



**BUREAU OF CLEAN WATER**

**SURFACE WATER COLLECTION PROTOCOL**

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## **INTRODUCTION**

As part of its water quality monitoring programs, the Pennsylvania Department of Environmental Protection (DEP) collects water chemistry data to assess the quality of the Commonwealth's water resources. This information is used to detect or confirm pollution sources and causes, for routine water quality monitoring, and for abiotic-biotic correlation.

This document provides guidelines for the standardized collection of water samples from wadeable surface water resources. The methods described here are adapted from scientific, peer-reviewed methods, and were developed by the Department's technical experts. This protocol does not attempt to describe the entire spectrum of water quality data-collection techniques (such as continuous instream monitors).

Changing trends in data management, aquatic sciences, and Department programs emphasized the need to standardize the DEP's methods for collection of surface water samples. As the Department's water quality monitoring programs evolve to meet scientific advancements and environmental challenges, this "Methods" manual must be dynamic, and consequently subject to revision.

Because sampling situations may vary largely, no single water sampling procedure can be universally recommended. This document describes surface water sampling procedures appropriate for typical DEP investigations and may require modification as situations dictate. Variations to this protocol will be dependent upon site conditions, equipment limitations, or limitations imposed by the procedure. Investigators should document modifications and report the final procedures employed.

Investigators should be aware of, and work to mitigate, the potential for sample contamination at all phases of the sample collection process by observing proper sample collection, handling, and preservation methods described here. The most common sources of error (also known as "interference") are cross-contamination and improper sample collection and preservation.

The mention of specific trade names or commercial products does not constitute DEP endorsement or recommendation for use.

## **COLLECTION REQUIREMENTS**

### **Collector Identification Number**

Field staff required to collect surface water samples must have an assigned four-digit collector identification number (e.g., 0925). This number along with a sequential three-digit sample number (e.g., 0925-001), and date/time of sample are used to help identify individual samples. Supervisory staff can request collector identification numbers for

their field staff with the “Collector ID Request Form” found at the Bureau of Laboratory’s (BOL) website ([Lab Forms](#)).

## Sample Information System (SIS) Requirements

Field staff must obtain an SIS login name and password in order to enter/edit sample information. SIS is an Oracle application that sample collectors use to store, manage, and retrieve sample information including sample results, sample medium, sample collection location, field parameters, quality control identification, general comment information, etc.

Field staff will need to contact a system coordinator or eFACTS coordinator to obtain the correct SIS securities (see SIS Security Request Form, doc # 1300-FM-IT1016 SIS), which will allow them to manage sample information in SIS. SIS securities are broken down into roles. Roles include (1) Querying, (2) Project Entry, (3) Monitoring Point Entry, and (4) Sample Entry. Each role is then applied to at least 52 specific programs or business units such as (1) Watershed Conservation, (2) Water Supply Management, (3) Land Recycling and Waste Management. Program or business unit names periodically change, pending reorganizations and other circumstances.

Field staff will need to have at least Querying and Sample Entry security roles for the program or business unit that they are collecting samples for. The program or business unit will be consistent with the Program Code entered on the “DEP Laboratory Submission Sheet”

## DEP Laboratory Submission Sheet

Investigators must submit samples to the PA DEP Bureau of Laboratories (BOL) using the “DEP Laboratory Submission Sheet” ([Lab Forms](#)). Field staff are required to document collector identification number, reason code, cost center, program code, sequence number, date collected, time collected (in military time format), fixative(s), Standard Analysis Code (SAC), legal seal numbers for each sample collected (if required), the number of bottles submitted per test suite, collector name, date, phone number, and any additional comments that lab analysts will use to properly handle samples.

As described previously, collector identification numbers are unique to each field staff collecting samples. Reason codes, cost centers, and program codes are program specific and should be obtained from the program responsible for coordinating sampling efforts. Sample sequence numbers are three digit sequential numbers (001-999) unique to a sample collected on a given day generated by field staff collecting samples. Date and time collected should be accurately documented, especially if field parameters with specific diurnal fluctuations (temperature, dissolved oxygen) will accompany analytical results. If a sample is “fixed” or preserved with acid this must be documented in the appropriate space.

A standard analysis code or SAC is a unique code that details analytical tests to be applied to a specific sample. Each DEP program uses specific SACs for specific projects or purposes. For example, SAC 018 is used by “Water Management” when submitting water chemistry samples for Special Protection Surveys. The analytes/tests listed under SAC 018 are those specifically identified by regulations that surface water must meet and therefore be assessed for if a special protection determination is warranted. Other programs have developed unique SACs for their specific purposes, and the DEP BOL encourages programs to create SACs tailored to a program’s specific needs. SAC 100 is used as a “generic” identifier to indicate that a single analytical test is being requested. SAC 100 samples require additional information to be entered in the ‘Comment’ field (i.e. mercury only sample). To view the current list of SACs and suite codes available, refer to [Standard Analysis Codes](#).

Legal seals and associated legal seal numbers are required under circumstances where it is imperative to document the integrity of samples from sample collection to sample analysis. Legal seals are not always required, and should be used according to a program’s specific requirements. Legal seal numbers must be singly listed (include letter and number) for each sample. Legal seals can be obtained from BOL. Refer to BOL for more information concerning legal seals for your particular needs.

