC/MS)	☐ 41. Doixin - Soil/Sediments (1613B GC/MS)
☐ 42. Other _____	

HAZARDOUS WASTES/RCRA ANALYSIS SW-846

☐ 43. EP Toxicity	☐ 48. EP Toxicity (Metals Only)	☐ 53. BNA (USEPA 8270 GC/MS)
☐ 44. Corrosivity	☐ 49. TCLP (Metals Only)	☐ 54. Pesticides (USEPA 8081GC/ECD)
☐ 45. Ignitability	☐ 50. Metals—17 Hazardous	☐ 55. PCBs (USEPA 8082 GC/ECD)
☐ 46. Reactivity	☐ 51. Percent Solids	☐ 56. Dioxin (USEPA 8280 GC/MS)
☐ 47. TCLP	☐ 52. VOA (USEPA 8260 GC/MS)	☐ 57. Other _____

MUNICIPAL SLUDGE

☐ 58. RS-01 ☐ 59. RS-02 ☐ 60. Other _____

COLLECTED BY:	TELEPHONE NUMBER: (717) 476-7206	REGION NO.:

CONTRACT LABORATORY:	COUNTY:	SAMPLING DATE:	MILITARY TIME:
Columbia Analytical Services			

SAMPLE MATRIX:

☐ Air ☐ Soil/Sediment ☐ Groundwater ☑ Surface Water ☐ Wastewater ☐ Other _____

CASE NO.	SDG NO.	SAMPLE NO.	CHECK FOR MS/MD	TYPE OF SAMPLE
			☐ This Sample	☐ Grab ☑ Composite ☐ Term ____

☐ Check if there will be more samples with this SDG sent in this calendar week.

SAMPLING POINT:

Report via Category B, unless checked ☐

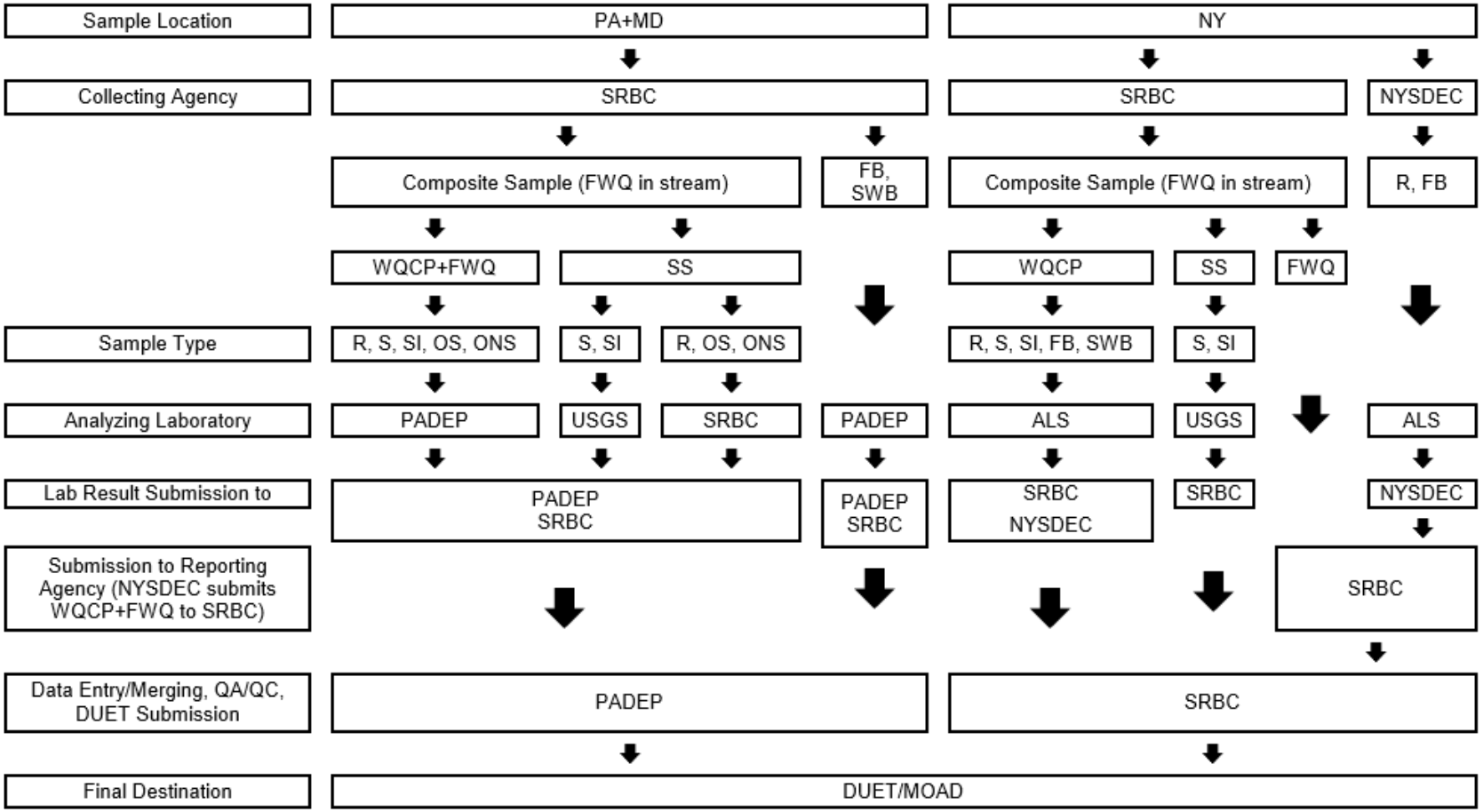
Check if field duplicate ☐ | Outfall Number

Check if sampling is part of inspection ☐

FLOW: _____ GPD _____ MGD

SPDES NUMBER/REGISTRY NUMBER

ATTACHMENT D
Data Collection and Submission Flow Chart



Acronyms:
R-Routine, SI-Storm Impacted, S-Storm, OS-Other Storm, ONS-Other NonStorm, FB-Field Blank, SWB-Source Water Blank, SS-Suspended Sediment, WQCP-Water Quality Chemical Parameters, FWQ-Field Water Quality, QA/QC-Quality Assurance/Quality Check, ALS-ALS Environmental, NYSDEC-New York State Department of Environmental Conservation, PADEP-Pa Department of Environmental Protection, USGS-United States Geological Survey, SRBC-Susquehanna River Basin Commission, DUET-Data Upload and Evaluation Tool, MOAD-Mother of all Databases