Collector Name, Date, Phone Number, and # of Bottles submitted were added to the “DEP Laboratory Submission Sheet” to meet NELAP chain-of-custody requirements. Using the area at the bottom of the form, each bottle submitted for the samples identified must be accounted for by enumerating the number of bottles per category listed for inorganic and organic analyses/tests. Each submitted form is also required to have printed the collector’s name, the date, collector’s signature (Relinquished by: ), and collector’s phone number. There are also spaces to document a facility name, facility identification number, and an alternate contact. These three pieces of information are not required.

The last piece of information to be documented is additional comments that lab analysts will use to properly handle samples. This information is documented in the ‘Comment’ field at the bottom of the form. The most common use of this field is to add or delete tests to or from a specified SAC. For example, SAC 018 does not include a test for turbidity; however, a sample collector needs to document turbidity for a particular sample. The sample collector would identify SAC 018 in the appropriate field and indicate in the ‘Comment’ field to add the turbidity test to the particular sample. If a large number of samples will be submitted with consistent modifications of a particular SAC, the BOL prefers a new SAC be created specifically for those samples. Other important comments to consider include identifying potentially toxic or otherwise dangerous samples, samples submitted for individual tests, and other important information that lab analysts will need to know to handle your samples correctly. The BOL recommends contacting the appropriate BOL staff before submitting samples requesting organic tests, potentially dangerous samples, or samples that need to be handled differently.

Sampling Supplies and Equipment

DEP programs can and do employ a multitude of program specific surface water sampling techniques that will require standard supplies (sampling bottles, preservatives, etc.), and can include specialized supplies (filters) or specialized equipment (Kemmerer, Van Dorn, etc.). This section describes the equipment and supplies required to collect the most commonly used sampling techniques and does not include all surface water sampling techniques that could be employed. Additional techniques are added as they become applicable and as standard procedures are formalized.

Many surface water samples are manually/directly collected instantaneous “grab” samples. Water samples should be collected before conducting other types of in-stream field work in the study reach, such as discharge measurements or benthic macroinvertebrate collection, in order to avoid disturbing the water column. Water samples are normally collected in High-Density Polyethylene (HDPE) or amber glass bottles (for organic compound analysis). Samples should be preserved immediately upon collection, if necessary, with the proper type and amount of chemical fixative (usually an acid to an amount where the matrix pH is less than 2.0 pH units) and should be cooled and held at  $\leq 6^{\circ}\text{C}$  until receipt by the laboratory. The sample bottles should be labeled in accordance with the procedure described later in this document. The numbers and types of sample bottles field staff need for one water sample depend on the specific SAC. The bottles used for a particular sample are determined by the analyses required for that sample and the different types of preservation required for the analyses of interest. Additional information can be found by contacting the appropriate person under [Directory](#).

Most Commonly Used Equipment:

- Sample bottles (e.g, 500ml, 125ml, 125ml Bac-T, 40ml amber VOA with TFE septa caps)
- Preservatives/Fixatives ( $\text{HNO}_3$ ,  $\text{H}_2\text{SO}_4$ , HCL, Ice)
- Sample filters (0.45 $\mu$  (micron), 0.10 $\mu$ )
- Filter equipment (squeeze bottle, surgical tubing, syringe)
- Field meter
- Sterile pipettes
- Coolers
- Field data sheets or notebook
- DEP BOL Sample Submission Sheets
- Ziploc bags (for bottles and/or sample submission sheets)
- Nitrile gloves
- Permanent markers
- Pencils
- Clear packing tape
- 0.1 molar HCl rinse (to decontaminate 1000ml squeeze bottle and pre-wash filters)
- Legal seals (if required)

Some chemical analyses require laboratory technicians to calibrate specialized laboratory equipment, prepare specialized reagents, or otherwise perform pre-analytical preparation before samples can be analyzed. If a collector is going to submit several samples involving specialized preparation (such as for bacteriological analyses, which involve agar plating), he or she should contact the appropriate technician at the laboratory to ensure enough time is allocated for the pre-test procedures. If the laboratory is not notified to expect a large volume of these samples, holding times may be exceeded and the sample may be voided.

Typically, a 500ml HDPE bottle is used for storing an unfiltered, non-chemically preserved sample for inorganic constituent analyses. Some of the common chemical analyses that are obtained from this sample bottle include (with holding times):

- pH (immediate)
- specific conductance (28 days)
- alkalinity (14 days)
- hardness (14 days)
- acidity (14 days)
- biological oxygen demand (48 hours)
- nitrate and nitrite (48 hours)
- sulfate (28 days)
- bromide (28 days)
- chloride (28 days)
- fluoride (28 days)
- turbidity (48 hours)

Normally, 125ml HDPE bottles are used for storing filtered or unfiltered, acid-preserved (1ml of 1:1 HNO<sub>3</sub>) samples for total and dissolved metals analyses. However, it is important to note that ferrous iron is preserved with 1:1 HCl, not HNO<sub>3</sub>. The 125ml HDPE bottles are also used for storing unfiltered, acid-preserved (2ml of 10% H<sub>2</sub>SO<sub>4</sub>) water samples for phosphorus and ammonia.

A sterilized 125ml bottle (with blue cap) containing pre-measured sodium thiosulfate preservative is used for bacteriological analyses (fecal coliforms, fecal streptococci, total coliforms, or total plate count). These bottles are prepared and provided by BOL. A separate laboratory sample submission form specifically for bacteriological analyses (1500-FM-LAB0151) must be submitted with any such sample. This form is available at the BOL lab form site.

Water samples collected for total or dissolved organic carbon or volatile organic compound analyses are stored in two 40ml VOA amber glass vials. Additional analyses may require other specialized containers, so it is important to check the BOL site when working with new analyses.

## **COLLECTION METHODS**



Field personnel must ensure that the samples collected will be representative of the aquatic system of interest. A grab sample temporally and spatially represents the part of the surface water system being investigated. The method of sampling and constituents chosen for analysis is critically dependent on the purpose and scope of the survey being conducted. Obtaining representative samples is of primary importance for a relevant description of the aquatic environment. Interference of the sampling process must be minimized; collectors must be alert to conditions that could compromise the integrity of a water sample. The most common causes of sample interference during collection include poor sample-handling and preservation techniques, input from atmospheric sources, and contaminated equipment or reagents. Each sampling site needs to be selected and sampled in a manner that minimizes bias caused by the collection process and that best represents the intended environmental conditions at the time of sampling.

Before handling sample bottles, the collector should ensure his or her hands are clean and not contaminated from sources such as food, coins, fuels, mud, insect repellent, sunscreen, sweat, nicotine, etc. Alternatively, collectors should wear disposable, powderless gloves (such as nitrile).

### Labeling Bottles

While the minimum required information is the collector number and sequential sample number, collectors should add additional information such as date and time collected, general test(s) description (total metals, etc.), “filtered”, and preservation indication. This will help prevent confusing what bottles are for which tests and to help ensure the sample is properly preserved. Labeling should be done so that at least 1” of space is left at the top of the bottle to allow BOL to apply lab labels.

Permanent marker will rub off HDPE bottles during collection and transport. So, clear packing tape is wrapped around the bottle to protect the hand-written labels. Using ball-point and other non-permanent ink pens must be avoided. BOL discourages the use of masking tape. Collectors should keep a log book of all samples they collect, and should not re-use sequential numbers in order to avoid confusion. The sample log should annotate the unique collector identification and sample number, date and time, the water body name, sample location, SAC code, and any additional analytical tests performed or excluded. Additional information on labeling samples can be found on the BOL website.

### Direct Surface Water Sampling of Wadeable, Flowing Water Bodies

The most common type of water sampling is conducted in wadeable, flowing water bodies, where the water sample is collected directly into the sample bottle. This method is not generally used in situations where contact with contaminants is a concern.

The collector should face upstream, taking care to not alter flow patterns or disturb substrate sediments upstream of where he or she will collect the sample. Collection bottles should be inserted into the water column vertically, facing down to avoid inadvertently collecting surface debris/films. In most situations, samples are collected at mid-depth in the approximate *thalweg* (the line defining the points along the length of a stream bed with the greatest depth). The collector should remove the stopper/lid from the sampling container just before sampling, taking care not to contaminate the cap, neck, or the inside of the bottle with his or her fingers, wind-blown particles, or dripping water from precipitation, clothes, body, or overhanging structures. All bottles are rinsed three times instream before filling the bottle. Once the sample is collected and capped, the collector should rinse any large amount of dirt or debris from the outside of the container.

## Field Meters

Field meters provide the ability to collect in-situ data that is not available through grab samples submitted to BOL. Standard field parameters include dissolved oxygen, temperature, specific conductance, pH, and turbidity. While BOL does report pH, it is understood that the pH of a grab sample can and will migrate, and the lab result may not reflect the actual instream pH. Specific conductance is useful in several situations including determining complete mix of a receiving water body in relation to the location a sample collector chooses to collect a particular sample.

The use of a field meter, while not universally required, is highly recommended and will depend on the specific field survey protocol being used. Field meters should be calibrated with standard solutions within 24 hours of sampling and should be checked against standards after each sampling day in order to document any fouling or calibration drift that may have occurred throughout the day. It is also advisable to check against standards throughout the day if the meter reports unusual or unexpected values. Each field meter must have documentation that allows the user to track date and time calibrated/checked; before and after calibration readings for specific parameters with standard solutions; performance of various probes; and comments detailing the maintenance history of probes, certifications, or unique circumstances that could affect meter operation.

## Collecting Unfiltered Samples

For unfiltered samples, the collection bottle is rinsed at least three times with the water to be sampled. The collector removes the lid from the bottle and partially fills the bottle under water. The bottle is then removed, capped above the water, shaken vigorously, uncapped, and inverted. Rinsing waste is discarded behind the collector to ensure no contamination reenters the sample bottle. Unfiltered, inorganic samples will be filled to the neck of the bottle, thus allowing for "head space" as requested by the BOL. Specialized bottles used to collect volatile samples, however, are filled to the top and capped so that no air remains in the bottle. It is imperative that the bottle is filled with water the same way every time to maintain consistency. The proper amount of reagent

is then added; the bottle is recapped and then inverted several times to mix the reagent with the sample.

### Collecting Filtered Samples

Filtered samples must be filtered and fixed immediately after sample collection using a 0.45 micron disposable (single-use, metals free) cartridge filter (AquaPrep 600 Groundwater Filters, VWR: #28145-142 or equivalent). Filters should be kept in their plastic shipping bags during use, with only the inlet and outlet nozzles (which are indicated by a directional flow arrow on the cartridge case) protruding. Filters should be rinsed with at least 500ml of trace-metal free deionized water. Rinsing removes trace contaminants (if any) from the manufacturing process.

For filtered samples, the collector uses a 500ml or 1000ml squeeze-type bottle to collect the sample. Prior to collecting the water, the collector rinses the squeeze bottle three times in the same manner as for an unfiltered sample. Using surgical tubing, the inlet nozzle of the pre-rinsed filter is attached to the squeeze bottle after the sample is collected and approximately 200ml of stream water is squeezed from the bottle through the filter. The bottled labeled for the filtered sample is then placed under the filtered cartridge effluent and is rinsed with the filtered sample three times in the same fashion. As with the unfiltered 125ml sample, the water sample in the bottle is filled to the neck of the bottle. It is imperative that the collector accurately fills water to this line to ensure consistency of dilution of the fixative between samples. If the collector is not consistent in performing this quality assurance step, his or her dissolved constituent concentrations may exceed the equivalent total constituent concentration in the unfiltered sample. The reagent preservative is added and mixed as for unfiltered samples.

For samples requiring a duplicate, such as for TOC or DOC, the collector should use a 125ml glass bottle to dispense and fix the sample, then split the sample into the two 40ml amber vials. Filling and fixing each 40ml vial independently will invariably yield variation between the duplicates. This 125ml glass bottle should be decontaminated before each sample with a small amount of  $H_2SO_4$  followed by rinsing with "ultrapure" water. As long as the lids on the 40ml vials have not been opened, they are not required to be pre-rinsed. The caps, however, usually collect potential contaminants while in storage (i.e., dust), and should be cleaned before opening the vial.

Other bottles are available for purchase as certified metals-free. These bottles should not need pre-rinsing unless the caps have fallen off in transit, or were accidentally dropped during handling.

### Preservation

Without preservation, water sample constituents will continue chemical interactions or otherwise undergo other physical processes, such as metals precipitation. Moreover, laboratory pH measurements are usually higher than field measurements because of carbon dioxide degassing from the matrix. Keeping the water samples at 4°C helps minimize this process and slows other reactions that may occur. Most chemical

preservatives function by decreasing the matrix's pH below 2.0 (or above pH 12 for cyanide - fixed with NaOH), which limits further constituent reaction.

Reusing graduated glass pipettes with a manually-controllable pipette may be necessary at times, but the collector should understand that doing so introduces potential for contamination at several points in the preservation process. The pipette must be carefully guarded against contacting any surface and should be cleaned between uses. The preservative contained in the bulk storage container will likely become contaminated from constant opening and insertion of the pipette.

As noted earlier, most metals are preserved using concentrated HNO<sub>3</sub>. *HNO<sub>3</sub> is highly reactive—even in small amounts—and will cause chemical burns to exposed skin and damage metal and clothing.* This preservative can be purchased in individual 1ml glass ampoules, plastic vials with twist-off caps, or in bulk supply (to be dispensed via graduated pipette). The glass ampoules require breaking the tip; the potential for skin laceration is present, and the collector must invert the ampoule and tap the bottom several times to dispense the preservative. Many collectors prefer the plastic twist-cap vials because the liquid preservative dispenses more readily and the potential for laceration from broken glass is avoided.

### Specific Considerations

In general, collectors should avoid sampling in eddies, pools, side-channels, or in tributary mixing zones unless necessary due to site-specific or other environmental considerations. Collectors must also be aware of potential point-source and non-point sources of water quality influence.

For slow moving streams with easily disturbed sediment, the collector should sample from the stream bank, boat, or bridge using a sampling extension pole. If sampling from a boat, the collector should sample near the bow as the boat moves upstream or faces upwind.

For point source surveys and characterizing other influences, representative water samples are collected from the discharge pipe/influence, from upstream (control), and downstream locations at a minimum. Sampling stations located upstream of the discharge pipe should be in a non-impacted zone to serve as a control. If there are multiple discharges, then sample stations should be placed to bracket individual discharges in order to better characterize each source. For sampling downstream of the discharge pipe, the investigator should avoid the immediate vicinity of the discharge/influence point and select a sample point far enough downstream to allow for mixing between the discharge and stream flow.

To decide where an acceptable downstream sampling point should be located, consider the following. For pollutants controlled by acute concerns, enforcement of numeric criteria is at the point of complete mix, or after 15 minutes of mixing, whichever occurs first. For pollutants controlled by chronic concerns, enforcement of numeric criteria is at the point of complete mix, or after 12 hours of mixing, whichever occurs first. These are

all projections at design conditions (Q7-10 or harmonic mean flow). The actual point of complete-mix depends on the stream size, its width and depth, its flow on that day, the velocity of the plume, the angle at which it enters the stream, and the roughness of the stream bed.

Conductivity measurements may help determine the point of complete mix. If the point of complete mix is unclear or too far downstream for representative sampling, then multiple samples should be collected across a transect. For very large streams and rivers it may be necessary to composite samples collected along a cross channel transect to accurately characterize water quality of the sampled stream segment (PA DEP, 2009).

For stormwater surveys, a minimum of one sample is collected during low or dry weather flow to determine background conditions and from 3 to 5 high flow (storm) events in conjunction with stream flow measurements to characterize pollutant loadings. For storm events it is important to make collections during the first flush and/or while the hydrograph is rising. Analyses should be performed for metals (Fe, Al, Cu, Pb, Zn, Cd, Cr, Hg), oils and grease, pathogens, and for total and dissolved nutrients. Analysis is not limited to the above, and parameters of special concern (e.g. fertilizers, pesticides and other organic chemicals) may be added as necessary (PA DEP, 2009).

If deemed necessary by the investigator, nutrient sampling will occur during the growing season at least once a month from May through October. Sampling should occur during both dry and wet weather in order to adequately characterize loadings. Wet weather samples should be collected during the rising hydrograph. In addition, stream discharge will be measured at least once. Water quality analyses should be conducted for total and dissolved nutrients using SAC 047 (PA DEP, 2009).

For abandoned mine discharges or acid mine discharges, samples should be collected from the point(s) of discharge, if possible. In addition, flow from the discharge(s) should be measured to determine loading rates for TMDL development. Flow and channel cross section are measured in the field according to standard USGS stream gauging techniques (USGS, 2006). Analyses are performed for metals, alkalinity, and acidity using SAC 909 (PA DEP, 2009).

Acid precipitation sampling should occur in late winter/early spring during heavy snowmelt and/or storm events to capture episodic acidification. Sampling should occur during both base flow and peak flow to characterize worst-case conditions and to document the difference between base flow and worst-case conditions. This protocol includes a filtering method for dissolved aluminum that differs from that prescribed for other dissolved metals. Water for the dissolved aluminum analysis is filtered through a 0.1micron filter rather than through the standard 0.45micron filter. The result from this alternate dissolved aluminum analysis correlates well with the occurrence of inorganic monomeric aluminum species, which causes lethal responses in fish. Analyses are performed for metals, alkalinity and acidity using SAC 910 (PA DEP, 2009).

For surface waters used as sources of drinking water, the potable water supply use can be evaluated by collecting samples upstream of the surface water withdrawal at a minimum of one location. However, multiple locations may be necessary to identify potential sources of pollution. Analyses are performed for total nitrites, iron, manganese, chloride, fluoride, sulfate, color, and dissolved solids using SAC 166. Additional microbiological parameters can be added on a site-specific basis (PA DEP, 2009).

### Quality Assurance

For quality assurance purposes, sample blanks containing “ultrapure” water obtained from BOL should be submitted for every 20 samples for each sampling trip/day to determine whether contamination is occurring in any part of the sample collection, handling, or preservation process. A duplicate grab sample should also be collected every 20 samples or for each sampling trip/day to gauge testing variability and potential sources of contamination due to collection procedures. Duplicate samples are collected simultaneously or sequentially with the associated environmental sample, using identical sampling and preservation procedures. Sequentially collected duplicates may measure inhomogeneities present in the water body. Both sample blanks and sample duplicates are assigned unique, sequential sample numbers. The collector needs to carefully annotate which sample is a duplicate or blank. Duplicates and blanks must be documented appropriately in SIS under the ‘Comments/Quality Assurance’ tab.

### Sample Holding Times

Water samples need to be shipped or delivered to the lab as soon as possible. The collector should understand that certain laboratory analyses have “holding times” during which tests must be conducted for result validity. Nitrate concentrations, for example, must be measured within 48 hours of sample collection. If a sample exceeds holding time requirements, the results will not be reported unless a “Request to Analyze Voidable Samples” form (see the BOL website) is submitted to the Bureau of Laboratories. *It is not advisable to collect and ship samples on Fridays*, as the laboratory does not operate on weekends; samples shipped on Friday will not be received and logged until Monday morning. Doing so will guarantee that holding times of 48 hours or less will not be met. Collectors essentially need to plan their water sampling from Monday through Thursday, dropping off samples collected those days by 1600 hours, and verify shipped samples will reach DEP BOL by early Friday morning at the latest. Samples collected for CBOD and BOD analyses have a 48 hour holding time. Holding time begins at the time of sample(s) collection. Initial DO is not performed on CBOD/BOD samples until Wednesday due to the five day incubation period. If samples must be collected on Mondays, collect the samples after 1:00 pm to ensure the test is within holding time.

## Shipping

All DEP district and regional offices are designated pick-up locations for water samples; the samples must be dropped off for pick up by 1600 hours. Other locations exist, such as at some Pennsylvania Department of Transportation facilities and some private businesses, but these drop-off locations may require call-ahead notice to the current courier, as they may not be visited daily. Further, the drop-off locations may require a drop-off specific key to open the drop-off entrance lock.

The collector should vertically insert bottles into a cooler, right-side up. The samples should be cooled with cubed or crushed ice. A sufficient amount of ice should be added to the cooler to ensure samples remain at 4°C during overnight shipping. Laboratory personnel will note whether samples were shipped properly. Improperly shipped samples may be subject to a data release request. Dry ice will freeze water samples and should never be used for storage or shipping. The “Sample Submission Sheet” should be filled out, inserted into a Ziploc bag, and attached to the inside of the cooler lid. Courier shipping labels should be printed out during ordering so they can be attached to the top of the cooler lid during sample drop-off. Shipping labels are secured to the cooler lip with two pieces of packing tape on the left and right side; taping all sides of the label makes removal difficult for lab technicians.

## **SAMPLE INFORMATION SYSTEM (SIS) DOCUMENTATION**

SIS is an Oracle application that sample collectors use to store, manage, and retrieve sample information, including sample results, sample medium, sample collection location, field parameters, quality control identification, general comment information, etc. Sample collectors, at the very least, must have security roles for their program to perform Sample Entry and Querying. Samples submitted to the BOL will have the following information populated in SIS: collector identification number, sample sequence number, sample time and date, and sample results. It is the responsibility of the sample collector to populate, at the minimum, sample medium, sample collection location, field parameters, quality control identification, and general comment information.

SIS can be accessed through the DEP intradep website by selecting ‘Oracle Applications’. DEP maintains several Oracle applications, so users must select ‘SIS - Samples Information System’. Users will be prompted to enter a unique (CWOPA) username and password, in addition to a database identifier. The database identifier is ‘prod’. Samples can be entered into SIS by the sample collector before or after BOL populates sample results. It is important to enter the collector identification number, sample sequence number, and date and time collected correctly. If samples are entered into SIS before BOL populates sample results these attributes will be used to associate sample results. If samples are entered after BOL populates results, the sample collector will need to query in order to find the sample and populate attributes. The following is a truncated step-by-step process outlining how and what to enter for each sample collected. Additional information is available through the ‘Sample Information Users’ Guide’.




### **I. Sample Entry**

- A. Select Samples and Sample Entry from the SIS menu.
- B. Select the Business Unit that the sample was collected for and select 'OK'. If you do not see the correct Business Unit, you may not have the correct security roles. You will need to contact a system coordinator or eFACTS coordinator to complete an SIS Security Request Form.

**II. To enter a sample before BOL populates sample results.**

- A. Select 'Create New Sample'
- B. (Required) Enter the four-digit collector number assigned to the employee, group, or monitoring device that collected the sample. Press the [TAB] key.
- C. (Required) Enter the date the sample was collected (format MM/DD/YYYY). Press the [TAB] key.
- D. Enter the time the sample was collected in military time (ex. enter 1:00 pm as 1300). Press the [TAB] key.
- E. (Required) Enter the sequence number for the sample. Press the [TAB] key.
- F. (Required) The reason defaults to "Routine Sampling". Update the reason, if applicable.

**III. To enter a sample after BOL populates sample results.**

- A. Select the File Menu option at the top of the screen and check the 'view all samples' box.
- B. Click the  button on the toolbar or press the [F7] key.
- C. Enter the four-digit collector Id assigned to the employee or monitoring point that collected the sample or select using the  button. Press the [TAB] key.
- D. Enter the date that the sample was collected. Press the [TAB] key twice (2x).
- E. (Optional) Enter the sequence number assigned to the sample.
- F. Click the  button on the toolbar or press the [F8] key.

Once the sample header information has been entered or the sample has been successfully queried, proceed with Linking the Sample to an Existing Project, Facility, and/or Monitoring Point (IV) or Insert Location Details (V). This document does not characterize creating new projects, facilities, or monitoring points. For more information see 'Sample Information System User's Guide'.



**IV. Linking the Sample to an Existing Project, Facility, and/or Monitoring Point**



A. Click the Project/Facility/Monitoring Pt TAB label.


Project/Facility/Monitoring Pt	Name & Address	Sampling Conditions
Location	Comments/Quality Assurance	Field Tests
Project Unit <input type="text"/>	<input type="text"/>	
Project ID <input type="text"/>	<input type="text"/>	
Primary Facility <input type="text"/>	<input type="text"/>	
Sub-Facility <input type="text"/>	<input type="text"/>	
Monitoring Point ID# <input type="text"/>	<input type="text"/>	
Monitoring Point Alias <input type="text"/>	<input type="text"/>	

B. If the sample was collected for an existing project, complete the following steps:

1. Enter the code identifying the project's business unit or select using the  button. Press the [TAB] key.
2. Enter the identification number assigned to the project or select using the  button.

C. If the sample was collected to monitor an existing primary facility and/or sub facility, complete the following steps:

1. Click in the *Primary Facility* field.
2. Enter the program-specific identification number assigned to a primary facility. Press the [TAB] key.
  - i. OG – API Well Number (Permit Number)
  - ii. Mining – Permit Number
  - iii. RPX – Registration Number
  - iv. RPNARM – License Number
  - v. WPC – NPDES Id
  - vi. AQ –Tax Id-Plant Code
  - vii. WM – Permit Number
  - viii. WRWOB –WOBS File Id
  - ix. LR – LRP Id
  - x. STSTS – Facility Id
  - xi. SDW –Public Water Supply Id
  - xii. WRDS –DAMINV Dam Id

OR
3. Select the primary facility by clicking the  button, entering the name or program to limit the list, clicking the ACCEPT button, highlighting the

primary facility on the list, and clicking the OK button. Press the [TAB] key.

4. Select a sub facility by clicking the  button.

D. If the sample was collected at a particular monitoring point, complete the following steps:


1. Click in the *Monitoring Point Id#* field.

2. Enter the identification number assigned to the monitoring point. Press the [TAB] key.

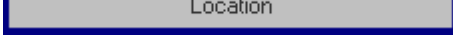
OR







i. Click in the *Monitoring Point Alias* field and enter the alias assigned to the monitoring point. Press the [TAB] key.

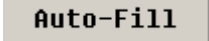
OR

ii. Click the  button to the right of either Monitoring Point field, enter the latitude and longitude to limit the list, click the ACCEPT button, highlight the monitoring point on the list, and click the OK button.

V. **Insert Location Details.** This section is used to identify the location at which the sample was collected. The latitude, longitude and datum are required in order to link and NHD record to the sample. If a sample is linked to a monitoring point on the Project/Facility/Monitoring Pt TAB, the locational information for the monitoring point will “automatically” display.






A. Click the  TAB label.

Project/Facility/Monitoring Pt	Name & Address	Sampling Conditions
<u>Location</u>	Comments/Quality Assurance	Field Tests
State 	<input type="text"/>	<input type="button" value="Auto-Fill"/>
County 	<input type="text"/>	
Municipality 	<input type="text"/>	
Quadrangle 	<input type="text"/>	
Latitude <input type="text"/>	UTM Zone <input type="checkbox"/>	Northing <input type="text"/>
Longitude <input type="text"/>		Easting <input type="text"/>
Datum 	<input type="text"/>	
Location Method 	<input type="text"/>	
Location <input type="text"/>		
<input type="button" value="GET / VIEW NHD DATA"/>		

B. Click the  button (The county and municipality will display based on the linked primary facility, sub facility, or monitoring point). If the county and municipality does not display, complete Steps c through e; otherwise, proceed to Step f.

C. The state defaults to “PA”. Update if necessary. Press the [TAB] key.

D. Select the county.

1. Enter the code identifying the county in which the sample was collected. Press the [TAB] key 2 times.  
OR
  2. Press the [TAB] key and enter the name of the county. Press the [TAB] key.  
OR
  3. Select by using the  button. Press the [TAB] key.
- E. Select the municipality.
1. Enter the code identifying the municipality in which the sample was collected. Press the [TAB] key 2 times.  
OR
  2. Press the [TAB] key and enter the name of the municipality. Press the [TAB] key.  
OR
  3. Select by using the  button. Press the [TAB] key.
- F. Select the quadrangle.
1. Enter the code identifying the quadrangle at the point where the sample was collected. Press the [TAB] key twice.  
OR
  2. Press the [TAB] key and enter the quadrangle name. Press the [TAB] key.  
OR
  3. Select by using the  button. Press the [TAB] key.
- G. (Required to insert NHD) Enter the latitude where the sample was taken (format Degree-Minutes-Seconds). Press the [TAB] key.
- H. (Required to insert NHD) Enter the longitude where the sample was taken (format Degree-Minutes-Seconds). Press the [TAB] key 4 times.
- I. (Required to insert NHD) Enter 'NAD 83' as the horizontal reference datum used to calculate the point at which the sample was collected or select by using the  button. Press the [TAB] key.
- J. Enter the method used to identify the point at which the sample was collected or select by using the  button. Press the [TAB] key.
- K. Enter a description of the location at which the sample was collected.

**VI. Creating a New NHD Record and Linking to the Sample.** If the sample is associated with a monitoring point, the NHD record for the monitoring point will “automatically” display for the sample and cannot be updated. Therefore, this procedure cannot be completed. This section identifies the steps for inserting a new NHD record for a sample.

- A. Click the **GET / VIEW NHD DATA** button at the bottom of the Locations TAB. The NHD Pop-Up Window will display.

- B.   
 C. Click the **Launch NHD Locator** button at the bottom of the screen.

Map	Snap Point	County	Minor Civil Division	Hydrologic Unit Code	Stream Name	NHD Reach	NHD Measure	Stream Side
Delete	1	Northampton	UPPER MT BETHEL	02040105	Delaware River	02040105000218	50.768	

- D. Use the NHD Locator Tool to either accept the default snapped point or create a user-defined, new snapped point to accept. Reference the NHD Locator Tool User Guide for the steps.
- E. Click the **ACCEPT SNAPPED POINT(S)** button and then click the **OK** button to exit the NHD Locator Tool and return to the **SAMPLE ENTRY** Screen.
- F. Click the **Get NHD Data** button to add the NHD record created via the NHD Locator Tool to the sample.
- G. Click the **Close** button to return to the Locations TAB.
- VII. Inserting Field Tests.** This section is used to identify the types of tests conducted in the field on the sample.

A. Click the **Field Tests** TAB.

Project/Facility/Monitoring Pt	Name & Address	Sampling Conditions
Location	Comments/Quality Assurance	<b>Field Tests</b>
Field Test Description	Result Amount	Units
pH By Color	<input type="text"/>	pH units <input type="button" value="v"/>
pH By Meter	<input type="text"/>	pH units <input type="button" value="v"/>
Temperature	<input type="text"/>	C <input type="button" value="v"/>
Dissolved Oxygen	<input type="text"/>	MG/L <input type="button" value="v"/>
Specific Conductance	<input type="text"/>	umhos/cm <input type="button" value="v"/>
Iron By Color	<input type="text"/>	MG/L <input type="button" value="v"/>
Manganese By Color	<input type="text"/>	MG/L <input type="button" value="v"/>
	<input type="text"/>	<input type="button" value="v"/>
	<input type="text"/>	<input type="button" value="v"/>

B. Use the scrollbar to locate the field test for which you have results.

1. The list of field test will vary based on Business Unit.

C. Click in the *Result Amount* field.

D. Enter the amount for the test. Press the [TAB] key.

E. Update the unit of measurement if necessary.

F. Repeat Steps B through E until all applicable field tests are entered.

**VIII. Inserting Sample Conditions.** This section is used to enter the conditions under which the sample was collected.

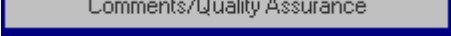
A. Click the **Sampling Conditions** TAB.

Project/Facility/Monitoring Pt	Name & Address	Sampling Conditions
Location	Comments/Quality Assurance	<b>Field Tests</b>
Medium Type <input type="button" value="v"/>	<input type="text"/>	
Medium <input type="button" value="v"/>	<input type="text"/>	
Initial Flow <input type="text"/>	Final Flow <input type="text"/>	Units <input type="button" value="v"/>
		Determination <input type="button" value="v"/>
Stream Condition <input type="button" value="v"/>	<input type="text"/>	
Depth To Water <input type="text"/>	Units <input type="button" value="v"/>	Determination <input type="button" value="v"/>
		<input type="checkbox"/> Well Purged



B. (Required) Enter the code that identifies the type (category) of sample medium (soil, water, air, plants, etc.) or select by using the  button. Press the [TAB] key.

C. (Required) Enter the code that identifies the sample medium or select by using the  button. Press the [TAB] key. \*Water samples collected from a stream or lake must have a sample medium of 'Surface Water'.

**IX. Inserting Comment/Quality Assurance Details.** This section is used to enter the comments and quality assurance details regarding the sample

A. Click the  TAB.

Project/Facility/Monitoring Pt	Name & Address	Sampling Conditions
Location	<b>Comments/Quality Assurance</b>	Field Tests
<b>Appearance</b> <input type="text"/>		
<b>Comment</b> <input type="text"/>		
<b>Quality Assurance Type</b> <input type="text"/>	<b>Duplicate of Sample</b> (Collector, Seq#, Date & Time) <input type="text"/>	
<b>Confidentiality Reason</b> <input type="text"/>	<input type="text"/>	<b>Void Sample</b> <input type="checkbox"/> <b>Dry Sample</b> <input type="checkbox"/>

- B. Enter a description of the sample's appearance. Press the [TAB] key.
- C. Enter any additional information regarding the sample. Press the [TAB] key.
- D. Enter the quality assurance type (duplicate, blank, or spike).
- E. If a duplicate, click the  button, enter the Id of the collector for the duplicate sample, enter the date the duplicate was collected, and click the ACCEPT button.
- F. Select the confidentiality reason (private water supply or legal enforcement action).
- G. If the sample is to be voided due to quality assurance reasons, click in the *Voided Sample* checkbox until a checkmark displays.
- H. If the sample is to be dry, click in the *Dry Sample* checkbox until a checkmark displays.
- I. Click the  button on the toolbar or press the [F10] key.

## REFERENCES

Pennsylvania Department of Environmental Protection. 2009. Instream Comprehensive Evaluation Surveys. Harrisburg, PA. URL:  
<[http://files.dep.state.pa.us/Water/Drinking%20Water%20and%20Facility%20Regulation/WaterQualityPortalFiles/Methodology/ice\\_2009am.pdf](http://files.dep.state.pa.us/Water/Drinking%20Water%20and%20Facility%20Regulation/WaterQualityPortalFiles/Methodology/ice_2009am.pdf)>

United States Geological Survey. 2006. National Field Manual for the Collection of Water Quality Data. U.S. Geological Survey, Water Resources Office of Water Quality. Chapter 4.1 - Surface Water Sampling: Collection methods at flowing-water and still-water sites. URL:  
<[http://water.usgs.gov/owq/FieldManual/chapter4/html/Ch4\\_contents.html](http://water.usgs.gov/owq/FieldManual/chapter4/html/Ch4_contents.html)>

## SAMPLING GEAR CHECKLIST

### SAMPLE CONTAINERS

- 500 ml sample bottles - inorganic, total metals, cyanides, phenolics, other
- 125 ml sample bottles - dissolved metals
- 1000 ml amber glass bottles - organics: semi-volatiles, pesticides, PCBs
- 40 ml glass vials - organics: VOAs
- 125 ml bac-t' (blue top) - bacteriological analysis (coliform & strep)
- other: \_\_\_\_\_

### FIXATIVES

- HNO<sub>3</sub>
- H<sub>2</sub>SO<sub>4</sub>
- other: NaOH, HCl

### FIELD METERS & RELATED SUPPLIES

- dissolved oxygen meter
  - replacement membrane kits
  - DO probe solution
  - zero % calibrating solution (if applicable)
- pH meter
  - buffers (pH 4, 7, 10)
  - KCl probe solution
- conductivity meter
  - calibrating solution (if applicable)
- thermometer
- meter field manuals (if applicable)

### OTHER

- Gelman .45µm groundwater filters
- Alkalinity test kit
- DI water (lab tested)
- soda water
- pipetter & pipettes
- buckets & rope (applicable length for bridge sampling)
- rinse squirt bottle
- eyewash bottle

### CHLORINE DEMAND

- chlorine meter & 10 ml vials
- reagents

- timer
- 2 - 1000 ml flasks & stoppers
- 2 - 500 ml flasks & stoppers
- pipetter & pipettes
- fresh bleach or pre-mixed dosing solution (& brown bottle)
- field instructions
- chlorine demand-free DI water

### FLOW

- flow meter
- rods (for anchoring tape bank-to-bank)
- tape measure
- wading rod

### FORMS

- laboratory water chem. sheets
- bac-t' forms
- physical data field forms
- flow field form
- habitat assessment forms
- chlorine demand forms
- other: \_\_\_\_\_

### SHIPPING

- courier shipping forms
- tape & dispenser
- shipping coolers
- ice

### MISC.

- hip boots
- maps
- GPS
- waders
- gloves
- markers, pens, & pencils
- calculator
- insect repellent
- screwdriver/tools
- batteries (D-cell, other: \_\_\_\_\_)
- other: \_\_\_\_\_